Alaska Division of Geological & Geophysical Surveys

PRELIMINARY INTERPRETIVE REPORT 2017-2

GEOLOGIC MAP OF THE CASTLE MOUNTAIN–CARIBOU FAULT SYSTEM, TALKEETNA MOUNTAINS, ALASKA

by

William A. Fuchs, Ph.D.

2019

Released by

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
Division of Geological & Geophysical Surveys

3354 College Road, Fairbanks, Alaska 99709-3707
Phone: (907) 451-5010, Fax (907) 451-5050
dggspubs@alaska.gov
dggs.alaska.gov

$19.00

STATE OF ALASKA
Michael J. Dunleavy, Governor

DEPARTMENT OF NATURAL RESOURCES
Corri A. Feige, Commissioner

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
Steve Masterman, State Geologist and Director

Publications produced by the Division of Geological & Geophysical Surveys (DGGS) are available for free download from the DGGS website (dggs.alaska.gov). Publications on hard-copy or digital media can be examined or purchased in the Fairbanks office:

Alaska Division of Geological & Geophysical Surveys
3354 College Rd., Fairbanks, Alaska 99709-3707
Phone: (907) 451-5010 Fax (907) 451-5050
dggspubs@alaska.gov | dggs.alaska.gov

DGGS publications are also available at:
Alaska State Library,
Historical Collections & Talking Book Center
395 Whittier Street
Juneau, Alaska 99811

Alaska Resource Library and Information Services (ARLIS)
3150 C Street, Suite 100
Anchorage, Alaska 99503

Suggested citation:
Fuchs, W.A., 2017, Geologic map of the Castle Mountain-Caribou fault system, Talkeetna Mountains, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2017-2, 57 p., 2 sheets, scale 1:24,000.
http://doi.org/10.14509/29715

CONTENTS

SHEETS

Cover photo: Castle Mountain Splay Fault located at the prominent drainage divide north of Puddingstone Hill, and viewed looking easterly.

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

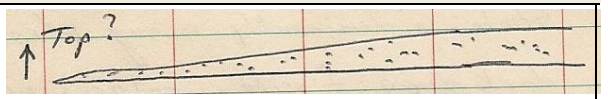
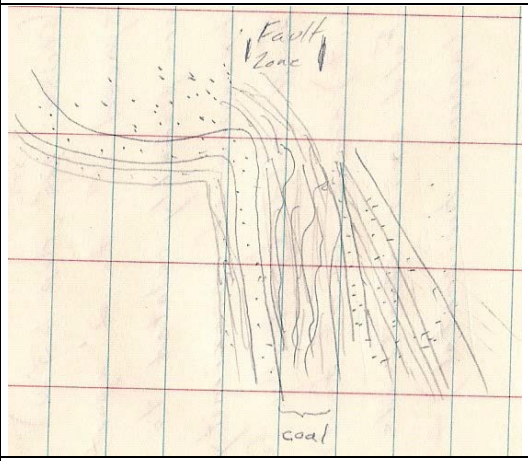
Introduction

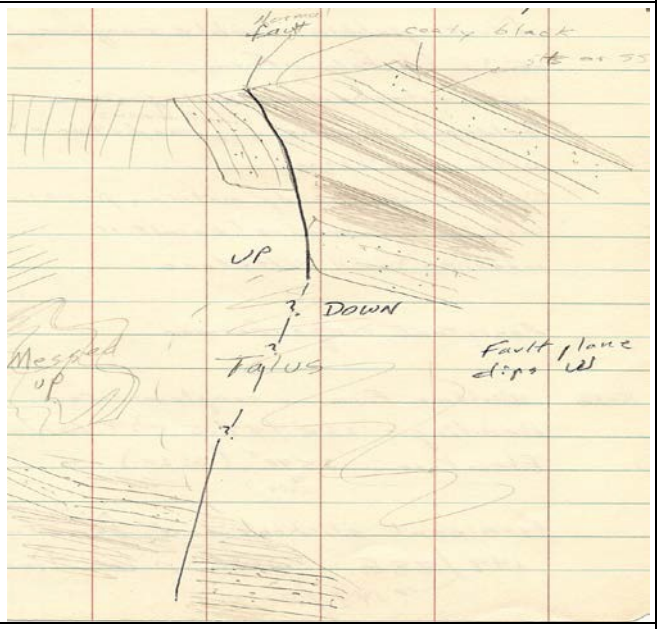
The Castle Mountain fault extends along the southern Talkeetna Mountains range front in south-central Alaska. This publication presents geologic mapping, field notes, and whole-rock major-oxide geochemical analyses of intrusive rocks from an area slightly west of Kings River to considerably east of Boulder Creek, a distance of 39 km and total map area of 264 square km. The map represents a newly compiled and digitized version of the 1980 Ph.D. dissertation map of William A. Fuchs (University of Utah). This 1:24,000 scale map built upon a previous 1:63,360 scale map by Detterman, R.L., et al., 1976 (Misc. Field Studies Map MF-738). The Fuchs map represents three field seasons of on-the-ground mapping. The author always assumed through the years that other maps would build upon, and perhaps, supplant his work, but no other comprehensive geologic maps of similar scale have appeared in the intervening years, hence, the publication of this "historic" map.

The field notes key to station localities shown on the map, and eastings and northings are UTM NAD27 CONUS. They contain stratigraphic, paleontologic, paleomagnetic, geochemical, petrologic, and structural information, much of which did not make it into the dissertation. The U.S. Geological Survey – Alaskan Branch gave initial material support, and three oil companies, Amoco Production Co., Atlantic Richfield Co., and Union Oil Company of California, funded and supported the original project. This area of the Castle Mountain fault has been of interest to oil and coal exploration, and tectonic studies. Because of the proximity to Anchorage and the active nature of the fault, the map area is of particular relevance to earthquake studies. The geochemistry samples were donated to the Geologic Material Center of the Alaska DGGS. The Fuchs dissertation, entitled *Tertiary Tectonic History of the Castle Mountain - Caribou Fault System, Talkeetna Mountains, Alaska*, is available on the Alaska DGGS website.

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

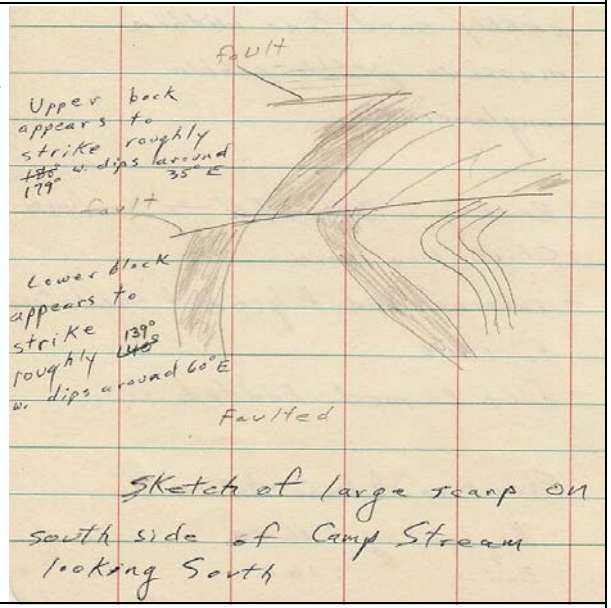
by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-1 through K-82 completed during summer 1977 along Kings River						
K-1		South side of camp stream	6	416650	6857463	 Nearest outcrop to camp on south side of camp stream. Chickaloon Formation. Bedding 038°/53°S, 037°/53°S; 25-foot-high exposure in stream cut. Interlayered shale, siltstone, and sandstone. Shale predominantly along stream, dark gray, fissile, weathers orange, concretions (6 inch average), abundant carbonaceous material and plant fossil fragments. Siltstone is dark gray, weathers dark grayish brown, fine to coarse, micaceous and "dirty", abundant carbonaceous material and plant fossils (predominantly ferns and leaves), some concretions (6 inch average), finely bedded. Sandstone is dark gray, weathers orangeish brown, fine grained, micaceous (muscovite) and "dirty", moderate carbonaceous material, slightly calcareous, normally in 6 inch beds that pinch out, beds flat on bottom.
K-2		North side of camp stream	6	416593	6857473	 Nearest outcrop to camp on north side of camp stream. Large stream-cut exposure (30 feet high). Bedding 018°/51°S (east of fault). Large fault zone (20 feet wide) in coal beds (bituminous) of Chickaloon Formation. Highly contorted bedding with slickensides in coaly beds. Slickensides indicate west side down. Fault was obviously preferentially located in coal. Fault surface is vertical and strikes 350°. Rocks on east side of fault are siltstone as described at K-1 with coarser, more massive interbedded siltstone (turbidite?). Prominent fractures (east of fault) (strike 319° dip 53°W) spaced 1 inch to 2 feet apart are probably related to faulting because of proximity. Small fold (partially faulted out) occurs west of fault; fold axis trends 020° (approximately horizontal) – drag fold??
K-3	S-1		6	416748	6857534	Elevation 1,770 feet Andesitic flow or sill? **Sample S-1**—fine grained, aligned feldspar laths, hornblende and magnetite. Trends roughly 020°; 100–150 feet thick; east of this a unit of Chickaloon siltstone 50–80 feet thick, and east of this you go back into andesite flow.
K-4		Near curve in road just above camp	6	416609	6857408	Chickaloon Formation. Massive, pinching-out (3–6 feet thick) siltstone enclosed in high carbonaceous to coaly shale. Structure broad, open fold, fold axis roughly 084°/37° plunge. Bedding (near crest) 159°/37°N.
K-5			6	417123	6858166	Talkeetna Formation north of Castle Mountain fault; fine-grained green volcanic (basalt or andesite), serpentine veinlets and slickensides; weathered surface and lichens make it difficult to see rock except by breaking; does not fizz with HCl. Slickensides: 108°/77°N; 099°/64°N; 088°/55°N; 096°/62°N; 068°/62°N; 085°/73°N; 078°/60°N; 102°/59°N (pitch lineation 50°, north block up, acute angle west); 099°/25°N (pitch lineation 35°); 274°/78°N; 92°/23°N (pitch lineation 55°W, north block up).
K-6			6	417124	6858243	Talkeetna Formation; control point
K-10		South side of camp stream	6	416926	6857498	Elevation: 1,750 feet Chickaloon Formation. Bedding 179°/58°E. Siltstone, medium to coarse silt, dark to medium gray, medium bedding to massive, tops not observed, slightly calcareous (calcite secondary?), calcite veins, "dirty." Structure moderately fractured, prominent fracture surface. Two readings: 266°/80°S; 083°/78°S; gentle warping.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-10, cont.		East of K-10				Elevation: 1,910 feet Sketch looking northeast of large scarp on north side of camp stream. 
K-11			6	417129	6857385	Elevation: 2,120 feet Bedding 183°/57°E; first pebble–cobble conglomerate in Chickaloon Formation; with interbedded medium-grained felds-pathic, “dirty”, calcareous sandstone with shale(?) chips. Conglomerate: sandy matrix, pebbles include volcanics (balsalt or andesite) and siltstone. Resistant ridge former.
K-12			6	417524	6857491	Elevation: 2,600 feet Wishbone Formation, conglomerate. Bedding 151°/47°E. Prominent slickensided fracture; 147°/88°E, 20°E pitch from east.
K-14			6	417467	6856968	Elevation: 3,120 feet Bedding 277°/15°N; Wishbone Formation; bedding in fine-grained, pebbly sandstone within massive pebble-cobble conglomerate.
K-15			6	416974	6856864	Bedding 300°/44°N; Chickaloon Formation; interbedded, fine-grained sandstone to shale; fine to medium bedded. Elevation of base station: beginning, 1,640 feet; end, 1,620 feet. Revisited 6/27/77. Elevation: 1,980 feet. Bedding (just north of previous K-15 bedding measurement, across small fault) 035°/49°E; small fault trends 252° based on stream valley alone. Bedding along road a little south of K-15: 010°/45°E, 080°/48°S (in Chickaloon siltstone and sandstone).

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-16			6	417365	6857929	Elevation: 2,830 feet Bedding 210°/78°W; overturned to the east based on cross-bedding; Chickaloon pebble-cobble conglomerate with medium-grained, cross-bedded sandstone lenses. 
K-17			6	417489	6858053	Elevation: 3,050 feet Bedding 202°/82°E. Right-side-up according to cross beds. Cross-bedded sandstone in pebble–cobble conglomerate (Wish-bone); cut by basalt dike 5 feet in width trending 264°.
K-18			6	417398	6858168	Elevation: 3,150 feet Bedding varies: 071°/84°E to 071°/78°E (nearer fault). Sandstone in pebble–cobble conglomerate; tops not observed; right next to Castle Mountain fault.
K-19			6	417384	6858131	Prominent slickensided fracture 011°/72°E; prominent slickensided fracture 076°/vertical; right next to Castle Mountain fault.
K-20	S-2: S-2a S-2b		6	417765	6858186	Elevation: 3,365 feet Bedding 045°/86°W probably overturned to the east on regional considerations; Wishbone Formation. **Sample S-2**: **S-2a** Sandstone and **S-2b** Conglomerate.
K-22			6	417203	6858656	Elevation: 3,025 feet Marble (Talkeetna Formation). Bedding 87°/60°N; abundant fracturing.
K-23			6	417293	6858510	Elevation: 3,290 feet Talkeetna Formation
K-24			6	417333	6858580	Elevation: 3,285 feet Intersection of two faults: 1. N90°E/60°N (both on plane itself and on larger scale) separates marble from Talkeetna volcanics, 1 foot indurated, sheared volcanics on fault contact; foreign Talkeetna fragments in zone; no well-defined shearing in marble. 2. 345° (approximate) fault cut by fault 1. Fault inferred from offset; no well-displayed contact seen.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-25			6	417382	6858571	Elevation: 3,500 feet Fault contact of same fault as fault 1 at K-24. 3-foot gouge zone in marble; 3-foot pyritic altered zone in volcanics. Fold axis measurements of small folds in gouge (bearing/plunge): 118°/60°; 145°/63°; 145°/61°; 135°/65°; 145°/43°; 350°/82°. Author believes it can be assumed that the fold axis measurements are perpendicular to the movement direction; fault plane at this point roughly strikes 090° and dip 75°S; bedding in marble just north of fault, 035°/17°E. Fold axis just east of previous readings. Intersection near another fault: 134°/54°; 133°/31°; 121°/25°; 149°/51°; 99°/67°. Fault continues east at a bearing of 104°; bearing of small fault north of this location, 134°.
K-26			6	417226	6855110	Elevation: 2,190 feet Folded, black, carbonaceous, fissile shale with up to 10 inches of limonitic concretions; strike and dip readings: 342°/24°E; 97°/15°N; 82°/46°S. Chickaloon; outcrop in recent slide cut along road.
K-27			6	417183	6855000	Elevation: 2,120 feet Good bedding in Chickaloon; dark shale 120°/35°N. Bedding just to the south along road 096°/53°N. Section measurement Location 5
K-28			6	417184	6854944	Elevation: 2,110 feet Strike and dip 274˚/48˚N; Chickaloon sandstone; bedding 090°/46°N Elevation: 2,030 feet; section measurement Location 4
K-29	SC-1 SC-2 SC-3 SC-4		6	417085	6854800	Elevation: 2,030 feet 6/27/77 Chickaloon siltstone. Bedding 105°/52°N. Revisited 7/3/77 Elevation: 2,020 feet Section starts (Location 1) south from K-29 along road; Section represents Chickaloon Formation. ——————— **LOCATION 1 (measured from bottom to top; true widths)** Unit 1 (3.0 feet) Siltstone; very fine grained (almost shale), grading upward into coarse siltstone; rust brown (weathered color); micaceous, limonitic, with carbonaceous material, plant fossils (ferns); fizzes very slightly with HCl; fine bedding (<1 inch) becomes more medium and less distinct upward. **Sample SC-1**. Unit 2 (0.9 feet) Underclay, light gray, some whitish, dusty weathering; soft, clayey texture upon rubbing with thumb; abundant carbonaceous plant fragments; gradational lower contact; occasional mica flakes; does not fizz with HCl. **Sample SC-2.** Unit 3 (6.0 feet) Bituminous coal, good quality, jet black, vitreous to dull luster, limonitic in places with occasional limonite concretions up to 8 inches diameter, slight yellowish weathering in places (sulfur?); abundant plant fossil remnants; fairly sharp lower contact. **Sample SC-3** 107°/31°N, traverse 240° Unit 4 (1.0 foot) Siltstone, medium to coarse as in upper Unit 1; limonitic concretions, sharp lower contact, only 1 foot thickness observed, then overburden. Unit 5 (40 feet graphically) Covered; predominantly siltstone float. Traverse from top of Unit 4 to bottom of Unit 6, 50 feet bearing 073°, 57 feet bearing 034°. **LOCATION 2** — Elevation: 2,030 feet (10 feet above Location 1); K-29, 105°/52°N Unit 6 (18 feet) Interlayered sandstone, fine-grained, and siltstone, medium to coarse grained; sandstone more abundant; mineralogically the two are identical, light brown, weathers yellowish to orange brown, micaceous, moderate carbonaceous material, abundant black opaques (magnetite?); fizzes very slightly with HCl; bedding varies from distinct (<0.1 to 5 inches) to indistinct, no upper or lower contacts observed, overburden on both sides, moderately resistant unit. **Sample SC-4.** Traverse 195° perpendicular to strike. Unit 7 (33 feet graphically) Covered; traverse 016°, 50 feet. Unit 8 (27 feet graphically) Covered; predominantly siltstone float with some coaly layers. Traverse 331°, 42 feet.

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION	
						All measured from bottom to top (true width)	**LOCATION 3** — Elevation: 2,040 feet (10 feet above location 2) 113°/43°N Unit 9 (4.0 feet) Sandstone, medium-grained, similar to that in Unit 6, hint of cross-bedding, probably a channel deposit, orange-brown, weathers orange (limonitic), carbonaceous, calcareous, abundant black opaques; no lower contact observed, mostly massive, resistant unit. Unit 10 (7.5 feet) Siltstone (similar to that in Unit 6), grades continuously upward into a carbonaceous underclay, gradational lower contact; clay is light gray and has a rounded globular or bally weathering behavior. Unit 11 (2 inches) Silty bituminous coal, dull to vitreous luster, jet black, sharp lower contact, not consistent in thickness laterally; evidence of some shearing movement along this unit; laminated. Unit 12 (2.0 feet) Siltstone, light gray, weathers orange brown, indurated and somewhat massive, probably due to cementing; fizzes only slightly with HCl; lower contact sharp, no upper contact observed. Traverse from top of Unit 12 to bottom of Unit 14. 50 feet, 009°; 50 feet, 016°; 50 feet, 010°; 50 feet, 028°; 50 feet, 026°; 50 feet, 067°; 50 feet, 086°; 50 feet, 095°; 50 feet, 102°; 50 feet, 098°; 65 feet, 091° Unit 13 (277 feet ± 30 feet) Covered.
	SC-5 SC-6						**LOCATION 4** — At K-28 – Elevation: 2,110 feet (70 feet above location 3) 274°/48°N Unit 14 (8.0 feet) Traverse 065°; strike and dip 274°/48°N; siltstone, fine-grained, brown, weathers tan, micaceous, carbonaceous (plant fossils), somewhat limonitic in places; well bedded (0.1 to 2 inches average), lower contact not observed; does not fizz with HCl. **Sample SC-5** Unit 15 (3.0 feet) Poorly exposed. Black carbonaceous shale grading into bituminous coal, more coal than shale, but actual transition boundary not observed; coal dull to vitreous jet black, laminated. **Sample SC-6**; lower contact fairly distinct, upper contact taken from float, appears that next unit up is a siltstone. Unit 16 (83 feet) Covered; traverse from top of unit 15 to bottom of unit 17. 50 feet, 077°; 67 feet, 015°

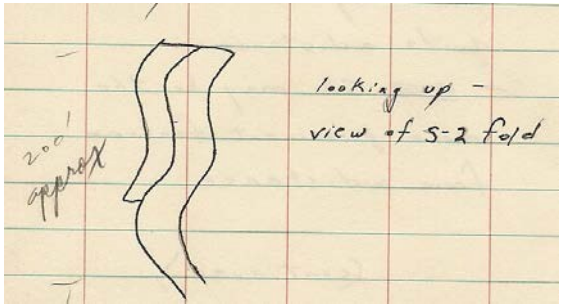
NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION	
	SC-7 SC-8 SC-9 SC-10 SC-11 SC-12 SC-13 SC-14 SC-15 SC-16					**All measured from bottom to top (true width)**	**LOCATION 5** — At K-27 – Elevation: 2,140 feet (30 feet above location 4) 096°/48°N Unit 17 (5.6 feet) Sandstone, medium-grained, orange-brown to orange, highly limonitic, channel deposit (?), calcareous, abundant black opaques (shale?, organic material?); 1 inch bedding, lower contact not observed. Unit 18 (7.0 feet) Shale, finely bedded, weathers variegated orange, maroon, and dark maroon, grades upward into alternating (1 to 6 inch) sequence of fine-grained sandstone (micaceous, organic or shale? rich) and siltstone (same mineralogically) or shale, well bedded sequence, fissile in certain layers, lower contact distinct, but not sharp, non-calcareous or only slightly calcareous. **Sample SC-7** (sandstone and siltstone or shale). Unit 19 (14 feet minimum) Sandstone, medium-grained, fairly massive, similar to unit 17; lower contact distinct but not sharp, *cross bedding indicates section is right-side-up, occasional highly fossiliferous layers (plant fragments). **Sample SC-8.** Small fault cuts unit. Fault is nearly vertical, strikes 201° (average 210°, 200°, 193° on different fault surfaces); distinct drag fold on block west of fault indicates west block is down. Strike and dip east of fault, 097°/56°N; west of fault, 091°/42°N. From the little change in strike and dip, I infer that most of the motion was vertical, although slickensides indicate some horizontal component; fault zone is 1 foot wide, amount of displacement unknown. Unit 20 (8.6 feet; above fault) Interbedded siltstone and sandstone similar to upper part of unit 18. **Sample SC-9**. Unit 21 (1 foot) Underclay, light gray, similar to unit 2. **Sample SC-10** Unit 22 (1 inch) Shaly coal, black. Unit 23 (3 inches) Limonitically cemented (indurated), very-fine-grained siltstone, moderate carbonaceous material, orange, laterally discontinuous, probably concretionary lenses. **Sample SC-11**. Unit 24 (8.2 feet) Coaly, shale, black, laminated, occasional limonitic concretionary lenses, occasional underclay; several layers of pure bituminous coal up to ½ inch thick. **Sample SC-12** (taken from bottom of unit). Unit 25 (16 inches) Bituminous coal, jet black, vitreous luster, laminated except top 2½ inches, which is massive. **Sample SC-13**. Unit 26 (1.7 feet) Shale, dark gray, occasional limonitic concretionary lenses, fissile. **Sample SC-14**. Unit 27 (4–10 inches; varies) Bituminous coal, jet black, vitreous luster, lower one-third laminated, upper two-thirds massive. **Sample SC-15**. Unit 28 (0.8 feet) Coaly shale, dark gray laminated. Unit 29 (5.0 feet) Strike and dip 089°/46°N. Bituminous coal, jet black, dull to vitreous luster, *possibly economic unit, fairly pure except for two ½ inch black mudstone layers within unit; more massive in character at bottom, more laminated at top. **Sample SC-16**. General Description above unit 29 (33 feet) Poorly exposed, but measurable with some digging (I stopped section at unit 29). Sequence of underclays, siltstones, concretionary layers, and several bituminous coal layers of the following approximate thicknesses: 8 inches, 20 inches, 12 inches. Total stratigraphic thickness of exposed sequence above unit 29 is 33 feet.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-30			6	416950	6857543	Elevation: 1,840 feet Prominent fracture in Chickaloon siltstone, 117°/49°S. Bedding (downslope 75 feet) 015°/83°E.
K-31			6	417052	6857539	Elevation: 1,865 feet Bedding in Chickaloon sandstone 017°/53°E.
K-32			6	417104	6857599	Elevation: 2,000 feet In large scar north of camp stream. Bedding in Chickaloon sandstone 330°/43°E.
K-33	S-3		6	417209	6857681	Elevation: 2,330 feet Pebble-cobble conglomerate; Chickaloon Formation; correlates with that found at K-11. *resistant ridge-forming, mappable unit (90 feet actual thickness; 100 feet thick in outcrop). Most cobbles no larger than the size of a fist; trend by projection across camp stream, 192°. *distinctive, uncommon, but not rare siliceous, fine-grained, turquoise-green, probably cupriferous pebbles (**Sample S-3**) may help in differentiating this unit from Wishbone Formation. (Non-calcareous) bedding in interbedded "dirty", micaceous, hornblende-rich(?), non-calcareous sandstone, 182°/57°E; other pebbles include white and black chert, silicified volcanics and/or intrusive, silicified siltstone(?).
K-34	S-4		6	417355	6857791	Elevation: 2,530 feet Bedding in competent, very micaceous sandstone. **Sample S-4**: 029°/57°E. Wishbone Formation contact on ridge just east of K-34.
K-35	S-5		6	417439	6858852	Elevation: 3,510 feet **Sample S-5**: Good sample of diorite, medium-grain, quartz <10%, fairly large phenocrysts, feldspar is slightly milky; hornblende going to chlorite; color index 40%; prominent fracture 50 feet east along slope from K-35 is 110°/75°N
K-36			6	417660	6858581	Elevation (in question): 4,110 feet Talkeetna Formation; andesite(?) flow, highly fractured.
K-37	S-6		6	418015	6858714	Elevation: 4,530 feet Well-bedded (fine to medium) limestone with beautiful small fold; no tops observed, no fossils observed. 75 feet to the north of K-37 syncline the measured fold axis is 105°. Bedding readings going in counter-clockwise circle from south to north: 277°/35°N; 272°/23°N; 042°/07°N; 312°/26°S; 290°/45°S; 276°/20°S; 095°/50°S; 106°/46°S; 113°/18°N. Outcrop is 50–70 feet in diameter. **Sample S-6**. Prominent fracture, 311°/80°S; 344°/73°E (average). Limestone highly fractured, abundant calcite veining. Talkeetna Formation.
K-38			6	418114	6858752	Elevation: 4,670 feet Limestone magmatically stoped out by intrusive diorite. Beautiful exposure in gully to north; malachite in quartz vein 1 foot wide; magmatic activity probably influenced limestone structure in this area; mainly Talkeetna greenstone south of ridge, but intrusive goes over to south side just north of K-38.
K-39			6	418180	6858758	Bedding in limestone, 300°/34°S
K-40			6	417348	6858685	Bedding in limestone, 140°/43°E (probably conforms to general attitude of area). Area contains numerous indistinct, open folds (wavelength 12 feet); difficult, but sometimes possible, to distinguish bedding from fracturing. Fold axes (bearing and plunge) 145°/24°; 025°/30°.
K-41			6	417792	6857157	7/1/77 – Elevations are probably ±50 feet Bedding in Wishbone, pebble-cobble conglomerate (near waterfall) 225°/18°E
K-42			6	417954	6857079	Elevation: 3,490 feet Bedding in carbonaceous sandstone (stream channel; Wishbone Formation) 337°/22°E; 323°/28°E (average 330°/25°E)
K-43			6	418189	6856899	Elevation: 3,990 feet Bedding in pebbly sandstone layer in pebble-cobble conglomerate: 306°/35°E; 276°/25°E; 329°/24°E (average 304°/28°E). Very prominent fractures ~200 feet southeast of K-43 = 003°/73°W, spaced 3–10 feet apart.

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

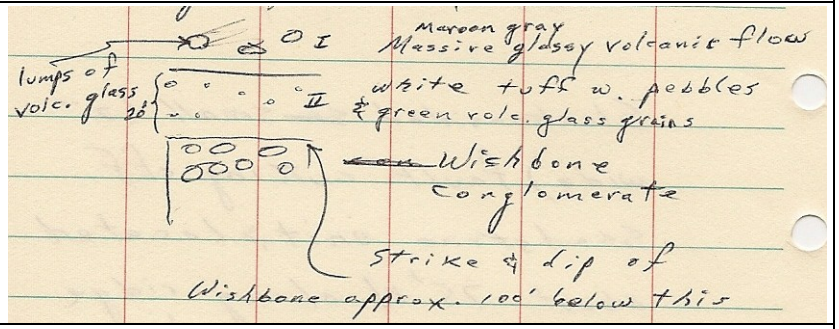
by William A. Fuchs

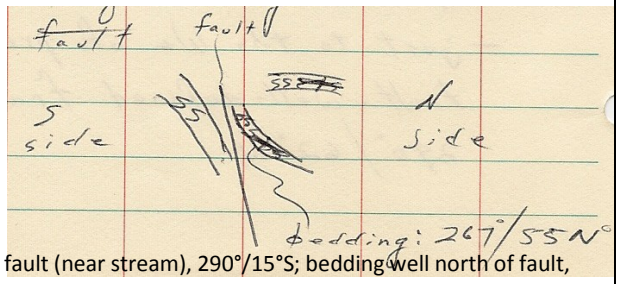
NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-44	S-7		6	418411	6856731	Elevation: 4,255 feet Vesicular basalt flow, 10 feet thick, columnar jointing, fine-grained, light green (chloritic), green phenocrysts (olivine? going to chlorite) *probably a very good marker horizon in the Wishbone Formation.; appears to thicken (6 feet → 15 feet) in a southerly direction, suggesting a source in that direction, but absolute direction of thickening unknown; at this point it appeared that there was a small fault of 10 feet displacement (south side up) but lack of fracturing in the overlying pebble-cobble conglomerate and flow pattern, as indicated by vesicles, led me to believe that this represents a depositional surface. Strike and dips south of stream, 136°/15°E (upper surface); north of stream, 127°/12°E (upper surface). **Sample S-7** possibly small synclinal warp with axis going approximately upstream; in streambed basalt is underlain by white tuffaceous pebble conglomerate (4 feet thick) while south of streambed basalt is underlain by regular Wishbone conglomerate. This further substantiates depositional surface-versus-fault argument.
K-45			6	418509	6856656	Elevation: 4,560 feet Bedding in sandstone of Wishbone Formation 055°/04°E
K-46			6	418242	6856462	Elevation: 4,390 feet Bedding in Wishbone Formation, horizontal beds.
K-47			6	417869	6856629	Elevation: 3,815 feet Bedding in sandstone of Wishbone Formation 354°/06°E
K-48			6	417649	6856865	Elevation: 3,380 feet Bedding in Wishbone sandstone 165°/15°E
K-49			6	417684	6857474	Elevation: 2,465 feet Bedding in Wishbone sandstone 259°/32°N
K-50			6	417635	6857559	Elevation: 2,330 feet Bedding in Wishbone sandstone 280°/30°N
K-51			6	418769	6858123	Elevation: 3,185 feet Bedding in Wishbone, sandy pebble layer 016°/32°E; located along permanent stream of topo map
K-52			6	418885	6858310	Elevation: 3,460 feet Bedding in sandstone unit of Wishbone Formation 117°/53°N
K-53	T-1		6	418899	6858425	Elevation: 3,580 feet 3 foot fault zone extends to both sides of the canyon; strike and dip 231°/80°N varies to vertical. This may just be a sedimentary sandstone to micaceous siltstone; however, I interpret it tentatively as a cataclastic rock. To be confirmed by thin section. Two **Samples: T-1** (*newly interpreted as sedimentary unit)
K-54			6	418788	6858624	Total width of zone = previously calculated thickness + 35 feet (75 + 35 = 110 feet) Prominent fractures obviously related to fault: 116°/55°W, 320°/37°E. Note, however, that these are fractures in a large block of Wishbone Formation that is within the fault zone itself and could have been rotated.
K-55			6	418887	6858803	Elevation: 4,410 feet Bedding on 3 inch chart bed in Talkeetna limestone 041°/67°E in place?? Probably the area is highly contorted. Bedding 50 feet west of K-55, 005°/vertical
K-56			6	418612	6857942	Bedding in sandstone of Wishbone Formation, 165°/13°E

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-57			6	418329	6858880	Elevation: 4,870 feet Prominent fractures: 152°/40°S, 143°/38°S, 136°/38°S (set 1 fractures 144°/38°S average) in large outcrop of Talkeetna limestone; what appears to be bedding is observed from a distance but is not seen close up (dip appears southerly and shallow to moderate). If it is bedding, the indicated thickness is probably 250 feet (75 meters) as opposed to 30 meters indicated by Detterman and others, 1976. Prominent fractures 50–75 feet west along ridge from K-57: 087°/64°N (set 2); 156°/60°S (set 3?); fractures seem to form a consistent set.
K-58			6	418341	6858925	Elevation: 4,945 feet Doubtful bedding (light-colored unit in limestone) 115°/30°S, 171°/27°W
K-59			6	418554	6859052	Elevation: 5,190 feet (topo may be incorrect) Fault 043° strike between limestone and highly altered, chloritic quartz diorite; intrusive(?) large pieces are essentially Talkeetna greenstone (xenolithic absorbed blocks?)
K-60			6	418839	6859135	Elevation: 5,330 feet Bedding in limestone 038°/60°E
K-61			6	418932	6859143	Elevation 5,320 feet Surface measurements on a beautiful fold in Talkeetna limestone (going in a direction of 240° from K-61 from elevation 5,320 to 5,170 feet?). Two folds may be present; nature of measured surfaces not known; may be folded fractures but the fold(s) are very real and may be seen from quite a distance. S2 may be the more prominent feature from a distance.  <u>Readings S-1</u>: 275°/48°S; 132°/67°W; 112°/49°S (? maybe S-2); 295°/35°S; 129°/40°S; 042°/85°W; 054°/69°W; 024°/33°S; 107°/59°S; 106°/61°S <u>Readings S-2</u>: 041°/46°W?; 182°/59°E; 192°/62°E; 225°/vertical
K-62			6	419557	6858489	Elevation: 3,850 feet Bedding in Wishbone Formation sandstone unit 015°/25°W
K-63			6	419779	6858476	Elevation: 3,775 feet Bedding in sandstone unit of Wishbone Formation 145°/15°E
K-64	T-2		6	420314	6859200	Elevation: 4,320 feet Small granodiorite (?) porphyry intrusive. **Sample T-2** slightly hematitic and chloritic.
K-65			6	420385	6859264	Elevation: 4,210 feet Same intrusive as at K-64 just north of stream, which is supposed to contain trace of Castle Mountain fault; to south of stream is Wishbone pebble-cobble conglomerate; bedding sandstone unit, 054°/75°E, 045°/62°E (average 050°/68°E). Fractures in Wishbone are noticeably concave upward, so detailed measurements were not taken; three representative fractures: 302°/52°N, 132°/32°E (same type?); 074°/84°S.
K-66			6	420740	6859468	Elevation: 4,860 feet Basal conglomerate (pebble-cobble) of Wishbone??; underlain by 5 feet of black, carbonaceous, very-fine-grained siltstone, which is in turn underlain by 10 feet (approximate true thicknesses) of light gray, micaceous, medium to finely bedded siltstone; below this is at least 50 feet of pebble-cobble conglomerate like Wishbone. Mapped by Detterman and others, 1976, as Chickaloon; author regards this as questionable. The Wishbone here does have andesite? siltstone? cobbles with white-weathering rinds, which supports idea of it being a basal conglomerate. Bedding in Chickaloon? 058°/77°S. Thirty feet east of K-66 Chickaloon? unit is cut off; may be a fault striking 010°(east side up??).

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

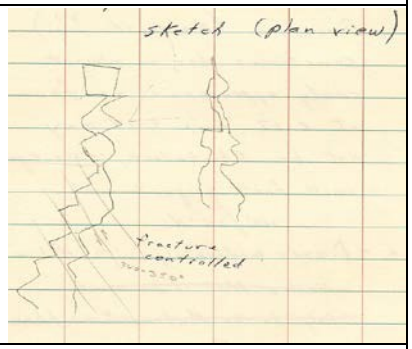
NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-67			6	420778	6859406	Elevation: 4,980 feet Bedding in Wishbone or Chickaloon?? 164°/40°W
K-68	T-5		6	420823	6859484	Elevation: 5,050 feet Bedding in sandstone of conglomerate 005°/49°E; above is Chickaloon? coal—observed in float thickness probably >5 feet. *__Sample T-5__ Andesite flow rock (in float). Looks extremely similar to sample S-1 from location K-3 (in Chickaloon). Thin section comparison should reveal if they are the same.
K-69			6	421039	6859392	Elevation: 5,190 feet (on ridge) Bedding in Wishbone sandstone 214°/60°S. Slickensided small (2-inch-wide) fault cutting off sandstone unit, about 75 feet north along ridge from K-69, 065°/84°N. 75 feet south along ridge from K-69, bedding 057°/68°S.
K-72	T-3		6	421469	6858909	Tv – Tertiary Volcanics, at contact up ridge from K-71. Contact not taken but dips very slightly south. __Sample T-3__ (units I and II) 
K-73	T-4		6	420904	6859582	Type locality for Castle Mountain fault in saddle. The following are just south of saddle in Wishbone(?) Formation: 1. 125°/72°W – 6 inch fault zone (east block up??) 2. 240°/64°S – small fault cut by 1 3. 087°/65°N – prominent fracture with no visible offset 4. 103°/67°S – fracture; probably offset 5. 164°/73°E – 5 inch fault zone 6. 145°/24°W – 6 inch fault zone 7. 105°/44°S – 6–8 inch fault zone In lowest part of saddle there is black mud (Chickaloon?). Main portion of fault just north of this (still in saddle) is intrusive porphyry (granodiorite?) (~25 feet thick); north of this is sheared Talkeetna greenstone with small intrusives localized in fault zones; *strike and dip of fault zone in sheared Talkeetna probably representative of main fault, 055°/76°N. On north side of saddle is Talkeetna limestone 085°/67°S (fracture face? bedding?). Although evidence is lacking, a fault splay striking 220° may better explain Chickaloon coal above K-68. This Chickaloon may just be a sliver brought up by the fault. Author sees no evidence at this point of Chickaloon east of the saddle, just Wishbone. **__Sample T-4__ – Porphyry intrusive, two bags for K-Ar dating; dating of this intrusive may be useful in establishing the date of the Castle Mountain–Caribou fault splay, as the intrusive is clearly localized in the fault and is near the splay.
K-74	T-6		6	420353	6859618	Elevation: 4,590 feet __Sample T-6__ – Diorite in float representative of large intrusive uphill.
K-75			6	420241	6859487	Elevation: 4,510 feet Talkeetna limestone; possibly vertical beds although no actual bedding observed.
K-76			6	419934	6859053	Elevation: 4,880 feet Castle Mountain fault zone in saddle; mostly covered; possibly 50 feet wide; black gouge and chloritic porphyry or andesite in zone.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
K-77			6	419895	6859220	Elevation: 5,140 feet Fault zone, 18 feet wide, yellowish brown, sheared and highly altered weathered porphyry; strike 036°; vertical or very steeply dipping to the south; similar rocks on both sides of the fault (basaltic flows; maroon).
K-78			6	419880	6859247	Elevation: 5,200 feet Talkeetna limestone contact, in saddle. Just to the south is a 50-foot-wide pyritic, hydrothermally altered basalt.
K-79			6	419763	6859347	Elevation: 5,350 feet Diorite intrusive
K-80	T-7		6	419652	6859408	Elevation: 5,530 feet Highly pyritic 15-foot zone (intrusive) bearing 75° (dipping south??). **Sample T-7**. Surrounded by limestone; upper limestone 50 feet above limestone contact (above K-80) is porphyritic andesite (flow?).
K-81			6	419290	6859053	Faulted sliver of Wishbone Formation; late fault? East boundary fault trends 001°; west boundary fault trends 025°; both boundaries probably curve into streams. Fault may be a wrench fault and may account for displacement in limestone; west of faulted sliver of Wishbone is a small amount of limestone, then Talkeetna greenstone; hillside to the northwest of sliver is Talkeetna greenstone (flows?) possibly mixed with diorite porphyry intrusive. New interpretation for K-81: Wishbone Formation may have been forced upward into its present position north of the fault by the small adjacent intrusive, or it could have been emplaced downward along faults of small displacement.
K-82			6	419200	6858867	Porphyry intrusive, as at location K-73, just beside Castle Mountain fault; did this intrusive push Wishbone Formation north of fault??
C-1 through C-83 Chickaloon River July 1977. Camp established near where Doone Creek joins Chickaloon River						
C-1		Chickaloon River	6	426195	6859178	Elevation: 1,340 feet Bedding 083°/12°N; Chickaloon? Massive graywacke sandstone, gray, fine- to coarse-grained, fossiliferous, underlain by dark siltstone with very-well-preserved leaf fossils; well-developed fractures: 298°/71°S; 298°/74°S, average 298°/72°S. Spaced 6 inches to 1½ feet apart.
C-2			6	426175	6859364	Elevation: 1,360 feet Bedding 254°/22°N; 255°/21°N; 251°/27°N, average 253°/23°N. Beginning of a very-well-exposed section of Wishbone (pebble-cobble conglomerate with cobbles of black chert, brown siltstone, greenstone, diorite, and less abundant jasper; also sand-stone beds up to 20 feet thick. Well-developed fractures, 345°/80°E; lesser developed but distinct fractures, 296°/71°S.
C-3			6	425890	6859472	Elevation: 1,760 feet Bedding 035°/18°W in siltstone layer of Wishbone Formation
C-4			6	423379	6858993	Elevation: 3,490 feet Fault zone bearing 267°, dipping vertical and curved (concave up) to the north. Several separate faults; just to the west of previous fault, well-defined fractures, 290°/62°N; just west of previous notation, large fault in Wishbone Formation; *235°/78°N – strike and dip of fault on fault gouge. *265°/dip unknown = strike of fault east of cut; 3 to 4 foot dark fault gouge zone with numerous side faults (such as 085°/74°N) and fractures (such as 280°/79°N); drag folding. Drag folding indicates north side down, south side up. Bedding well south of fault (near stream), 290°/15°S; bedding well north of fault, 305°/17°S; 284°/15°S; average 294°/16°S; 265°/67°N is probably the best overall strike and dip on fault. 

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
C-5		Doone Creek	6	425151	6860018	Elevation: 2,200 feet (not reliable) Fault, 247°/78°E; crosses stream; 1–2 foot dark gouge zone in Wishbone Formation.
C-6			6	425139	6860077	Bedding in Chickaloon? Formation (siltstone to sandstone sequence, not unlike Matanuska Formation) 058°/vertical; small fault 087°/20°N.
C-7	T-8A		6	425266	6859951	Elevation: 2,170 feet (not reliable) West of fault. Bedding in sandstone 054°/76°E. Fault zone minimum 20 feet thick; dark gouge with slickensides; abundant carbonaceous material, concretions, and some coal in fault zone; bedding may generally reflect trend of fault (bedding plane fault??). East of fault is sequence of pebble conglomerates and sandstones (some siltstones); cross-bedding indicates sequence is right-side-up; fossils are plant fossils. Rocks are graywackes with abundant muscovite. This may be Chickaloon Formation instead of Wishbone Formation. **Sample T-8A**
C-8			6	424895	6860154	Elevation: 2,250 feet Chickaloon Formation; evidence of contortion and bedding plane faults in coaly layer; in scar north of Doone Creek; location uncertain from elevation, take location from air photo.
		Doone Creek	6			7/27/77 – Beginning of 9-day backpack trip up Doone Creek. Elevation of intersection of side stream near camp at Doone Creek: 2,560 feet
C-9			6	424731	6860213	Elevation: 2,290 feet Chickaloon Formation; minor folding due to incompetent coal beds; general strike and dip on sandstone beds 237°/76°N (north of stream); 243°/86°N (south of stream); other bedding in folded area 059°/30°N; 043°/47°N; prominent fracture with slickensides 024°/80°E (pitch on lineation = 30° from the south).
C-10			6	424239	6860541	Elevation: 2,720 feet (up side creek from camp) Chickaloon?? Formation; "dirty", fine-grained graywacke sandstone; bedding not observed; very close to fault mapped by Detterman and others (1976). Highly fractured. Representative fractures: 125°/84°E, small fault with gouge; 157°/85°E, fracture; 141°/79°E, fracture; 118°/81°E, fracture with slicks; 150°/64°W, fracture with slicks; 131°/88°W, fracture; 114°/87°W, fracture with slicks.
C-11			6	424112	6860765	Elevation: 2,880 feet Bedding in Chickaloon Formation; siltstone and coaly shale 065°/vertical
C-12			6	424091	6860817	Elevation: 2,910 feet Cataclasite of large fault zone; zone of most intense faulting is 80 feet wide (covered to the south); zone of lesser faulting (but still a cataclasite) is ~100 feet wider to the north; fault trend 089°, dips vertical to steeply south.
C-13			6	424089	6860824	Elevation: 2,920 feet Bedding 246°/79°N. Talkeetna Formation; contact between green andesite and red andesite, flows? Above C-13 part of an ammonite ~1 foot in diameter was found.
C-14			6	424081	6860921	Elevation: 3,000 feet (located differently on topo for good reasons) Bedding in well-bedded (beds 6 inches to 1 foot thick) Talkeetna andesite flow, 072°/31°N
C-15			6	424083	6860965	Elevation: 3,050 feet Located at waterfall; farther travel upstream not possible; abundant and well-defined fractures appear to be controlling stream at this point; significant offset on fractures on west side (zone is ~50 feet across) may even be considered a fault; fractures: (two prominent sets?) 342°/83°W; 009°/89°W; 137°/74°W; 147°/82°W; 153°/70°W; 337°/88°W; 333°/76°W. Rock is Talkeetna Formation, dense, aphanitic to porphyritic, light green andesite, flow?, with white talc-like veining (especially in fractures).
C-16			6	424329	6860338	Slump block (of Matanuska Formation?)

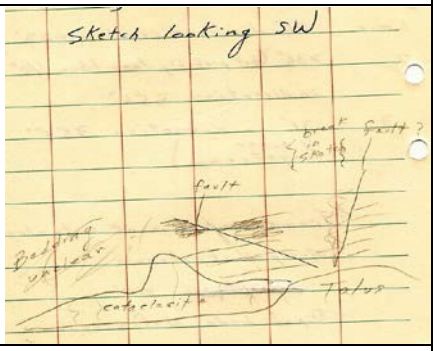
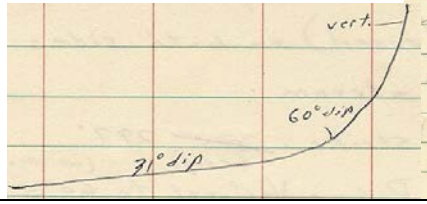
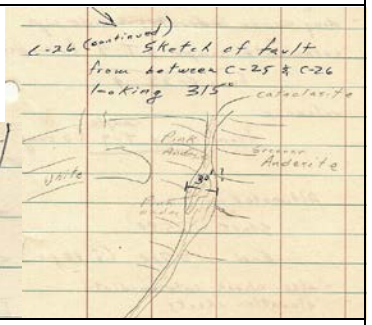
CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
C-17		Along Doone Creek	6	424165	6860383	Elevation: 2,590 feet Coaly shale beds, contorted but basically standing on end; somewhat of a gouge appearance in fault? contact with Matanuska? Formation (pebbly conglomerate and sandstone); strange things going on here; does not correspond with Detterman and others' (1976) map. Lack of marine fossils makes it difficult for me to distinguish Matanuska Formation in this whole area. Bedding 058°/75°W
C-18			6	424065	6860383	Elevation: 2,640 feet Highly indurated and sheared, black, micaceous, fine-grained siltstone. Rock appears to have been squeezed (caught in a wedge?); pervasive slickenside appearance; impossible to identify formation (Matanuska??); sometimes has an almost coaly appearance as found at C-17. C-17 may not be Chickaloon, reinvestigate; small fault gouge zone 110°/35°N; fizzes moderately with HCl; bedding destroyed; prominent fracture 50 feet north of C-18 350°/vertical.
C-19			6	423962	6860377	Elevation: 2,670 feet Essentially whole sequence of rocks between C-18 and C-19 are the same as those at C-18; brittle fracture-controlled boudinage-like structure (remanent of bedding?) in plane 042°/88°E. Fractures with left-lateral displacement: 342°/steep; 350°/steeply west; 347°/steep; 343°/steeply west; 334°/moderate west. Conjugate fractures (possibly later): 104°/moderate north; 111°/?; 082°/?; 097°/steeply north. Fractures in surrounding area: 355°/43°E, strong fracture; 093°/62°S, strong fracture; 156°/48°N, strong fracture; 066°/76°E. 
C-20			6	423637	6860579	Elevation: 2,980 feet Highly sheared (volcanics?? or siltstone); fault zone (Castle Mountain fault); main zone may be to the south (covered)
C-21			6	423644	6860647	Elevation: 3,020 feet Talkeetna volcanic flows; andesite with abundant calcite veining; moderately well bedded; 068°/14°N; many fracture trends, but one prominent trend ranging from 055° to 070° strike, dip generally vertical.
C-22		At waterfall	6	423296	6860618	Elevation: 3,040 feet Fault in Talkeetna Formation (interbedded flows and tuffs); farther travel up the stream not possible; numerous roughly aligned fractures presumed to be the fault itself: 330°/63°W; 325°/71°W; 335°/68°W (average 330°/67°W); well-bedded on east side, bedding 017°/23°E; fault is high-angle reverse with ~75 foot vertical displacement; based on displacement of green andesite found high up on west side of stream and lower down on east side (*75% certain, 25% chance of opposite displacement); fault probably controls stream course at this point.
C-23	T-8B		6	422746	6860645	Elevation: 3,210 feet Cataclasite – large fault zone; possible thrust fault; green andesite with extremely abundant white veining (talcose or tremolitic?); beds above pinkish bedded volcanic agglomerate? Cataclastic effect only mild in overlying rock; distinct fault (011°/83°W) cuts cataclasite but not overlying volcanics; it is several inches wide and contains breccia. Great structural complexity between here and upstream, where cataclasite is also visible (access is difficult), probably due to cross cutting fault; all rocks involved are probably Talkeetna Formation; apparent dips on possible thrust fault: 1. 36° dip in direction 022° 2. >36° (but probably <40°) in direction 356° 3. 31° in direction 355° (taken upstream) Trend on prominent cataclasite outcrop east of stream, 011°. Dip of beds west of stream above cataclasite roughly eyeballed southerly 20°. **Sample T-8B** cataclasite (two samples).

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

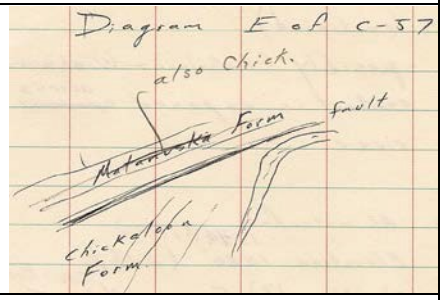
by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
C-24	T-9	Across stream from C-23	6	422713	6860596	011° trend on cataclasite east of stream from C-23. **Sample T-9** volcanic (two samples). 
C-25			6	422646	6860727	Elevation: 3,470 feet Bedding in andesite flow, 058°/30°S; located 350° from C-23.
C-26			6	422729	6860754	Elevation: 3,495 feet Strike and dip on cataclasite (exposed) on both sides of stream. Strike (at top) 297°. Dip vertical to 60°S (at stream) (a better strike could be obtained from west side of stream (strike 301°). Fault is a thrust fault; beautifully exposed through entire section sketch; this is probably a very major fault; **drag sense indicates south side up.  
C-27			6	422542	6861035	Cataclasite seen at distance (from C-26); covered just to the north.
C-28		Above C-21	6	423544	6861181	Large fault in Talkeetna Formation observed with binoculars from Doone Creek; very pronounced drag folding indicates north side up, south side down; exact trend could be better observed by plane.
C-29			6	422641	6860298	Elevation: 3,230 feet Talkeetna Formation; red andesite exposed along Doone Creek
C-30			6	422570	6860313	Elevation: 3,290 ft (at stream) Cataclasite exposed in hillside; also found higher upslope to the west. The block is somewhat slumped, but appears to be essentially in place.
C-31			6	421537	6859802	Elevation: 4,030 feet Quartz-eye, hematitic porphyry intrusive – as in saddle.
C-32	T-10		6	421473	6859813	Elevation: 4,130 feet **Sample T-10** – intrusive taken for age dating.
C-33			6	421710	6859979	Elevation: 3,910 feet Cataclasite, roughly trending 049°; 75–100 feet thick; dipping steeply south.
C-34			6	421700	6860111	Elevation: 3,940 feet Fault 10°/84°S. Trace 340° azimuth. Places very red amygdaloidal flow (epidote in amygdules) on north against highly sheared green andesite on south; fault gouge zone 1½ feet thick.
C-35			6	422590	6860047	Elevation: 3,490 feet Bedding in Wishbone conglomerate: 337°/34°W, 350°/34°W (average 343°/34°W). Elevation: at stream below 3,350 feet.

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

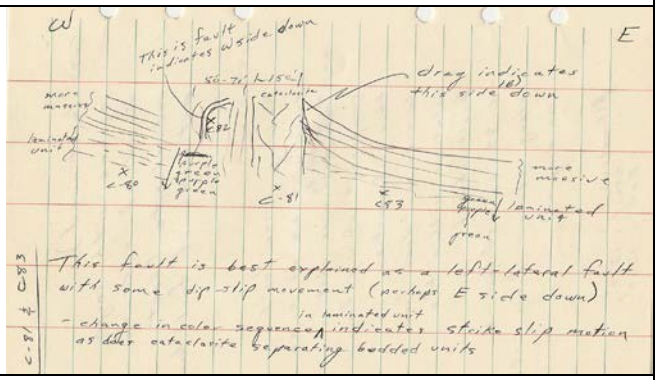
NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
C-36			6	422760	6860421	Elevation: 3,140 feet Highly fractured Talkeetna volcanics (no preferred orientation)
C-37			6	422584	6860543	Elevation: 3,280 feet Bedding in Talkeetna purple agglomerate 213°/26°E
C-38			6	422389	6860635	Elevation: 3,420 feet Large fault zone (85 feet wide); cataclasite and fault breccia exposed in stream cut; just south of zone fault - 249°/20°S – 4 inch gouge zone, fault – 248°/64°N – 1 foot fault breccia; in zone itself 215°/56°N; however, other trends are present and this may not reflect overall trend. High-angle portion of a large thrust fault??
C-39	T-11		6	422245	6860759	Elevation: 3,540 feet Small fault zone cutting thrust fault, 106°/60°N; black, dense unit at stream; this unit can be followed downstream on east side and then on west side for a distance of 200 feet – highly chewed up – maximum thickness of several feet; good evidence that I am walking along the plane of a thrust fault. Is this black unit, which is calcareous, the Talkeetna limestone smeared out along the thrust? Thin section analysis needed. **Sample T-11** **All rocks along stream from C-38 to C-39 and beyond are highly faulted, cataclastic, and hydrothermally altered in places. If this is a thrust, it is huge and the fault plane itself has a minimum thickness in places of 100 feet. I believe at this point that this fault correlates with the one found in the canyon just to the west.
C-40			6	422178	6860820	Elevation: 3,570 feet Vein 1–6 feet thick; 058°/80°S; zone up to 1 foot thick of 50% pyrite in the middle; crosses stream.
C-41			6	422020	6860940	Elevation: 3,690 feet Fault zone 192°/77°E; 20 feet thick. Is thrust becoming high angle at this point??
C-42	T-12		6	421961	6860995	Elevation: 3,770 feet (elevation: high??) End of fault zone. **Sample T-12**: lower plate rocks just northwest of C-42
C-43			6	421936	6861052	Chickaloon Formation!! Well-bedded dark shales and siltstones. Bedding 206°/35°W; ~200 feet northwest of fault; note sense of drag!
C-44			6	421874	6861062	Elevation: 3,850 feet End of outcrop; siltstone – Chickaloon. Bedding 241°/25°W
C-45			6	421965	6861126	Elevation: 4,030 feet Chickaloon? Formation. Plant fossils. Bedding 197°/78°W; probably next to fault; prominent fracture with slick 082°/77°N; lineation on slickenside 35° from west.
C-46			6	422554	6861278	Elevation: 3,860 feet Cataclasite (another imbrication on thrust fault?) high angle at this point? More cataclasite continues upstream at least 500 feet along stream (still another imbricate?)
C-47			6	422543	6861076	Elevation: 2,690 feet Highly fractured, faulted, and altered (not cataclasite, however) volcanics? (andesite flow?) *Note rocks north of fault described at C-26 are green andesite agglomerates and flows – very fractured.
C-48			6	423802	6860287	Elevation: 2,850 feet Chickaloon Formation; coarse, micaceous sandstone, pebbly in places, plant fossils; no evidence of Matanuska up this canyon as mapped by Detterman and others (1976).
C-49			6	423727	6860190	Elevation: 3,020 feet Bedding 082°/59°S; good exposure of well-bedded shale, siltstone, and sandstone (Chickaloon)

<table>
<tr><th>NOTE</th><th>SAMPLE</th><th>LOCATION</th><th>ZN</th><th>EASTING</th><th>NORTHING</th><th>DESCRIPTION</th></tr>
<tr><td>C-50</td><td></td><td></td><td>6</td><td>423695</td><td>6860052</td><td>Elevation: 3,290 feet
Bedding 029°/32°E; Chickaloon black shale; some coal present in section; the decrease in dip upstream substantiates the presence of a large fault below C-49, if it is assumed to be caused by drag; note that from C-49 upstream through C-50 is a good continuous section, which would be measureable (although with some difficulty); very little structural complication.</td></tr>
<tr><td>C-51</td><td></td><td></td><td>6</td><td>423609</td><td>6859919</td><td>Elevation: 3,580 feet
Pebble conglomerate; pebbles mainly black chert, white quartz, minor jasper, no Talkeetna. This is probable Wishbone contact as used by Detterman and others (1976).</td></tr>
<tr><td>C-52</td><td></td><td></td><td>6</td><td>423560</td><td>6859790</td><td>Elevation: 3,880 feet
Beginning of thick sequence of pebble-cobble conglomerate (definite Wishbone – contact of Wishbone that I was using on King River work). Bedding (~60 feet below C-52) 265°/28°S in highly carbonaceous black shale.
<table>
<tr><th colspan="3">General description of lower Wishbone Section from top to base</th></tr>
<tr><th>Formation</th><th>Thickness</th><th>Description</th></tr>
<tr><td>Wishbone</td><td>—</td><td>Pebble–cobble conglomerate</td></tr>
<tr><td>Wishbone</td><td>40 feet</td><td>Interlayered siltstone or shale and coarse sandstone.</td></tr>
<tr><td>Wishbone</td><td>50 feet</td><td>Black, highly carbonaceous fissile shale with concretions.</td></tr>
<tr><td>Wishbone</td><td>175 feet</td><td>Sandstone, fine-grained, well-bedded.</td></tr>
<tr><td>Wishbone</td><td>30 feet?</td><td>Pebble conglomerate; pebbles predominantly black chert, white quartz, minor jasper, little or no Talkeetna or siltstone.</td></tr>
<tr><td>Chickaloon</td><td></td><td>Interbedded, highly carbonaceous black shale, siltstone, sandstone (with pebbles occasionally) with abundant plant fossils.</td></tr>
</table></td></tr>
<tr><td>C-53</td><td></td><td></td><td>6</td><td>422769</td><td>6860259</td><td>Elevation: 3,290 feet
Chickaloon? In float (probably near to being in place) plant fossils (but are they from Wishbone above); rock somewhat chewed up; no compelling reason to call this Matanuska Formation. This makes me have doubts as to the existence of a splay in this location.</td></tr>
<tr><td>C-54</td><td></td><td></td><td>6</td><td>424367</td><td>6860378</td><td>Bedding 250°/59°N. Chickaloon Formation – abundant plant fossils in dark shale, sandstone, and conglomerate; mapped by Detterman and others (1976) as Matanuska Formation.</td></tr>
<tr><td>C-55</td><td></td><td></td><td>6</td><td>424948</td><td>6860892</td><td>Cataclastic Talkeetna Formation; probably part of the Caribou fault zone, the main part of which is probably in the covered area immediately to the south of this point.</td></tr>
<tr><td>C-56</td><td></td><td></td><td>6</td><td>425328</td><td>6860712</td><td>Pebble conglomerate, pebble–cobble conglomerate in places; possibly upper Chickaloon Formation; probably lower Wishbone Formation; minor carbonaceous material found on close inspection; not Matanuska! Bedding 064°/65°S. Fractures: 338°/77°E, 006°/30°S – with slickensides, 186°/67°W.</td></tr>
<tr><td>C-57</td><td></td><td></td><td>6</td><td>424497</td><td>6860274</td><td>Fault – Castle Mountain segment?
Tentatively I accept the rock exposed in scar north of Doone Creek from C-57 to C-58 as Chickaloon Formation; dark siltstone (micaceous) with carbonaceous smears, sandstone, local conglomerate. However, good plant fossils as normally found in Chickaloon are absent; fault zone observed in scar uphill and east of C-57 is distinguished by folding in Chickaloon Formation, which is on south side of fault.
 
</td></tr>
<tr><td>C-58</td><td></td><td></td><td>6</td><td>424638</td><td>6860242</td><td>Elevation: 2,390 feet (take as plotted)
No evidence that this is a fault contact; very concordant transition; not investigated closely, but Chickaloon Formation (north of C-58 is taken as the white band that cuts across scar); from float it appears to be conglomerate with plant fossils (including a tree fragment – which was coal).</td></tr>
</table>

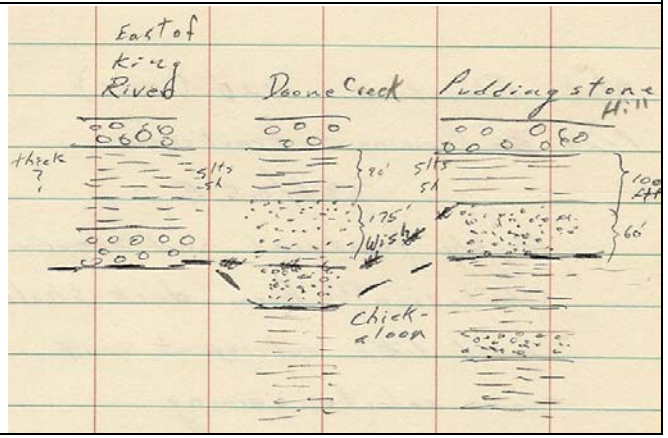
NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
C-59		Near Chickaloon River	6	426903	6859280	Wishbone Formation – large outcrop. Pebble-cobble conglomerate with abundant sandstone lenses. Bedding: 160°/10°E, 172°/14°E, 202°/11°E, 150°/20°N (average 171°/14°E). Fracture zone 322°/64°S. Fracture 287°/15°N. Possibly Chickaloon–Wishbone; contact is exposed across river.
C-60		At waterfall	6	426785	6861158	Elevation: 1,540 feet Chickaloon Formation; interbedded sandstone and pebble conglomerate. Bedding: 067°/70°S, 059°/79°S (average 063°/75°S). Prominent fractures: 349°/56°N, 352°/45°N (same set?); 319°/21°N. Sedimentary features indicate to me that sequence is right-side-up, but it is not positively certain.
C-61			6	426619	6861239	Elevation: 1,700 feet Chickaloon Formation; sequence contains equal amounts of pebble conglomerate (some cobbles) and dark siltstone; prominent fractures (south of stream in conglomerate) filled with calcite averaging 335°± 3° strike; dips steeply east and west. Conglomerate contains carbonaceous material; siltstone contains some carbonaceous smears and fragments of plant fossils. Fault (bedding plane fault?) just north of stream 065°/85°E.
C-62		150 feet up-stream of C-61	6	426583	6861268	Elevation: 1,710 feet Bedding 057°/88°W. Chickaloon Formation – dark shale
C-63			6	426541	6861300	Elevation: 1,760 feet Chickaloon; coaly shale against pebble conglomerate; looks very similar to sequence found at C-7. Is sequence from C-61 to C-63 Wishbone Formation or Matanuska Formation?? (There is a lot of conglomerate in the sequence, but it is more pebble conglomerate than pebble–cobble conglomerate). Bedding 064°/88°W.
C-64			6	426445	6861313	Elevation: 1,810 feet Bedding 030°/vertical. Chickaloon Formation; minor open folding overturned to east? Good coal bed.
C-65		150 feet downstream	6	426207	6861280	Elevation: 1,870 feet End of Chickaloon in float; unit Qal upstream on north side; interval from C-64 to C-65 in very coaly upper Chickaloon?? Indicates formation downstream probably Wishbone, not Matanuska Formation.
C-66			6	426034	6861320	Elevation: 1,930 feet Fault rock in float; probably very near to in-place.
C-67			6	426012	6861348	Elevation: 1,950 feet Brecciated limestone (Talkeetna?) with some volcanic fragments; probably in or just along large fault zone; 30 feet width, trending roughly 055°.
C-68		Approximately 150 feet up-stream from C-67	6	425975	6861415	Elevation: 1,980 feet Very well exposed fault zone on north side of stream; 7 feet wide; cuts off red volcanic unit on west (same as upper plate thrust rocks up Doone Creek. Gouge on east and west boundaries of fault, cataclasite (rock type similar to unit above red volcanics) occupies most of zone; cataclasite (red volcanics) to east. Fault surfaces 208°/80°W (east boundary), 210°/85°W (east boundary), 218°/85° (west boundary); drag on west side indicates west side down; fault may cut off brecciated limestone unit to the southwest. Bedding 058°/37°W (south side of stream); displacement on fault not known but probably large.
C-69			6	425949	6861461	Elevation: 2,020 feet Contact of pink andesites with gray and white andesite flows (actual contact ~15 feet lower in elevation) unconformable contact; white and gray volcanics (weathered colors) dip gently northward; further travel upstream possible only by wading.
C-70			6	426330	6861820	Elevation: 2,400 feet Andesite flow – quite chewed up; small exposure
C-71			6	426338	6861915	Elevation: 2,540 feet Diorite intrusive in contact with andesite flow (andesite above, diorite below); forms distinct white cliffs; diorite similar to that found in Kings River area but is cataclastically deformed with abundant white veining.

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
C-72			6	426461	6862224	Elevation: 2,640 feet Diorite intrusive – andesite porphyry contact; end of diorite?
C-73			6	425907	6861130	8/9/77 Nine-mile cabin trip (camp elevation 1,370 feet) (Chickaloon River elevation 1,330 feet) Elevation: 2,150 feet Landslide in creek; dark siltstone with carbonaceous smears (hint of plant fossils), in float, but very close to being in-place; Chickaloon? Formation; abundant slickensides.
C-74			6	426672	6862092	Elevation: 2,250 feet Talkeetna Formation; andesite flows.
C-75			6	425932	6861518	Elevation: 2,030 feet Upper plate, maroon, Talkeetna volcanics, flows and flow breccia, well-bedded. Bedding 224°/30°W.
C-76			6	425923	6861578	Elevation: 2,050 feet 5-foot-wide fault zone 223°/85°W (south side of stream); bearing 210°(north side of stream); Talkeetna Formation
C-77			6	425901	6861662	Elevation: 2,070 feet 6 feet wide fault zone 285°/85° to vertical; curved fault south of stream.
C-78	T-13		6	425743	6862435	Elevation: 2,500 feet Well-bedded Talkeetna Formation. Bedding 205°/26°E. Highly fossiliferous (pelecypods?) limey flysch with abundant volcanic fragments (andesite), underlain by water-lain limey volcanic breccia. **Sample T-13** (two samples). Unit is 6–15 feet thick.
C-79			6	425751	6862480	Elevation: 2,520 feet Fault (possibly large) separates andesite? flows on south from basaltic flows with interlayers of laminated, silty-like (possibly sedimentary) layers on north; general trend of fault 090°; small pyritiferous diatreme on north side.
C-80			6	425707	6863061	Elevation: 2,880 feet Bedding 180°/46°E. Bedded volcanics, laminated; west of fault.
C-81			6	425730	6862990	Elevation: 2,850 feet Cataclasite fault zone, approximately vertical and 150 feet thick (see diagram) 
C-82			6	425759	6863032	Bedding measurements on fold within fault zone (fold ~20–30 feet in diameter): 244°/74°E, 251°/87°W, 118°/50°N (plot on stereonet to get fold axis). See how this agrees with rough trend of 025° on cataclasite (best estimate of fault trend). (See diagram for C-81.)

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
C-83		150 feet east along stream from C-81	6	425742	6862967	Bedding 194°/45°E; same unit as at C-80; **may be able to determine vertical component of slip from this information; west side is down from relations within the fault itself. (See diagram for C-81.) **8/11/77 General Description of Talkeetna Formation – west side Chickaloon River** Two and possibly three large volcanic units are distinguishable. Lower unit is a well-bedded sequence within a maroon color overall. This unit consists of andesitic flows, more abundant flow breccias, and less abundant agglomerates. I call this maroon unit 'upper plate volcanics' as it appears as the upper plate of thrusting in the vicinity of the Caribou–Castle Mountain fault splay. Resting in angular unconformity above this unit is a very thick, well-bedded, andesitic (and possibly basaltic in places) sequence of whiter-appearing (weathered color) volcanics. In general, this unit has more layers, which are tuffaceous, and hence the whiter color. A third general volcanic unit is a maroon to green, somewhat cataclastically deformed andesitic volcanic (mainly flows and flow breccias). It is not clear whether this actually represents a separate unit or cataclastic deformation of the other units. It is shot through with white veinlets of calcite and an undetermined talcose–serpentine-like mineral assemblage. It appears in places that with a little metamorphism it would be the same as the greenstone Talkeetna Formation in the Kings River area. There is at least one highly fossiliferous (primarily pelecypods?) limey, flysch-like unit with abundant andesite fragments and good bedding. The unit is 6–15 feet thick. It is not known whether the fossiliferous unit belongs to the upper plate volcanics or the more tuffaceous unit.
P-1 through P-61 completed August 1977 along Puddingstone Hill						
P-1		Puddingstone Hill Camp	6	428835	6859833	Elevation: 2,830 feet Dark carbonaceous siltstone and graywacke sandstone in float – close to in-place; Chickaloon Formation.
P-2			6	428879	6859783	Elevation: 2,970 feet Wishbone contact (Wishbone upstream). Pebble conglomerate, same as at C-51; 10 feet thick.
P-3			6	428919	6859740	Elevation: 3,090 feet Bedding (sandstone in Wishbone conglomerate) 244°/48°S
P-4			6	428957	6859693	Elevation: 3,170 feet Prominent fractures in yellow-brown, altered, tuffaceous sandstone, with cherty concretions: 188°/75°W, 182°/79°W (average 185°/77°W)
P-5	SP-1		6	428985	6859603	Elevation: 3,390 feet White tuffaceous, pebbly sandstone, 20 feet thick, same as found across and slightly upstream from C-2. **Sample SP-1**. Bedding (50 feet at 330° from P-5) 242°/40°S.
P-6			6	429054	6859532	Elevation: 3,670 feet Glassy basalt; actual contact probably at 3,640 feet
P-7			6	429370	6859378	Volcanics
P-8			6	429669	6859575	Volcanic vent? Greenish volcanic breccia surrounded by pink volcanic flow.
P-9			6	428987	6859450	Elevation: 3,620 feet Wishbone-Volcanics contact (actual contact covered)
P-10			6	428802	6859070	Elevation: 3,460 feet (at top of knob) Volcanics-flow breccia. Bedding 200°/05°E.
P-11		340° from P-10	6	428757	6859127	Elevation: 3,270 feet Wishbone – volcanic contact (Wishbone downhill)
P-12			6	428927	6859954	Elevation: 2,760 feet First pebble conglomerate (thickness ~40 feet). Bedding 087°/37°S. Prominent fracture with slickensides, 130°/87°E, 137°/67°E (average 134°/77°E).

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
P-13			6	428873	6860012	Elevation: 2,650 feet Bottom of 40 foot pebble conglomerate. Between P-12 and P-13 there are thin coal beds, so this must be Chickaloon Formation; for several hundred feet (horizontal) below P-13 there are abundant beds of small pebble conglomerate.
P-14			6	428634	6860187	Elevation: 2,210 feet Abundant coal in good outcrop for ~100 feet upstream; some coal beds up to 12 inches thick.
P-15		Intersection of two streams	6	428412	6860292	Elevation: 2,030 feet Highly fractured andesite? flow in Chickaloon Formation; possibly same as Sample S-1 taken at King River, but flow texture not present; very fine grained.
P-16			6	428824	6860477	Talkeetna Formation; highly sheared greenstone much like that found at King River; many slickensides, many trends on fractures.
P-17			6	429285	6860277	Elevation: 2,730 feet Small-pebble conglomerate and sandstone; Chickaloon Formation. Bedding (at 2,790 feet) 296°/20°S.
P-18			6	428897	6860529	Series of right-laterally offset faults (may be dikes) seen from across valley; offset ~15–20 feet. Very well exposed (but inaccessible); picture taken.
P-19			6	429608	6860251	Elevation: 3,170 feet Bedding in Chickaloon Formation siltstone 079°/74°S.
P-20			6	429717	6860235	Elevation: 3,300 feet 8/24/77 Wishbone–Chickaloon Formation contact (9/4/77, upstream) **General method for determining contact:** Work from top down. Find thick sequence of definite pebble–cobble conglomerate. Contact is gradational. Below the 'definite' sequence of Wishbone is a series of siltstone, sandstones, and pebble conglomerate (in Kings River area pebble–cobble conglomerate). Included in the Wishbone Formation is the siltstone and shale below the definite Wishbone Formation and the next pebble conglomerate below this. Below this is Chickaloon Formation, which usually contains a dark, highly carbonaceous shale unit in the first or second siltstone/shale unit below the contact.
P-21			6	429566	6860409	Elevation: 2,940 feet Bedding 104°/57°S; good outcrop of Chickaloon Formation, coal, and sandstone.
P-22			6	429678	6860512	Elevation: 2,920 feet Chickaloon Formation, south of stream probably close to in-place; 100 feet north of stream is Talkeetna Formation; Castle Mountain fault probably follows stream here.
P-23			6	429965	6860626	Elevation: 3,670 feet Bearing 065° from crook in stream. Wedge of fissile, highly sheared and indurated, dark gray, fine-grained argillite or volcanic; fizzes slightly in HCl; concretionary-like beds (orange–brown) look like surrounding material but are highly calcareous; probably Matanuska Formation. Bedding 063°/77°S. Probably faulted in. Bedding 064°/vertical (distinct but discontinuous). 

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
P-24			6	428281	6860330	Elevation: 1,920 feet Prominent fractures 334°/65°E. Highly fractured and sheared Chickaloon? Formation; dark shale; much like outcrop at C-19; some calcite veining. (See note for P-28.)
P-25			6	428120	6860237	Elevation: 1,820 feet Bedding 282°/77°N; taken on contact between Chickaloon dark shale and andesite flow? (also Chickaloon Formation). Between P-24 and P-25: highly sheared and indurated Chickaloon shale with andesite flow higher up slope (north side of stream); complicated and incomprehensible structure. I get the feeling something big is going on here, including folding, much like what I saw at King River (see K-16 sketch), but the rocks are too messed up to tell. (See note for P-28.)
P-26			6	428056	6860237	Elevation: 1,820 feet Slickensided fracture next to possible fault gouge 321°/74°N. Coaly Chickaloon Formation. (See note for P-28.)
P-27			6	427690	6860379	Elevation: 1,640 feet Bedding in Chickaloon sandstone 052°/71°E; less sheared, fractured, and indurated than upstream; coaly section. (See note for P-28.)
P-28		Intersection of stream with Chickaloon River	6	427226	6860784	Elevation: 1,340 feet (topo) **Note: section from P-24 to P-27 contains andesite flows (or sills) and highly indurated siltstones, which are very difficult to tell apart.
P-29		Chickaloon River	6	427095	6859674	Elevation: 1,240 feet Bedding 264°/47°S. Sandstone in good Wishbone conglomerate.
P-30			6	426862	6859213	Bedding in Wishbone Formation 313°/10°N on east side of Chickaloon River; on west side of river I can see siltstone beds, which are probably lower Wishbone Formation.
P-31			6	426626	6858959	Dip of bedding 0°–2° (call it horizontal); graywacke sandstone (either lower Wishbone or upper Chickaloon Formation).
P-32			6	426670	6858737	Bedding 170°/17°N; Chickaloon Formation probably; 100 foot sequence of siltstone and shale; many plant fossils, abundant leaves; take Wishbone–Chickaloon contact as being between P-30 and P-31.
P-33		Bearing 076½° from crook in stream	6	430170	6860525	Elevation: 3,720 feet Probable fault contact between Chickaloon Formation on south and Talkeetna Formation on north; fault zone (Castle Mountain fault) is ~250 feet wide here, 100 feet north of this point and 150 feet south of this point, fault zone appears to consist of a swarm of andesite? Dikes (8–10 dikes in all) separated by dark fault gouge and, in places, breccia. Identity of the gouge is obscure but appears to be somewhat coaly south of P-33 and volcanic north of P-33. **The dikes, which are fairly fresh, and the fault gouge are folded. Dating of the dikes, which were probably intruded along the fault, and a stereonet analysis of the folding might be very illuminating. Small folded fractures in andesite dike 35 feet northwest of P-33. Fold axis – bearing 065°, plunge 20°.
P-34		Bearing 070° from crook in stream	6	430129	6860599	Elevation: 3,780 feet Shear zone, 1 foot wide, 102°/88°S; slickensides indicate vertical movement, south side up; in Talkeetna Formation volcanics.
P-35			6	429933	6860718	Elevation: 3,730 feet Contact 018°/40°S; between 50 feet whitish tuff on top and black highly fractured, aphanitic argillite or volcanic on bottom; Talkeetna Formation?
P-36			6	430126	6860239	Elevation: 3,940 feet Wishbone–volcanic contact uphill at ~3,970 feet; Wishbone–Chickaloon contact downhill at ~3,850 feet; float from volcanic basalt or andesite, fine-grained, hornblende crystals occasionally.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
P-37			6	430023	6860248	Elevation: 3,800 feet Basaltic?, very-fine-grained dike, trending 025° (but also intruding in other directions), altered, intruding Chickaloon Formation, pebble conglomerate, coal 40 feet uphill.
P-38	P-2		6	430237	6860454	Elevation: 3,890 feet (top of fold) Fold (~75 feet across) in Castle Mountain fault zone; folded, light-colored andesite or basalt dikes (up to 20 feet thick) and dark fault gouge, often coaly (coked??) in appearance. **Sample P-2** (two samples; one for age dating with K-Ar; one for thin section); dating of dike should demonstrate movement on this portion of the splay since the obtained date. Bedding measurements on fold: top of fold 090°/67°S, 252°/32°S, 103°/58°S, 090°/74°S; inner part of fold 240°/50°S, 104°86°N; bottom of fold 196°/26°E, 166°/34°E, 112°/49°E, 301°/79°E, 144°/31°E; funny things going on at hinge 112°/85°N, 087°/88°N, 062°/73°S; south limb of fold 065°/64°S, 082°/70°S. (Pictures taken close-up with Miriam looking 060° and far shot looking 080°.) Reasons I know dikes are folded rather than intruded that way: 1. Two and possibly three dikes are concordantly folded. 2. Surrounding Chickaloon Formation gouge is generally concordant with the fold, and where it isn't, it is folded in small folds, including chevron folds.
P-39	P-3		6	430582	6860537	Elevation: 4,660 feet (8/30/77) Contact between andesite or basalt flow (with biotite or phlogopite phenocrysts) on south and argillite or possibly volcanics on north, which has erratic, carbonate-rich (siderite) concretions (Matanuska Formation?, possibly Chickaloon Formation); probably same as at P-41 up the ridge. **Sample P-3** (two samples of argillite) is a wedge between two faults; north fault splay also defined by andesite dikes. 8/31/77 – As seen from a distance, unit appears to dip northerly ~30°.
P-40			6	430554	6860430	Andesite? flow with basalt or andesite dikes same as in fault zone; disregard Tim mapped unit on Detterman and others (1976) map.
P-41			6	430656	6860682	Talkeetna Formation volcanics; some argillite rocks in unit – blocks; near fault; does Talkeetna Formation die here and not continue eastward?
P-42	P-4 P-5		6	430990	6861039	Elevation: 5,185 feet Andesite? flow; weathers fissile; Talkeetna Formation; all formerly named argillite is probably volcanic (has limestone concretions – probably subaqueous). **Sample P-4** (two samples): Do thin section work; hint of bedding? dipping 3° in easterly direction. **Sample P-5**: Sample of biotitic (or phlogopitic) graywacke, sandstone(?) same as described at P-39; indicates north-on-north fault splay; very distinctive rock; useful marker horizon. P-5 is light-colored unit at top—it dips in an approximately northerly direction 10°–15°.
P-43			6	430709	6861207	Elevation: 4,830 feet 30 feet south of here is an area of moderately tight folding – fold axes generally trend northeast, plunge 30°
P-44			6	430988	6861287	Not visited (difficult to get to). Some kind of faulting going on in here.
P-45			6	428455	6860912	Elevation: 3,000 feet Talkeetna Formation; very-fine-grained, somewhat fissile argillite.
P-46	P-6		6	429034	6860975	Elevation: 3,750 feet Talkeetna Formation; Miriam insists this is graywacke. I originally believed this to be andesite flow similar to sample P-5 (biotitic), but thin section work on **Sample P-6** shows this to be graywacke.
P-47	P-7		6	429297	6861060	Elevation: 3,970 feet Ammonite? in float; most calcareous, fossiliferous pieces of rock appear to come from concretions in volcanic trap. **Sample P-7** (fossil).

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
P-48	P-8		6	429427	6861116	Elevation: 4,140 feet ****Sample P-8** Trap – typical of this whole ridge; make thin section to confirm that rock is volcanic. Note: Pictures taken on the way downslope looking toward P-39 (bearing 115°) of wedge between fault splay.
P-49	P-9 P-10		6	428866	6861565	Elevation: 2,440 feet Talkeetna volcanic? Fissile trap with calcareous sandstone-like elliptical nodules up to 1½ feet long, much like rock found on ridge above nodule. ****Sample P-9** thin section, rock has some sedimentary characteristics (looks like a graywacke) (10/21/77 confirmed graywacke). ****Sample P-10** just above P-9 (20 feet higher) graywacke sandstone??
P-50			6	428889	6861550	Elevation: 2,490 feet Bedded sandstone (graywacke like P-10). Bedding 066°/50°W.
P-51	P-11		6	428964	6861418	Elevation: 2,790 feet Sedimentary siltstone and sandstone; confirm in thin section with **Sample P-11** – calcareous indurate siltstone; no fossils, but some sedimentary-like flow structure; probably Matanuska – sandstone layers look very much like that up Granite Creek. Bedding 073°/61°W.
P-52			6	429440	6861930	Sandstone as at P-50.
P-53			6	428795	6862115	Elevation: 1,570 feet Bedding 248°/67°W. Matanuska Formation? indurated siltstone.
P-54	P-12 P-13a P-13b		6	429562	6861891	Elevation: 2,810 feet Matanuska Formation? **Sample P-12** – Andesite sill or dike? Confirm by thin section. **Samples P-13a and P-13b** – siltstone with fossils (*Inoceramus?* in one). Sample P-12 fizzes slightly in HCl – may be sandstone. Bedding 060°/59°W; highly fossiliferous upstream and upslope from P-54 (*Inoceramus?*).
P-55			6	429713	6861764	Elevation: 3,810 feet Pebble conglomerate in Matanuska Formation; pebbles up to 3 inches across, generally elliptical, unit is 1 foot thick and discontinuous laterally; highly indurated. Fault 297°/72°S, 2 feet wide, contains 6 inch calcite vein; surrounding rock is biotitic sandstone, medium grained as in sample P-5; matrix of conglomerate pebble, also biotitic; bedding attitude not certain.
P-56			6	429844	6861762	Elevation: 4,060 feet Medium-grained graywacke sandstone, like sample P-5, biotitic, calcareous cement.
P-57			6	429776	6861730	Elevation: 3,990 feet Bedding 220°/34°W. Rock similar to that of P-56.
P-58			6	429785	6862281	Elevation: 2,180 feet Highly indurated, dark Matanuska Formation siltstone. Bedding 286°/42°N; prominent fractures 278°/80°S, 035°/82°W.
P-59			6	429926	6862137	Elevation: 2,580 feet Diabase dike, ophitic texture, abundant feldspar laths, and pyroxene; contains 6 inch mixed calcite and diabase vein, minimum 7 feet thick; strike 114°, dip approximately vertical; fairly fine-grained; may be feeder to abundant medium-grained gabbro float found in stream (pyroxene-rich); surrounding rocks are Matanuska Formation siltstone.
P-60			6	429999	6862108	Elevation: 2,770 feet Pyroxene gabbro intrusive in Matanuska Formation; gabbro is medium- to coarse-grained; much of it is altered to chlorite and epidote; side canyon does not show up on topo – use air photo mapping.
P-61			6	430338	6862189	Elevation: 3,150 feet Gabbro intrusive; Matanuska Formation in the float indicates that it is up the hill higher.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-1 through B-191 completed during summer 1978 along Boulder Creek						
B-1		Boulder Creek	6	439820	6865054	Elevation: 3,220 feet Matanuska Formation; black, indurated siltstone; small fault – 3 inch zone; strike 001°, dip almost vertical, displacement west side down, 10 feet(?); many fractures with various displacements. Bedding 071°/63°N; declination 26½°E.
B-2			6	439915	6865258	Elevation: 3,400 feet Matanuska Formation. Black siltstones with limestone concretions and biotitic sandstones, abundant *Inoceramus.* Large fault strike 299°, high angle, cuts off large siltstone sequence; smaller subsidiary fault strike 090° (average of four readings) with slickensides; strike-slip motion.
B-3			6	439739	6864580	Elevation: 2,770 feet Gabbro? Highly weathered, possibly Matanuska sandstone; pyritic in places
B-4			6	439538	6864570	Elevation: 3,110 feet Pebble conglomerate; Matanuska Formation probably (see B-9); pebble of quartzite and andesite?; rock at B-3 may be Matanuska sandstone.
B-5			6	439460	6864720	Elevation: 3,460 feet Small fault 130°/76°S, 1½ foot displacement in Matanuska Formation; argillite with concretion layers, highly chewed up; just above B-5 (elevation 3,510 feet): • Fractures: 313°/75°S; 295°/66°S; 336°/82°N. Bedding 077°/20°N. • Fractures (shear fractures): 107°/62°S; 296°/57°S; 48°/61°E ♦ Bedding 241°/37°W (50 feet from previous bedding measurement) ♦ Bedding 235°/48°W (just above previous bedding; elevation 3,620 feet)
B-6			6	439465	6864809	Elevation: 3,660 feet Gabbro dike, same one as on east side of Boulder Creek probably; appears to be same lithology as gabbro seen last summer on east side of Chickaloon River. Elevation: 3,670 feet Trend on dike 312°. Cooling joints and/or flow banding: 317°/88°N; 320°/87°N; 320°/90°. Cross fractures (joints?) 049°/74°E; 050°/88°E.
B-8			6	439536	6864424	Elevation: 2,910 feet Diabase dike along river
B-9			6	439377	6864382	Elevation: 3,110 feet Bedding in Talkeetna Formation; sandstone 132°/15°S. This sandstone is underlain by conglomerate such as that at B-4, and overlain by typical Talkeetna Formation andesite flow.
B-10			6	439520	6864481	Elevation: 3,000 feet Fault zone 6 feet wide in Talkeetna Formation. Strike and dip 210°/90°; slickensides indicate left lateral strike-slip movement.
B-11			6	439454	6864557	Elevation: 3,100 feet Gabbro dike; trend 282°, nearly vertical, 10 feet thick. Rock above unknown (baked?).
B-12			6	439287	6864553	Elevation: 3,090 feet Diabase dike; perfect example of sample P-2; 137°/72°S
B-13			6	439194	6864587	Elevation: 3,180 feet Diabase dike (almost pyroxenite); trend 105°; almost vertical; surrounding rock probably highly baked, impossible to identify (black)

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-14			6	439004	6864378	Elevation: 3,850 feet Fault between Talkeetna Formation (Horn Mountain member) and Tuxedni??; Matanuska?; 30-foot-wide zone, trend 50°, connects with fault below?
B-15		Bearing 267° from spot in river	6	438780	6864380	Elevation: 4,220 feet Bedding 036°/6°W; in Tuxedni? siltstone
B-16			6	439314	6864670	Elevation: 3,230 feet Bedding 290°/27°N; Matanuska Formation
B-17			6	439205	6864537	Elevation: 3,230 feet Bedding 090°/42°N; Matanuska; sandstone bed
B-18			6	438743	6864921	Not Listed - No Entry
B-19			6	438924	6863400	Elevation: 3,110 feet Silicified tuff; Talkeetna Formation
B-20	SB-1 SB-1-AM		6	438684	6863403	Elevation: 3,510 feet Top of "Whitey the tuff"; marker horizon; very white tuff with moderately large, well-formed sanidine crystals, chlorite-rich (replaced mafics) on top; same unit seen on adjacent ridges and across Boulder Creek; probably 80–100 feet thick; difficult to tell because attitude is unknown.
B-21		In Anchorage D-3 Quad	6	440982	6866476	Elevation: 2,970 feet Tuxedni Group; tan-gray siltstone, does not fizz with HCl, no bedding apparent
B-22			6	440878	6867126	Elevation: 3,320 feet Bedding 221°/20°E; Tuxedni; medium-grained, massive sandstone, low-rank graywacke, moderate amount of hematite (which probably gives the unit its tan-gray color), mafics and/or opaques, feldspar? Walking up creek to this point indicates that the rocks are tan-gray siltstones and sandstones (which do not fizz with HCl) and lesser massive gray limestones; few fossils. Plant and bryozoan found; bedding is usually difficult to discern except in this spot. Very little structure except moderate fracturing.
B-23			6	440057	6867811	Elevation: 4,370 feet Probably Red Glacier Formation in Tuxedni Group. Bedding 337°/31°W; pelecypods abundant in some layers; mainly sandstone, some siltstone. General description of Tuxedni Group view across valley to northeast: 1. Upper one-third: Tan to tan-orange siltstones and sandstone. 2. Middle one-third: Variegated gray, white, dark gray, and orange-tan siltstone, shales, and sandstones. Top to bottom: gray, white, gray, dark gray, white, gray to brown-gray, tan-orange, dark gray, white, gray, dark gray, tan, white, gray to bottom one-third of unit. 3. Lower one-third: Tan-orange siltstone and sandstone with a dark gray unit running through the middle. Elevation, top of hill: 4,500 feet. Bedding (halfway between B-23 and hilltop) 327°/39°N; nautiloids fairly common.
B-24		135½° bearing to camp	6	439729	6865187	Elevation: 3,650 feet Diabase dike, trend ~299°. Strike and dip 111°/77°S (straight average of three readings). True thickness ~40 feet; goes up to elevation 4,150 feet; hooks slightly north.
B-25			6	439511	6865273	Elevation: 4,180 feet Bearing 75° to top of dike; fault 060°; dips slightly east; shear fractures 282°/72°N; 105°/75°N; 359°/57°E

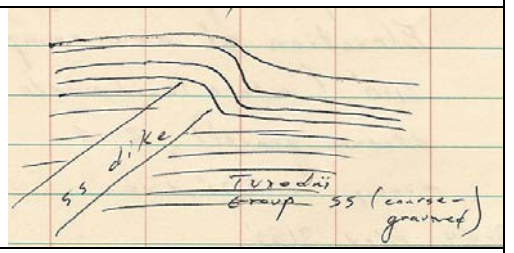
NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-26		Bearing from camp 308°	6	439337	6865424	Elevation: 4,630 feet Altered diabase dike; strike and dip 242°/56°N – goes all across cirque; 20 feet thick; may be a sill; no bedding apparent from B-25 to here; rocks (Matanuska argillite, mainly) consistently more beat up and fractured than at elevation of B-24. Thrust faulting??
B-27			6	439216	6865405	Elevation: 4,780 feet Matanuska Formation near Caribou fault; bedding destroyed
B-28			6	439131	6865292	Elevation: 5,030 feet Bedding 060°/51°W; Matanuska Formation
B-29		Accurate on map	6	438838	6865361	Intensely sheared Matanuska argillite with tight, very small (wavelength 2 inches) folds with vertical axes, indicating strike-slip motion (sense not certain); trend same as ridge trend here.
B-30		As located on map	6	438658	6865248	Bedding 161°/22°N in Matanuska Formation
B-31			6	440107	6865361	Elevation: 3,260 feet Moderate–large fault running along gabbro dike, trend 298°. Bedding (25 feet lower) within middle fault block; 011°/15°W in Matanuska Formation; coarse biotitic sandstone; 285°/80°S – calcite-filled shear; probably best estimate of true strike and dip of fault; prominent fracturing 045°/69°E; pelecypods; second fault ~100 feet to south, also follows dike, 279°/83°S, trend 290°; south block dropped down; actually the fault is a zone about 35 feet wide; on south side attitude of 296°/63°S is clear on fault plane but curves in dip somewhat; small bed dragged up in fault zone clearly indicates south block down, 50 foot displacement is indicated by elevation reading; bedding south of fault is 047°/8°W.
B-32			6	437697	6861723	Elevation: 3,030 feet Bedding 067°/11°N; Talkeetna Formation; submarine volcanic sandstone, medium grained, small scale cross-bedding; very-well-bedded sequence of volcanic sandstones and tuffs here and above; ~100 feet downstream there is beautiful agglomerate; fault near here has 100 foot displacement.
B-33	Nine samples total SITE I PAL-1-I-1 PAL-1-I-2 PAL-1-I-3 SITE II PAL-1-II-1 PAL-1-II-2 PAL-1-II-3 SITE III PAL-1-III-1 PAL-1-III-2 PAL-1-III-3	SITE II is 47 feet upstream from Site I SITE III is 50 feet upslope from Site II	6	437605	6861914	Elevation: 3,230 feet (mapping done 7/3/78) Contact with intrusive stock; felsite (probable rhyolite), aphanitic with very few quartz and chlorite (after mica) phenocrysts; satiny white, but elsewhere pink (white only near contact?); fantastic cooling joints characterize the whole intrusive; very minor pyrite; highly baked contact 6–12 inches thick; Talkeetna Formation; volcanic flow below contact. (Paleomagnetic sampling of felsic intrusive done on 7/17/78.) Oriented samples. SITE I: All samples taken within 7 feet of one another (chill zone) **PAL-1-I-1**: 292°/55N - 7 inches above contact **PAL-1-I-2**: 291°/67°N – 12 inches above contact (on tape line is 292°) **PAL-1-I-3**: 294°/88°N – 13 inches above contact SITE II: All samples taken within a 6 foot area ~8 feet above contact **PAL-1-II-1**: Line on top (not strike line) is 261° **PAL-1-II-2**: Line on top is 270° **PAL-1-II-3**: 325°/75°N SITE III: All samples taken within 6 foot area **PAL-1-III-1**: 0°/77°E **PAL-1-III-2**: 358°/85°E **PAL-1-III-3**: 357°/84°E

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

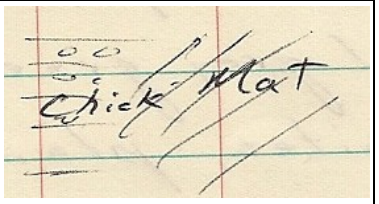
NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-34	 SITE I PAL-2-I-1 PAL-2-I-2 PAL-2-I-3 SITE II PAL-2-II-1 PAL-2-II-2 PAL-2-II-3 SITE III PAL-2-III-1 PAL-2-III-2 PAL-2-III-3	Samples taken 50 feet upslope from stream SITE II is 50 feet upstream from site I SITE III is 30 feet upstream from site II	6	437518	6862003	Elevation: 3,350 feet (at stream) (mapping done 7/3/78) Diabase to gabbro dikes (two), ~40 feet apart. Orientations 101°/75°S; 113°/76°S; 107°/73°S (average = 107°/75°S). Some pink felsite (in addition to white) south of stream. (7/18/78 – Paleomagnetic sampling of diabase dike. Sampled northerly dike. Dike ~10 feet wide.) SITE I **PAL-2-I-1**: 315½° – Line on top; sample 2 feet in from contact **PAL-2-I-2**: 281½° – Line on top; sample 2 feet from contact **PAL-2-I-3**: 257° – Line on top; sample 3 feet in from contact SITE II: All samples were taken within 2 feet of each other and ~6 inches from contact, and thus represent chill zone **PAL-2-II-1**: 202½° – Line on top. Note: Use bottom portion of upper level line. **PAL–2–II–2**: 245° – Line on top. **PAL–2–II–3**: 288° – Line on top. Note: Watch crack. SITE III: All samples taken within 6 feet of each other and near the middle of the dike **PAL-2-III-1**: 206½° – Line on top. **PAL-2-III-2**: 256° – Line on top. Note: Use lower level line. **PAL-2-III-3**: 274° – Line on top. Note: Level lines short; may be difficult to level properly.
B-35	B-2 and B-2-Am	~150 feet up-stream from B-34; north side of stream	6	437463	6862035	Elevation: 3,400 feet Somewhat coarser variety of rhyolite; white with uniform distribution of green poikiloblastic hornblende?; chlorite, very minor pyrite? Samples **B-2** and **B-2-Am** for age dating. [Determined to be rhyolite by geochemical whole rock analysis done after dissertation completed. See analyses.]
B-36			6	440321	6865815	Elevation: 3,260 feet Clam fossils in sandstone; also limestone nearby; Matanuska Formation.
B-37			6	439934	6866133	Elevation: 3,230 feet Eastern limit of exposed Chickaloon?; pebble conglomerate; actually this is located float.
B-38			6	439780	6866111	Elevation: 3,420 feet In float – fault gouge characteristic of that found in the Caribou fault; Caribou fault probably very close to this spot.
B-39			6	439641	6866158	Elevation: 3,390 feet Bedding 112°/24°N; in Tuxedni Group? Thick sequence of sandstones with considerable volcanic material.
B-40	B-3 B-3-Am B-3-2		6	439520	6866062	Elevation: 3,650 feet Caribou fault zone, ~50–100 feet wide, Chickaloon pebble conglomerate to south; Tuxedni Group sandstone to north; beautiful fault gouge (samples). fault trend = 085°. Samples **B-3**, **B-3-Am**, and **B-3-2** for possible future age dating.
B-41			6	439218	6865929	Elevation: 4,040 feet Caribou fault zone; well exposed on ridge; fault trend = 262°.
B-42			6	439104	6865941	Elevation: 4,010 feet Caribou fault? Zone 082°/25°S is attitude on shear zone; Tuxedni Group north of fault; Talkeetna Formation south of fault; attitude of fault roughly parallels bedding in Tuxedni; rotated fault zone??
B-43			6	439183	6865817	Elevation: 4,220 feet Fault; Chickaloon Formation to south and Tuxedni Group to north, fault zone~50 feet wide; diabase dike occupies zone and its trend appears to be trend of fault 230°.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-44	B-5 B-5-Am		6	439126	6865657	Elevation: 4,310 feet Bedding 061°/48°N; Chickaloon Formation, pebble conglomerate.
B-45			6	439116	6865609	Elevation: 4,345 feet Bedding 319°/45°N; Chickaloon Formation; fault between here and B-44.
B-46	B-4 B-4-Am		6	439102	6865433	Elevation: 4,620 feet Contact of Chickaloon Formation (pebble–cobble conglomerate, ~50 feet thick) with Matanuska Formation argillite. Unfortunately, only Chickaloon Formation is exposed in outcrop, but this does not appear to be a fault contact. Looking westward along contact toward knob 2,000 feet westward, a consistent strike and dip in the Matanuska Formation can be seen, measured as 242°/65°N on a resistant unit. This is the Matanuska–Chickaloon sequence Detterman and others (1976) match up with a similar sequence on the north side of the fault to obtain 16? kilometer right lateral offset. **Samples B-4 and B-4Am** of Chickaloon Formation; pebble conglomerate plus a curious calcareous concretionary? rock, which weathers orange, found sporadically in the same unit. Walking eastward downstream it can be seen that Matanuska Formation at the contact is a fairly thick, black argillite sequence with numerous limestone concretion layers (which fizz in HCl). Here, the Chickaloon Formation is not pebble–cobble conglomerate as in Sample B-4, but rather a pebble conglomerate as in Samples B-5 and B- 5-Am at site B-44. Samples **B-4** and **B-4-Am** for comparison purposes.
B-46-X			6	439419	6866824	Elevation: 3,070 feet Cataclasite, Horn Mountain Tuff member of the Talkeetna Formation—large fault zone, exposed for a distance of 300 feet upstream; slickensides indicate more strike-slip than dip-slip motion; fault has a very rough trend of 320° at this point (if the slickenside surfaces are a true indication of the fault trend)
B-47			6	439007	6866223	Elevation: 3,490 feet Tuxedni Group, sandstone. Bedding 127°/23°N; small? fault 20 feet to the south, attitude 085°/57°N; prominent fractures 085°/53°N—parallels fault, 189° nearly vertical. Fault farther upstream, elevation 3,570 feet; strike changes from 050° east of stream to 064° west of stream; dip 72°S. Farther upstream, elevation 3,590 feet; small intrusive, 30 foot diameter, diorite, speckled gray, equigranular, 60% subhedral, milky plagioclase, 30% anhedral green hornblende, >10% (close to 10%) subhedral quartz; medium-grained, small calcite veinlets, somewhat pyritic in places, may correlate with diorite pluton up Kings River.
B-48			6	438918	6866027	Elevation: 3,730 feet Fault gouge, fault may roughly parallel stream here
B-49			6	438896	6865662	Elevation: 4,150 feet Fault breccia, 4 feet wide, quartz cementing Tuxedni fragments, trend 355° Note from 7/7/79: South of B-49 in north-trending fault zone in Talkeetna Formation. Slick surface = 15°/58°W; slickensides = 16° plunge, 218° bearing; east of zone 247°/66°N surface, horizontal slickenside.
B-50			6	438833	6865648	Elevation: 4,190 feet Tuxedni Group sandstone, highly fractured. Elevation: 4,270 feet (above lower outcrop). Mixed Tuxedni Group and diabase dike rock (scrambled diabase dike occurs throughout the fault zones in this area)
B-51			6	438689	6865401	Elevation: 4,590 feet Lower contact Chickaloon Formation, fault contact with Talkeetna Formation to the south.
B-52			6	438544	6865604	Elevation: 4,240 feet Chickaloon Formation, next to fault, Talkeetna Formation east of fault
B-53			6	438667	6866067	Elevation: 3,780 feet Fault zone, Talkeetna Formation on both sides, trend on fault from shear zone in stream = 230°; going northward found horrendous fault breccia with calcite filling in vugs – possibly a very large fault

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-54			6	439087	6867127	Elevation: 3,180 feet Bedding 226°/09°S in Horn Mountain Tuff coarse-grained sandstone; ~200 feet upstream from B-54 there is a beautiful sandstone dike injected into flat-lying beds and resulting in a kink fold with a fold axis of ~100° with a slight plunge in that direction; sedimentary feature. [In diagram Horn Mountain Tuff mislabeled as Tuxedni] 
B-55			6	438992	6867474	Elevation: 3,310 feet Horn Mountain Tuff; beds steeply dipping to the northeast, fault probably just south of here. Sense of drag folding indicates north side down, but this is opposite of up-down indicated on map of Detterman and others (1976); sandstone from B-54 to here. Mostly medium grained. All of it seems highly tuffaceous. Wavy folding common; some sandstone dikes.
B-56			6	438829	6867528	Elevation: 3,410 feet Fault zone, cataclasite + diabase dike trending 65°, Tuxedni Formation, tuff to the east
B-57			6	438648	6867742	Elevation: 3,520 feet at stream Tuxedni Group, sandstone very much volcanic material in detritus, dark green. Bedding 262°/28°S (very representative of this northern block).
B-58			6	438953	6867543	Strike-slip fault, trend 170°, almost vertical but curved
B-59			6	438509	6866830	Elevation: 3,340 feet Bedding 248°/16°N. Tuff – probably the Horn Mountain tuff member of the Talkeetna Formation and not Tuxedni Group as mapped by Detterman and others (1976).
B-60	F-1 F-1-Am1 F-1-Am2		6	438355	6866944	Elevation: 3,470 feet Tuff on east, Tuxedni sandstone on west; uncertain if contact is a fault contact. **Sample F-1**: *Trigonia* and belemnites, key fossils to Tuxedni Group; in characteristic graywacke, sandstone matrix. **Sample F-1-Am1**: *Trigonia*. **Sample F-1-Am2**: clam. Also found petrified wood and ammonites.
B-61			6	437653	6866440	Elevation: 3,840 feet Fault 220°/85°E; Tuxedni to east, tuff to west; slickenslides, pitch 10°N, indicate left-lateral slip. Relations between tuff and Tuxedni unclear. Just downstream from B-61 Tuxedni seems to underlie the tuff, but at B-61 the two are clearly in fault contact and the fault is very sharp (that is, faults elsewhere could easily be missed); small fault upstream (attitude 182°) cuts off tuff.
B-62		Location as plotted	6	437488	6866440	Bedding 058°/10°N; Tuxedni Group, sandstone. Fault, trend 305°.
B-63			6	436123	6865965	Elevation: 4,260 feet Bedding 015°/08°W; Tuxedni Group, coarse-grained, medium-bedded sandstone
B-64	B-6-1 B-6-2	~15 feet above contact with Talkeetna Formation greenstone	6	436297	6865482	Elevation: 4,730 feet Although slickensided shears are evident, it is demonstrable that the thick tuff sequence is gradational, thus leading credence to the idea that this is the Horn Mountain Tuff member of the Talkeetna Formation. Age dating of samples **B-6-1** and **B-6-2** should resolve whether this is so or if it is Tertiary volcanics as mapped by Detterman and others (1976). Sample **B-7** (for thin section) is a sample of the Talkeetna Formation greenstone. The tuff is dusty white with considerable orange iron oxide in matrix.
B-65			6	438481	6866396	Bedded tuffs. Bedding 138°/16°E; prominent fracture 103°/78°W.
B-66			6	438405	6865840	Elevation: 4,170 feet Tuxedni Group, sandstone, typical gray-green, belemnites, plant fossils, pelecypods, *trigonia*

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-67			6	438142	6865405	Elevation: 4,810 feet Talkeetna Formation greenstones to south and Talkeetna Formation (I think it is) pink, porphyritic, less altered volcanic flows to the north.
B-68			6	437842	6865120	Elevation: 4,440 feet  Bedding 145°/10°W; Chickaloon Formation. Important location because Chickaloon–Matanuska contact is seen. Looking northeast from here Chickaloon is a ~350 foot sequence of almost entirely pebble conglomerate, with pebbles of black chert, white quartz, and Talkeetna? Formation, (plus some pebble–cobble conglomerate). It is steeply dipping southward along fault. Actual contact with Matanuska is occupied by dike-sills of diabase. Contact was probably originally erosional with Chickaloon, forming stream gravels. The upper Matanuska is a dark argillite with some sandstone beds. No fossils seen.
B-69			6	437328	6865010	Elevation: 4,850 feet Caribou fault zone starts here and continues upstream. Very well exposed and sharp. Attitude on fault plane 240°/15°N – actually a thrust here, but this is probably not true for whole zone.
B-70	B-8-1 B-8-2		6	437077	6864735	Elevation: 5,480 feet In fault zone: diabase–gabbro dike, attitude 115°/70°S; representative of many dikes. Samples **B-8-1** and **B-8-2** for age dating.
B-71			6	437192	6864662	Elevation: 5,650 feet, ridge top Strongly cross-bedded; 63°/63°N; Chickaloon Formation
B-72			6	437074	6864429	Chickaloon Formation. Bedding 074°/40°N; nearby dike oriented 267°/54°S.
B-73			6	441855	6866887	Elevation: 3,290 feet Bedding 164°/25°E; Chinitna Formation, siltstone, indurated, fractured, indistinguishable from Tuxedni Group.
B-74			6	441866	6867027	Elevation: 3,670 feet Bedding 254°/19°S; Chinitna Formation; from B-73 to here has been a continuous section of greenish gray to brown-gray siltstone (with some limestone concretionary layers) with very occasional thin sandstone beds. No fossils seen.
B-75			6	441482	6867166	Elevation: 3,050 feet Bedding 205°/22°E; Chinitna Formation, siltstone, brownish gray with concretions, thin, medium-grained sandstone, orange
B-76			6	441175	6868000	Elevation: 3,260 feet Fault zone, attitude 168°/75°W; normal fault; abruptly cuts off Tuxedni Group sandstone; gray with minor conglomerate and belemnites; in places it is adjacent to orange Tuxedni siltstone.
B-77			6	441560	6868526	Fault seen from opposite ridge, displacement roughly 400 feet Note: from ridge to peak = 236° at elevation 3,970 feet

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-78			6	441661	6868457	Elevation: 4,130 feet Bedding 181°/24°E; Chinitna Formation, dark sandstone, concretions, some pyritic areas, lower boundary of formation is at ~4,070 feet. Tuxedni below is brown (weathered) siltstone hundreds of feet thick with concretionary layers, very uniform. Story of the Tuxedni–Chinitna contact: As mapped by Detterman and others (1976) at this location, the uppermost Tuxedni Group consists of hundreds of feet (>500 feet) of non-resistant, orange-brown weathering siltstone with concretionary layers, all very uniform in appearance. The Chinitna Formation is concordant and begins with a dark brown, medium-grained sandstone, perhaps 50–100 feet thick, then a brown siltstone, non-resistant, less orange (weathered) than the uppermost Tuxedni, perhaps 100–200 feet thick. Then a very thick sequence (>1,000 feet) of resistant, cliff-forming black and white monotonous, alternating rocks, siltstone with thin sandstone interbeds. The uppermost rocks are predominantly gray siltstone with one distinctive orange sandstone bed. Belemnites are moderately common in the Chinitna and less common are beds with pelecypods. Occasional ammonites are also found. The Chinitna may be very difficult to distinguish from Tuxedni in isolated outcrops. (Note added 9/9/78) Except for the lowermost beds, the Chinitna is noticeably less fossiliferous than the Tuxedni Group.
B-79			6	442496	6867167	Elevation: 3,250 feet Bedding 169°/16°E; Tuxedni Group; no fossils seen. Greenish gray sandstone like Tuxedni Group.
B-80			6	442629	6867581	Elevation: 3,470 feet Bedding 027°/13°E; Tuxedni Group
B-81			6	442074	6867847	Pronounced unconformity between Chickaloon and Chinitna
B-82	SK-1	West side of King River	6	413952	6856740	Elevation: 3,410 ± 30 feet **Sample SK-1**, two bags for age dating; sheared diorite. Shear fractures 323°/88°E – sampled; shear fractures 336°/88°E; 332°/80°E; 337°/45°W; 295°/85°N; taken ~300 feet from main Castle Mountain fault zone; many shears slickensided.
B-83	SK-2		6	413988	6856764	Elevation: 3,470 ± 30 feet **Sample SK-2**, two bags for age dating. Shear fractures 330°/75°E (sampled); 328°/85°W; 080°/10°N – many approximately parallel to this.
B-84	SK-3	Bearing 252° to peak across river	6	413563	6857358	Elevation: 3,730 feet **Sample SK-3**, for age dating. Fresh diorite, medium-grained, some calcite veinlets.
B-85	SK-4	Bearing 246° to peak across river	6	413314	6857531	Elevation: 3,700 ± 30 feet **Sample SK-4**, for age dating, fresh diorite, more mafics and pinker than SK-3, some slickenside fractures nearby, but these caused little or no alteration in the samples taken. NOTE: The purpose of age dating samples SK-1 through SK-4 is to compare the fission track age dates of apatite in the sheared diorite with that in fresh diorite. Apatite fission tracks anneal at 150°C and thus it is possible that a significant faulting event accompanied by frictional heating may be dated.
B-86			6	414050	6856443	Matanuska Formation, siltstone, dark gray, highly fractured, no fossils seen.
B-87			6	440738	6864305	Elevation: 3,210 feet Lowest point on spectacular diabase dike on east side of Boulder Creek across from camp; orientation of cooling joints 136°/ vertical. Rough trend on dike 127°.
B-88			6	440863	6864365	Elevation: 3,350 feet Bedding or foliation (cleavage?) 013°/51°W; probably an altered (it has pyrite and some sericitic sheen) welded tuff next to diabase dike. Just upslope from here at an elevation of 3,420 feet is a dike swarm ~100 feet wide with an orientation of 120°/77°S; fairly certain dike occupies a fault as evidenced by sheared material almost gouge-like.

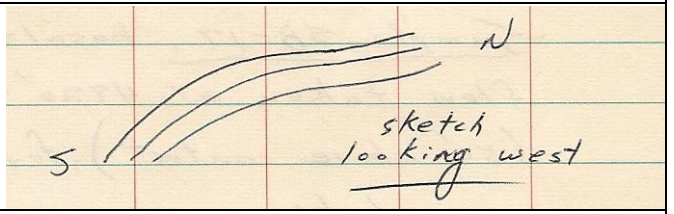
NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-89			6	441040	6864419	Elevation: 3,550 feet Diabase dike – attitude 103°/approximately vertical; ~50 feet wide
B-90			6	441472	6864367	Elevation: 4,410 feet Fault, right-lateral strike-slip offsets distinctive dike swarm ~500 feet; can be seen to extend southward across valley; trend 010°; must have some normal vertical component with east-side-up (as indicated by 500 foot gap in the dike swarm); dike occupies fault at this location.
B-91	B-9-Am-I B-9-Am-II fossils		6	441770	6864341	Talkeetna Formation – high-rank graywacke, highly fossiliferous, mostly mollusks, some ammonite fragments.
B-92			6	441129	6865404	Elevation: 3,080 feet Bedding 061°/40°. Matanuska Formation, mostly well-indurated siltstone, bedding reading taken on small sandstone bed. No fossils seen to this point.
B-93			6	441266	6865393	Elevation: 3,240 feet Diabase dike, trend 123°, nearly vertical.
B-94			6	441467	6865452	Elevation: 3,560 feet Diabase dike, 3 feet wide, trend 126°, nearly vertical.
B-95			6	441497	6865410	Elevation: 3,660 feet Diabase dike, trend 105°, nearly vertical. Fault 75 feet southeast along ridge from here separates Matanuska Formation on north from Talkeetna Formation, silicified tuff on south; fault trend 055°.
B-96			6	441616	6865153	Elevation: 4,065 feet Cataclastic fault zone, trends 090° to W, 095° to E. Prominent faults 132°; 172°. Slickensides dominantly strike-slip; 310° slickensides.
B-97			6	441616	6865118	Elevation: 4,140 feet Diabase dike, trend 102°, nearly vertical
B-98			6	440374	6863679	Elevation: 3,080 feet Diabase dike; trend 100°
B-99			6	440593	6863514	Elevation: 3,310 feet Diabase dike swarm 100 feet wide, rough trend 150° ± 5°. Note topo map is screwed-up here. Stream fork is mislocated by at least 200 feet.
B-100			6	440702	6863681	Elevation: 3,480 feet Bedding 092°/25°N; Talkeetna Formation, volcanic siltstone; surrounding rocks are flows and agglomerates. Bedding 100 feet upstream 087°/14°N.
B-101			6	438256	6863742	Elevation: 4,060 feet Diabase dike; attitude 296°/72°S
B-102			6	438232	6863801	Elevation: 4,150 feet Talkeetna Formation–Tuxedni Group contact; fault contact, but fault may be small. Some slickensides. Bedding 060°/38°N in Tuxedni Group sandstone; bedding taken 200 feet west along slope at same elevation as this locality.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-103	FSB-10 FSB-11-AM FSB-11		6	438117	6864092	Elevation: 4,590 feet Bedding 036°/37°NW; 051°/47°NW; 051°/36°NW. Tuxedni Group. **Sample FSB-10** – Very distinctive brachiopod (in field asst. Steve McMillin's possession). Also good belemnites. **Sample FSB-11-AM** – mollusks and belemnites. **Sample FSB-11** – (in McMillin's possession) mollusks and belemnites. 7/11/79: Boulder Creek fault north of B103 has an overall dip of 50°S (it is actually somewhat undulatory).
B-104			6	441390	6865812	Bedding 271°/16°N. Matanuska Formation.
B-105			6	442125	6865895	Elevation: 3,080 feet Bedding 261°/41°N. Matanuska Formation 150 feet north of major fault separating Matanuska and Talkeetna Formations.
B-106			6	442421	6865614	Elevation: 3,470 feet Diabase dike – attitude 098°/77°S; in Talkeetna Formation; part of a small dike swarm; better overall trend is probably 115°.
B-107			6	442669	6865100	Elevation: 3,790 feet Fault with diabase dike; rough trend 095°; smaller pyritic mineralized zone is associated.
B-108			6	442844	6864761	From this point to upstream 600 feet greenstone exposed similar to that found on Kings River. Section from B-105 to B-108 represents ~2,000 feet of Talkeetna Formation above greenstone, assuming a northward dip of 25°.
B-109			6	442892	6865454	Fault seen from a distance; displacement ~200 feet, northwest side up.
B-110			6	436914	6864177	Elevation: 5,730 feet Fault zone, ~150 feet wide, occupied by numerous diabase dikes; trend at this point 90°.
B-111	SB-12		6	436879	6864076	Elevation: 5,830 feet (topo probably wrong here) **Sample SB-12** – Belemnites in dark gray siltstone (Chinitna? Formation); section composed of predominantly siltstone with limestone concretionary layers and some thin beds of medium to coarse sandstone with moderate feldspar.
B-112			6	436762	6863940	Elevation: 5,930 feet Bedding 078°/35°N; Chinitna? Formation
B-113			6	436288	6864047	Elevation: 5,750 feet Diabase dike, trend 125°
B-114			6	436315	6863981	Elevation: 5,800 feet Bedding 253°/47N; Chinitna Formation?
B-115			6	437000	6864652	Small fault (100 foot displacement) in Chickaloon Formation seen across valley from B-114
B-116			6	436599	6863621	Elevation: 5,780 feet Fault with up to ~200 foot displacement
B-117			6	436815	6860597	Elevation: 2,950 feet Felsite intrusive
B-118			6	436705	6860705	Elevation: 3,350 feet Igneous breccia containing mostly Talkeetna Formation pebbles with small amount of igneous matrix.
B-119			6	436545	6860619	Felsite intrusive
B-120			6	439036	6860061	Elevation: 2,990 feet Talkeetna Formation, maroon agglomerate.
B-121	SB-13		6	439968	6859891	Elevation: 3,880 feet Diorite intrusive, medium-grained; chloritic and cataclastic in places; causes doming-up of overlying Talkeetna Formation. **Sample SB-13** – for age dating (low priority). [Later whole-rock geochem analysis shows this to be borderline gabbroic diorite–monzodiorite.]

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-122			6	440074	6859978	Elevation: 3,950 feet Bedding 295°/20°N; Talkeetna Formation, agglomerate, just above intrusive contact
B-123			6	440505	6860215	Elevation: 4,280 feet Bedding 278°/23°N; Talkeetna Formation, agglomerate
B-124			6	440086	6859689	Elevation: 4,470 feet Bedding 061°/28°N
B-125			6	440205	6859508	Elevation: 4,460 feet Bedding 229°/25°S
B-126			6	440263	6859584	Elevation: 4,600 feet Bedding 292°/12°S
B-127			6	440219	6859617	Elevation: 4,550 feet Bedding 356°/42°E
B-128			6	437534	6858586	Elevation: 4,010 feet Castle Mountain fault zone. Chickaloon to south, Talkeetna Formation to north; in float.
B-129			6	437018	6858300	Bedding 055°/82°N; Matanuska Formation, probably upper Matanuska; very sandstone-rich
B-130	SB-14		6	436888	6858395	**Sample SB-14** – Rhyolite–dacite intrusive, [Borderline rhyolite–dacite determined by geochemical whole-rock analysis done after dissertation completed. See analyses.]
B-131	SB-15		6	435503	6858626	**Sample SB-15** – Float from cliff; felsite intrusive
B-132		Boulder Creek upstream from cabin	6	443904	6867823	Elevation: 3,230 feet Bedding 156°/62°E; Chinitna Formation. Belemnite found here. Considerable fossilized wood found in stream. Gray sandstone and siltstone.
B-133			6	443848	6867911	Fault; vertical displacement, ~150 feet
B-134			6	443786	6868071	Unusual fossil in talus (probably close to in-place), like a small crab's leg, preserved in concretion nodule. Sequence appears to be one-third sandstone, two-thirds siltstone; belemnites fairly common, but few other fossils found; this may be Chinitna Formation.
B-135			6	444097	6868073	Bedding 166°/35°E; Chickaloon Formation, sandstone, plant fossils (wood fragments) seen in stream material.
B-136			6	443818	6868214	Elevation: 3,970 feet Contact between Chinitna and Chickaloon Formation; 2 inches soil horizon (clayey) at contact, black siltstone below contact, boulder–cobble conglomerate above contact.
B-137			6	443688	6868393	Elevation: 4,370 feet Bedding 159°/22°E, Chickaloon Formation, sandstone with plant fossils.
B-138	SB-16		6	443422	6868526	Tuffaceous(?) sandstone, Chickaloon Formation, very white, several hundred(?) feet thick. This unit has been seen elsewhere, and can be considered a marker horizon. **Sample SB-16**, for age dating; coaly fragments; thin coal bed in saddle here.
B-139			6	443256	6868875	Elevation: 4,860 feet Bedding 219°/85°S; Chickaloon Formation, tuffaceous sandstone–pebble conglomerate.
B-140			6	443277	6869071	Elevation: 4,960 feet Major fault placing Chickaloon against Tertiary volcanics. Entire Chinitna missing (that is,~2,000 feet vertical displacement); trend 272°, fault plane dips to south, normal fault, beds dragged.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-141			6	444518	6868417	Elevation: 3,410 feet Bedding 015°/51°E; Chickaloon Formation? Coaly beds present. NOTES: Naknek not here. What is mapped as Naknek by Detterman and others (1976) would underlie Chinitna, which is impossible. There are stratigraphic inconsistencies across the Caribou and Castle Mountain faults, in the Talkeetna, Tuxedni, and Chinitna Formations, (that is, the tuffaceous sandstone of Talkeetna Formation and the different Tuxedni–Chinitna contact), which suggest significant, perhaps even large amounts of strike-slip motion. However, no major inconsistencies in the Wishbone stratigraphy are found across the faults. Not enough Chickaloon and Matanuska Formation is seen north of the Caribou fault to compare stratigraphy. This would argue against major strike-slip on the order of hundreds of kilometers since the Eocene. The Wishbone Formation is the key to the early Tertiary history of the fault. North of the Caribou fault, Wishbone rests on Talkeetna and Chinitna. To the south it rests on Chickaloon. This implies either large vertical movement at the end of the Paleocene or major strike-slip motion since that time. The very nature of the Wishbone Formation argues against major strike-slip. It is a very impressive, huge sequence of boulder–cobble–pebble and cobble–pebble conglomerate that must have formed in a restricted environment (such as a graben??) and would not be expected to form over a large lateral area. This and similar stratigraphy suggest that the units north and south of the Caribou and Castle Mountain faults were originally deposited in close proximity to one another. Strike-slip motion on the order of tens of kilometers is not ruled out, however.
B-142			6	444419	6868462	Elevation: 3,530 feet Up to here is Chickaloon Formation for certain; 3–4 major coal beds, thickest one is here at waterfall, ~10 feet thick but much of it is shaly coal; rest of the rocks are fluvial sandstone with some conglomerate. Bedding (taken by Steve) 203°/59°E
B-143			6	444214	6868772	Elevation: 3,790 feet Tuxedni Formation, fine-grained sandstone, outcrop in stream
B-144			6	444133	6868871	Elevation: 3,870 feet Bedding 225°/07°N
B-145			6	443820	6869349	~100 feet displacement on this graben
B-146			6	444120	6868665	Elevation: 3,750 feet Whitish coarse-grained sandstone much like that of Chickaloon Formation near contact with Wishbone Formation, some coal was seen upstream; outcrop appears to be close to in-place.
B-147			6	444323	6868193	Elevation: 3,400 feet Bedding 135°/20°; definite Chickaloon Formation, fine-grained, greenish gray graywacke sandstone.
B-148			6	445833	6868742	Elevation: 3,220 feet Chinitna Formation; dark greenish gray siltstone, massive, belemnites, somewhat chewed-up.
B-149			6	445756	6868998	Elevation: 3,260 feet Bedding 060°/20°S; Chinitna Formation, siltstone with thin sandstone beds
B-150			6	445499	6868955	Fault with ~300 foot vertical displacement can be seen east of stream; small flexural axis just north of here, trends 010°, plunges easterly. 
B-151			6	445237	6869051	Elevation: 3,420 feet Bedding 169°/37°E; Tuxedni Group, siltstone

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-152			6	444603	6869495	Bedding 307°/17°E; Tuxedni Group
B-153			6	443716	6869899	Elevation: 4,080 feet Tuxedni–Chinitna contact
B-154			6	444152	6870357	Elevation: 4,650 feet Bedding 122°/14°N; Chinitna Formation
B-155	SB-17		6	444161	6870472	Elevation: 4,810 feet Contact of Tertiary volcanics with Chinitna Formation. **Sample SB-17**, basalt flow taken at 4,860 feet (50 feet above contact), for age dating.
B-156			6	444900	6868571	Elevation: 3,330 feet Bedding 210°/55°E; Chickaloon Formation, fluvial sandstone with abundant wood fossils
B-157			6	444804	6868676	Elevation: 3,450 feet Fault
B-158			6	445215	6868641	Chickaloon Formation, small outcrop
B-159			6	446060	6869287	Elevation: 3,840 feet Bedding 221°/47°E; Chickaloon Formation
B-160	SB-18 SB-19		6	446101	6869589	Elevation 4,370 ft.; Chickaloon Formation in contact with Tertiary volcanic flow. This Chickaloon is transitional in character to Wishbone, but more like Chickaloon. **Sample SB-18 (critical to tectonic interpretation)** small basalt flow, amygdaloidal, appears to be equivalent of one found on Castle Mountain (see notes for locality K-44); has significance in showing transitional nature of upper Chickaloon -lower Wishbone (facies equivalents) as well as portending the onset of volcanism; Chickaloon here is a pebble-cobble conglomerate with abundant black chert and less abundant pebbles of white quartz, Talkeetna Fm. volcanics, and diorite. Tertiary volcanics consist of massive glassy flow (no basal tuff), blackish brown, weathers pink. **Sample SB-19**, for age dating, taken 10 feet above contact. Existence of coal beds nearby establishes Chickaloon designation.
B-161			6	446853	6869985	Elevation: 4,300 feet White tuffaceous sandstone, Chickaloon or Wishbone(??); contains minor coal
B-162			6	446811	6869905	Elevation: 4,190 feet Bedding 132°/14°S; Chickaloon Formation
B-163			6	447234	6869298	Tuff, Talkeetna? Formation
B-164	FSB-21 SB-20		6	447616	6870466	Elevation: 3,400 feet Bedding 124°/43°N, taken on north-side of stream; Matanuska Formation, abundant *Inoceramus*, **Sample FSB-21** (Steve's possession): One belemnite, worm burrows. **Sample SB-20** (for Eckdale): Biotitic graywacke in places, sandstone is fine- to medium-grained, greenish gray Matanuska–Chickaloon contact is grandly exposed at waterfall where a fine-grained gray-wacke directly underlies a boulder–cobble–pebble conglomerate ~100 feet thick (Chickaloon Formation). Above that is typical whitish, coarse-grained Chickaloon sandstone with coal beds (upper Chickaloon Formation).
B-165			6	447327	6870655	Elevation: 3,970 feet Bedding 026°/23°E; Chickaloon Formation, 10 foot section of bituminous coal interlayered with shale.
B-166			6	447314	6870706	Elevation: 4,060 feet Fault cutting off coal beds, slickenside surface; attitude 254°/64°S

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-167			6	444396	6866981	Elevation: 2,990 feet Bedding 047°/27°N; Matanuska Formation, black siltstone, *Inoceromus* present; small cataclastic fault zone just downstream trends 0°; much felsic intrusive in stream float.
B-168			6	444439	6866716	Elevation: 3,730 feet Talkeetna Formation
B-169			6	444364	6866876	Elevation: 3,440 feet Possible position of fault, cataclasite in float.
B-170			6	444538	6866915	Offset moraine? Has definite landslide features (ponding)
B-171			6	444628	6866513	Elevation: 3,940 feet Projection of dike, trend
B172			6	443294	6868439	Displacement on fault ~100 feet
B-173			6	443251	6868566	Displacement on fault ~50 feet
B-174			6	442951	6868336	Elevation: 4,550 feet Chinitna–Chickaloon contact
B-175			6	442646	6868269	Elevation: 4,700 feet Bedding 172°/31°E; Chickaloon Formation
B-176			6	442534	6868030	Elevation: 4,470 feet Chinitna–Chickaloon contact
B-177			6	442946	6866215	Elevation: 3,210 feet Fault zone – mostly Matanuska in zone; cataclastic zone goes from here up to elevation 3,330 feet
B-178			6	443268	6865452	Altered highly pyritic felsic intrusive.
B-179			6	443853	6866569	Elevation: 3,470 feet Fault zone
B-180			6	446191	6867883	Elevation: 3,390 feet Talkeetna Formation; bedding (~100 feet upstream from here on hillside) 074°/43°N; well-bedded volcanics; unusual to find measureable bedding in this block.
B-181	SB-21		6	445882	6866010	Elevation: 4,710 feet **Sample SB-21** – Rhyolite intrusive [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
B-182	SB-22		6	445647	6865357	Elevation: 5,210 feet **Sample SB-22** – (two samples not in bags) Porphyry phase of dacite intrusive. *For age dating K-Ar on hornblende separate [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
B-183			6	448646	6869815	Looks very much like glassy basal Tertiary volcanic. Above here definitely Tertiary volcanic, below I don't know (could be same or Talkeetna Formation). Immediately below glassy stuff it looks vesicular and like Tertiary volcanic.
B-184			6	450107	6871061	Could easily be Talkeetna Formation, but may also be Tertiary volcanic.
B-185			6	449047	6867453	Mapped by Detterman and others (1976) as Tertiary mafic intrusive. Not so. Intrusive porphyry, which is probably a volcanic pipe of the Talkeetna Formation.
B-186	SB-23		6	447609	6868636	**Sample SB-23** – Age dating (whole rock?) would resolve whether this is Talkeetna or Tertiary volcanics – pink flow breccia.
B-187			6	448531	6868838	Elevation: 3,870 feet No doubt about it – Caribou fault zone in exposure

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
B-188			6	449051	6868635	Elevation: 4,030 feet Fault zone, trends 126°, contains felsic (?) intrusive
B-189			6	449211	6868794	Elevation: 4,240 feet Fault zone, probably large fault, trending 119°, occupied by gabbro dike
B-191	SB-11 SB-11alt.		6	440132	6858164	**Sample SB-11** and **SB-11 alt.** – Rhyolite intrusive; offset stock? – collected via Amoco's helicopter. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
CH-1 through CH-5 completed during summer 1978 along west side Chickaloon River to 16 Mile						
CH-1		West side Chick-aloon River	6	430416	6867763	Elevation: 2,240 feet Outcrop begins at 2,210 feet. Bedding 265°/24°N; Talkeetna Formation? Bedded tuffaceous sandstone; significant shearing seen where outcrop begins.
CH-2		West side Chick-aloon River	6	428985	6868161	Elevation: 3,140 feet Diorite or monzonite intrusive, medium-grained, fresh, two feldspars present (one pink). From CH-1 to here has been Talkeetna Formation. Just upstream from CH-1 is a beautiful, thick section of well-bedded tuffaceous sandstone, same as found up 9 Mile Creek, very distinctive (bedding, white color, mottled appearance), at least several hundred feet thick, farther upstream are more flows, and the rocks are more messed up, actually cataclastic in places.
CH-3	AG-1	West side Chick-aloon River	6	428755	6868131	Elevation: 3,250 feet **Sample AG-1**, for age dating of pluton. Diorite or monzonite, fresh intrusive, medium-grained, some calcite veining in adja-cent rock, but almost none in this sample.
CH-4	AG-2	West side Chick-aloon River	6	431423	6871100	Elevation: 2,240 feet Lowest outcrop on stream. Fresh intrusive, similar to that of sample AG-1, but finer grained and much less calcite veining. **Sample AG-2**, for age dating.
CH-5		West side Chick-aloon River	6	430657	6871155	Everything from CH-4 to here is fresh intrusive; all of the float in the streambed is intrusive, some of it with limonitic alter-ation.
79-1 through 79-86 summer 1979						
79-1	F79-1	Anchorage D2 Quadrangle	6	463968	6852125	Talkeetna Formation; fractured and messed-up agglomerate or lapilli tuff. **Sample F79-1** for age dating; locality is ~300 feet south of bridge crossing Caribou Creek; first good outcrop on west side of road.
79-2	F79-2	Lion Head (above RCA tower)	6	464841	6850408	Elevation: 2,370 feet Location out of map area. **Sample F79-2** –Rhyolite from volcanic plug (just like all the others), very well displayed cooling joints, rock fine-grained, porphyritic; sampled for age dating and Rb, Sr, Ba analysis. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-3	F79-3	West of F79-2	6	464637	6850373	Elevation: 2,460 feet Location out of map area. Location out of map area. Rhyolite; locality should actually be plotted halfway between F79-2 and F79-4. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-4	F79-4	West of F79-3	6	464432	6850323	Elevation: 2,430 feet Location out of map area. **Sample F79-4** – Rhyolite. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.] 6/24/79: Observed geology up Moose Creek; saw Tsadaka–Chickaloon contact. Poorly consolidated boulder–cobble–pebble conglomerate unconformably overlies black siltstone; contains abundant granitic material. Contact can only be observed on west side of creek from east side. No dikes observed in Tsadaka Formation.
79-5			6	435098	6860741	Elevation: 3,010 feet Outcrop of medium-grained graywacke; bedding not apparent, moderately fractured; could be Matanuska Formation or Tuxedni Group.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
79-6			6	434997	6860726	Elevation: 3,160 feet Bedding in graywacke 351°/28°E; formation?
79-7			6	435070	6860759	Elevation: 3,060 feet 25 feet upstream from here is Talkeetna Formation; purple andesite porphyry
79-8			6	434829	6860970	Elevation: 3,310 feet Fault zone in Talkeetna Formation, 10 feet wide, chloritic cataclasite with fault breccia; trends 077° (heavy topographic influence); dip couldn't be determined, but is moderate. Upstream from 79-8 to an elevation of 3,470 feet, it is apparent that the formation to the south is Tuxedni Group. Evidence: fossil wood, abundant belemnites, several ammonite fragments in stream bed; overall appearance of section similar to that in vicinity of the area southwest of B-116.
79-9			6	434780	6860426	Elevation: 3,670 feet Matanuska? Formation; unusual bed 4 feet thick with mottled appearance; white spots appear to be tuffaceous material (dateable??); everything downslope has been medium-grained graywacke, few fossils, some woody fragments; above this point some silty beds occur. Bedding: 40°/16°W, 01°/10°W, 56°/15°W, 10°/07°W (average of four readings 027°/12°W)
79-10			6	434408	6860667	Elevation: 4,490 feet Diabase dike, trend 055°
79-11			6	435558	6861029	Elevation: 2,990 feet Diabase dike, ~100 feet thick, attitude 130°/vertical, intruding latite; latite includes abundant xenoliths of Talkeetna Formation, flow breccia; may be near edge of latite dome.
79-12	F79-12		6	435554	6861116	Elevation: 3,030 feet Mineralization in Talkeetna Formation, flow breccia and flows? Pyritic, highly oxidized, argillic alteration; on west side of stream; has been examined by others (evidence of rock-hammer blows); color not right for copper; what appears to be a porphyry intrusive occurs along stream. **Sample F79-12** for thin section and comparison with quartz-eye porphyry (albite granite porphyry), which it somewhat resembles. The sample taken is quite fresh – light gray matrix with phenocrysts of feldspar and quartz. Sample also resembles that which was called Talkeetna Formation (although USGS mapped it as unit Tim) in Section 3, T21N, R8E. F79-12 may be the mineralizer here.
79-13	F79-13		6	435554	6861190	Elevation: 3,060 feet **Sample F79-13** – pyritic. Talkeetna(?) Formation; highly altered.
79-14	F79-14		6	435727	6861282	Elevation: 3,220 feet **Sample F79-14** – pyritically altered Talkeetna(?) Formation
79-15			6	434966	6861087	Elevation: 3,800 feet Altered Talkeetna Formation, bleached and pyritic; dike nearby (to east) has trend of 326°; Talkeetna Formation here has a great unconformity between it and Tuxedni Group. Talkeetna in fact seems to be a submerged mountain. This could represent a Jurassic volcanic center. Angular unconformity between Tuxedni Group and Matanuska Formation seen across valley to south. Fault across valley has displacement of ~100 feet, high-angle, south side down.
79-16	F19-16		6	434855	6861473	**Sample F79-16** – (two bags) for age dating. Talkeetna Formation, andesite porphyry flow breccia, collected near what is thought to be top of Talkeetna section. Similar to quartz-eye porphyry, but I believe it is Talkeetna Formation; may be from a vent of a volcano that fed Talkeetna Formation.
79-17	F79-17		6	434727	6861674	Tuxedni contact just below here. Bedded sandstone, bedding, 170°/25°S (actually very well cross-bedded, with definite evidence beds are right side up). **Sample F79-17** – of sandstone for reference; unit is ~25 feet thick; below this is a greenish chloritic, tuffaceous unit similar to that seen elsewhere.

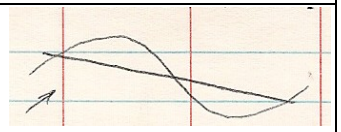
CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
79-18			6	434661	6861686	Bedding in highly fossiliferous Tuxedni Group. Bedding 029°/23°W; clams, brachiopods, gastropods, belemnites, fossil wood (similar to locality B-103?); also fossiliferous upslope from here. Measured section – Tuxedni Group; from bottom to top UNIT 1 - 250 feet true thickness (estimated). Sandstone, medium-grained, massive to medium-bedded (8 inches), feldspathic, green-gray (unweathered), slightly orange-brown (weathered). Bedding 140°/17°S. Not many fossils, wood fragments. UNIT 2 – 1,250? feet thick. Bedding 136°/24°S. Bearing 265°, slope 27°. *50 feet + 50 feet + 50 feet; predominantly siltstone, brown to maroon-gray (weathered color), lesser sandstone and shale. UNIT 3 - 60 feet (not true thickness); green-gray feldspathic sandstone, medium-grained. I'm calling this Tuxedni Group, but could be Matanuska Formation; attitude similar to below. Matanuska Formation – black argillite. Note: I have not noted fossil content in this section because access to the rocks was difficult. Not many fossils were seen, and section appears to be significantly less fossiliferous than that to the north of the Caribou fault. *Total section thickness = 370 meters. (Unit 3 assumed to be Matanuska Formation.)
79-19	H79-19		6	435716	6860332	Elevation: 3,170 feet Talkeetna Formation in small outcrop. Volcaniclastic sandstone and minor tuff. **Sample H79-19** (Donna's sample)
79-20	F79-20		6	435960	6860609	Elevation: 3,670 feet Rhyolite, **Sample F79-20** – for Rb, Sr, Ba analysis, slightly weathered. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-21			6	436097	6860670	Elevation: 3,830 feet Diabase dike, minimum 5 feet wide, 090°/~vertical
79-22	F79-22		6	436353	6860829	Elevation: 4,080 feet Rhyolite, **Sample F79-22** – for Rb, Sr, Ba analysis. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-23	F79-23		6	436457	6861123	Elevation: 4,530 feet Bearing on rhyolite peak Anthracite Ridge = 170°. Rhyolite, **Sample F79-23** – for Rb, Sr, Ba. [Determined to be rhyolite by geo- chemical whole-rock analysis done after dissertation completed. See analyses.] Coming down the slope: Talkeetna/rhyolite contact 4,240 feet; rhyolite/Talkeetna contact 4,060 feet; Talkeetna/rhyolite contact, 3,270 feet.
79-24	F79-24	West side, An-thracite Ridge	6	435256	6858578	**Sample F79-24**, dacite for Rb, Sr, Ba analysis. [Determined dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-25	F79-25		6	438260	6863667	Elevation: 3,910 feet Talkeetna andesite porphyry, flow? Purple. Lies just below altered Talkeetna Formation and its contact with Tuxedni Group (below Boulder Creek fault). **Sample F79-25** for age dating (fission-track) represents youngest Talkeetna Formation?
79-26			6	433474	6859616	Elevation: 3,480 feet Bedding 196°/09°W, Tertiary volcanics. Below this point are basaltic flow and diabase feeders; above are flow breccias and flows.
79-27	F79-27		6	433576	6859631	Elevation: 3,320 feet **Sample F79-27**, Tertiary volcanics; porphyritic andesite flow, probably within 50 feet of base of volcanic sequence, for age dating.
79-28			6	434284	6859693	Matanuska Formation, argillite – Castle Mountain fault must be south of here. No evidence of Wishbone Formation downslope.
79-29			6	433489	6859791	Possible double fault scarp on Castle Mountain fault; very pronounced.

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
79-30			6	434003	6859768	Elevation: 2,810 feet Very chewed up Matanuska Formation. Inferred that Castle Mountain splay fault lies just to the south.
79-31A			6	433199	6860823	Elevation: 3,550 feet Bedding 295°/19°N in Matanuska graywacke
79-32A			6	433060	6861218	Elevation: 4,170 feet Bedding: 224°/17°W; 261°/15°N (slightly upslope); average 233°/16°N. Matanuska Formation; argillite with some sandstone and concretionary beds. Note: Attitude of 79-32 is not quite as steep as block as a whole is assumed to be. Reason: Later undulatory folding, which should steepen dips in some places and decrease them in others. Example: Superimpose a sine wave on a plane. 
79-31B			6	434577	6864071	Bedding 056°/71°W in Matanuska Formation. Whole section below here is certainly same as across valley – very unfossiliferous, shaly siltstones with interspersed sandstone beds.
79-32B	F79-32		6	434314	6863566	*Inoceramus* fossils; Ammonite (**Sample F79-32**) just south of here.
79-33			6	434130	6863232	Bedding 218°/46°W Note: That which was mapped as Chinitna last year is now assumed to be Matanuska Formation. Reason: Rock on ridge north of 79-31 is same as across valley, and lies stratigraphically above rock of 79-32 which is certainly Matanuska Formation. No noticeable unconformity observed.
79-34	D79-34		6	434884	6864323	**Sample D79-34** – Trace fossils in Matanuska Formation.
79-35			6	435096	6864981	Altered tuff. Mapped as limestone by Detterman and others (1976) but it is Talkeetna tuff similar to **Sample B-6**. The fizzing with acid is due to calcite veining.
79-36			6	435237	6863709	Elevation: 4,270 feet Bedding 042°/45°N; similar to splay block as a whole? Matanuska Formation.
79-37			6	435074	6863541	Matanuska Formation; pebble conglomerate unit 3 feet thick, discontinuous in thickness.
79-38			6	434852	6863242	Matanuska Formation. Bedding 047°/57°W.
79-39			6	435467	6865838	Bedding 059°/26°W; Talkeetna Formation, tuffaceous sandstone.
79-40	F79-40		6	435882	6865553	**Sample F79-40**, agglomerate, Talkeetna Formation, for age dating (two bags), from ~50 feet below Tuxedni–Talkeetna contact. Notes concerning the Chinitna versus Matanuska Formation argument: In USGS Bulletin 776, Martin (1913) describes fossil evidence of Chinitna north of Boulder Creek. The main criterion appears to be the existence of Cardiocerus (Callovian, Europe). Of the three sampling localities, in each case (based on mapping by this author), it appears as if Tuxedni may have been sampled rather than Chinitna Formation. Either *Cardiocerus* may have been misidentified or could *Cardiocerus* (an ammonite) also have existed in Middle Jurassic (versus Upper Jurassic). (Is our time scale so well defined? Especially when correlating an Alaskan species with a European species.)
79-41	F79-41		6	434402	6861016	Pebble conglomerate, 2 feet thick in Matanuska Formation. Probably correlates with that of 79-37. Potential 3-point problem. **Sample F79-41** for reference.
79-42			6	433402	6861783	Elevation: 4,880 feet Bedding 175°/32°W; Matanuska Formation, medium-grained greenish graywacke, medium bedded.
79-43			6	432840	6859740	Elevation: 3,950 feet Tertiary volcanic; glassy flow probably correlative with basal flows north of Boulder Creek, but here there are hundreds of feet of underlying volcanics.

CASTLE MOUNTAIN – CARIBOU FAULT SYSTEM FIELD NOTES (referenced to station localities – UTM NAD27 CONUS)

by William A. Fuchs

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
79-44	F79-44		6	432527	6860078	Elevation: 4,160 feet Castle Mountain splay fault zone. Must be at least 200 feet wide (probably closer to 300 feet wide) in this saddle. **Sample F79-44** (two bags) – calcite from fault zone for thermoluminescence dating. Most calcite collected from colluvial float, but some in place, and all of it clearly came out of fault zone. The calcite occurs in shear fractures and in fault breccia. The source of all this calcite is the Tertiary volcanics, but it also occurs to a lesser extent in Matanuska Formation in the vicinity of 79-45 slickenside measurements.
79-45	F79-45		6	436131	6857967	Elevation: 3,320 feet **Sample F79-45** – Dacite for Rb, Sr, Ba. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-45X			6	432762	6860239	Strain analysis on Castle Mountain Splay fault slickenside measurements. *(S = slickenside lineation; LL = left lateral; RL = right lateral)* 168°/71°W – Omit | 137°/86°S – S = 20°S | 221°/vert. – S = 15°S 109°/58°S – S = 78°E | 156°/81°W – S = 17°E | 135°/72°E – S = 12°S 005°/80°W – S = 13°S | 200°/76°W – S = 42°S | 071°/68°N – S = 19°W 132°/84°W – S = 85°S | 338°/35°E – S = 90° ?LL? | 138°/80°S – S = 12°S 103°/81°N – S = 0° | 132°/81°N – S = 34°S | 167°/83°W – S = 0° 180°/80°W – S = 0° | 183°/80°W – S = 10°S RL | 084°/69°S – S = 78°W 053°/82°N – S = 0° | 039°/82°N – S = 0° | 162°/80°E – S = 003°S 105°/55°N – S = 016°E | 103°/34°S – S = 09°E | 098°/55°S – S = 02°E 128°/76°N – S = 20°S | 128°/49°N – S = 45°S | 000°/82°E – S = 18°N RL 055°/80°W – S = 12°S | 211°/78°W – S = 43°S | 191°/78°W – S = 58°S 020°/89°W – S = 35°S All the above measurements were made in medium-grained graywacke (Matanuska Formation). The Tertiary volcanics on the other side of the valley had abundant shear fractures, but very few good slickensides.
79-46	F79-46		6	440294	6858177	Elevation: 4,630 feet **Sample F79-46** – Dacite for Rb, Sr, Ba. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-47	F79-47		6	440228	6858145	**Sample F79-47** – Dacite (two bags) for age dating and Rb, Sr, Ba. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-48	F79-48	North of Caribou fault	6	445863	6869325	**Sample F79-48** – Siltstone for palynology (#32393) by ARCO (J.E. Bennett). Upper Jurassic (W.A. Fuchs: therefore Chinitna Formation); see Fuchs dissertation for report.
79-49	F79-49	North of Caribou fault	6	441993	6867629	**Sample F79-49** - Siltstone for palynology (#32394) by ARCO (J.E. Bennett). Upper Jurassic (W.A. Fuchs: therefore Chinitna Formation); see Fuchs dissertation for report.
79-50	F79-50	South of Caribou fault	6	434795	6864294	**Sample F79-50** – Shaly siltstone for palynology (#32395) by ARCO (J.E. Bennett). Upper Cretaceous (Campanian/Maastrichtian). (W.A. Fuchs: therefore Matanuska Formation); see Fuchs dissertation for report.
79-51	F79-51		6	444881	6866015	**Sample F79-51** – Rhyolite for Rb, Sr, Ba. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-52	F79-52	North of 14 mile on Chickaloon River	6	431916	6866307	Elevation: 3,550 to 3,600 feet **Sample F79-52** – Three samples (two samples pebble–cobble conglomerate, one sample coarse graywacke)
79-53	F79-53	West of Hicks Creek	6	450460	6857088	**Sample F79-53** – Rhyolite for Rb, Sr, Ba. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
79-54	F79-54		6	450350	6857404	Elevation: 4,670 feet **Sample F79-54** – Dacite for Rb, Sr, Ba. Note: 20 foot? dike which goes right into main body to west; quartz phenocrysts. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-55	F79-55		6	449827	6857059	Elevation: 4,510 feet **Sample F79-55** – Dacite; nearby diabase dike (2 feet thick). Trends N60°W. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-56	F79-56	Slightly uphill and to west of 79-55	6	449784	6857094	**Sample F79-56** – Dacite; slightly different lithology from F79-55, country rock inclusions; jasper uphill from here. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-57	F79-57		6	447756	6856293	Elevation: 4,760 feet **Sample F79-57** – Chickaloon sandstone (not felsic intrusive as mapped by Detterman and others [1976]); 20 feet thick; dip 60° in direction 007°
79-58	F79-58		6	447695	6856307	Elevation: 4,810 feet **Sample F79-58** – Chickaloon sandstone (not felsic intrusive as mapped by Detterman and others [1976])
79-59	F79-59	Northeast of thrust up Doone Creek	6	423043	6861697	**Sample F79-59** (three bags) – Talkeetna Formation agglomerate or coarse tuff, for age dating.
79-60			6	442048	6862089	Elevation: 3,130 feet Diabase with coarse feldspar phenocrysts; small sheeted dike complex; probably Tertiary. Note: It is Tertiary because of latite xenoliths in the gabbro, found upstream from this locality and in the second canyon to the west.
79-61			6	442472	6861382	Major cataclastic fault zone, trends ~100° (Mesozoic fault?), occupied in places by strange dikes of unknown age. Entire zone probably 200 feet wide. Zone appears to have steep northerly dip. From what I can see of it, the fault is entirely in Talkeetna Formation.
79-62			6	442681	6861035	Elevation: 3,990 feet Small cataclastic fault zone, vertical, subhorizontal slickensides
79-63			6	443165	6860818	Elevation: 4,520 feet Small marble pod, elliptical 200 × 100 feet, calcite mainly in veins; it appears to be a possible candidate for the limestone unit of the Talkeetna Formation (north of Castle Mountain–Caribou fault), but it is impossible to say for sure; the marble is mixed with volcanics, so it would have had to be extensively remobilized.
79-64	F79-64		6	443509	6860507	Elevation: 5,110 feet **Sample F79-64** – Dacite for Rb, Sr, Ba analysis; *hand specimen sample contains a rod-shaped zircon within black circle. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-65	F79-65		6	443184	6860202	Elevation: 5,150 feet **Sample F79-65** – Dacite for Rb, Sr, Ba analysis. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-66			6	442651	6861679	Elevation: 3,150 feet Highly-chewed-up gabbro
79-67			6	442755	6862258	Elevation: 3,210 feet Bedding 186°/20°W. Volcanics – flows and agglomerates – Talkeetna Formation
79-68	F79-68		6	441231	6862234	Elevation: 3,400 feet **Sample F79-68** – Rhyolite for Rb, Sr, Ba analysis. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
79-69			6	441229	6862322	Elevation: 3,760 feet Bedding 273°/28°N; flow of Talkeetna Formation; coarse tuff in vicinity
79-70	F79-70		6	441115	6862214	Elevation: 3,440 feet **Sample F79-70** – Rhyolite for Rb, Sr, Ba analysis. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.] 20-foot-wide basic dike of unknown type located 25 feet to the south.
79-71	F79-71		6	442059	6859060	Elevation: 4,430 feet **Sample F79-71** – Agglomerate for age dating, should represent the oldest Talkeetna Formation I could obtain; not too pristine, but the best I could do in this area.
79-72			6	441893	6859002	Elevation: 4,470 feet Bedding 177°/32°W; Talkeetna Formation; tuffaceous, fossiliferous (clams), sandstone, medium-grained.
79-73	F79-73I F79-73II		6	441456	6860299	Cataclasite, large zone(s) extends from here north along side of ridge. Has some similarities to a flat-lying thrust fault in form, but I basically do not know what is going on here. This may represent a Mesozoic deformational event. It might also be hydrothermal in large part (note: shot through with a large amount of calcitic, talcose white veinlets, and stringers) and occurred shortly after deformation. **Sample F79-73I**– small bit of veinlet material (x-ray might establish PT conditions). **Sample F79-73II** – root fragments in cataclasite, some sort of flow?
79-74	F79-74		6	443708	6858801	Elevation: 4,700 feet **Sample F79-74** – Dacite for Rb, Sr, Ba analysis. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-75	F79-75		6	444968	6857340	Elevation: 5,730 feet **Sample F79-75** – Calcite from Castle Mountain splay fault for thermoluminescence dating. Found in float in gully just 90 feet (elevation-wise) down from fault saddle. Calcite is clearly coming out of fault zone.
79-76	F79-76		6	445371	6857661	Elevation: 5,250 feet **Sample F79-76** – Dacite/granodiorite (coarse-grained), for thin section analysis of coarse-grained stuff; no geochem.
79-77			6	442260	6862335	Elevation: 3,690 feet Gabbro, top contact. Looking across stream to west it can be seen that gabbro was injected in dike-like form and is cut by diabase dikes, which I have assumed is equivalent to gabbro. Thus, there appear to have been two pulses of magmatic activity, probably of at least slightly different ages.
79-78			6	442308	6862451	Elevation: 3,990 feet Volcaniclastic conglomerate; Talkeetna Formation. From gabbro contact to top of slope consists of a bedded marine(?) sequence of tuff, tuffaceous sandstone, limestone, and volcaniclastic sandstone, no fossils observed.
79-79	F79-79		6	444858	6860050	Elevation: 5,270 feet **Sample F79-79** – Dacite for Rb, Sr, Ba analysis. [Determined to be dacite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-80	F79-80		6	439048	6859632	Elevation: 3,450 feet **Sample F79-80** –Felsite, for thin section analysis. This stuff is similar to that at B-121, across the way, in that it is different from normal felsite (rhyolite–dacite) and may not be equivalent. It is phaneritic and has a higher mafic content than normal felsite, but in the end it is probably equivalent.
79-81			6	440530	6857833	Elevation: 4,610 feet Bedding 084°/27°S in Matanuska Formation, argillite.

NOTE	SAMPLE	LOCATION	ZN	EASTING	NORTHING	DESCRIPTION
79-82	F79-82		6	438975	6858992	**Sample F79-82** – Shaly material for micropaleontology (but never analyzed), Tuxedni(?) Group. Marine because sandstone bed above contain pelecypods, abundant plant fragments in units above, whole unit is brownish with not highly indurated sandstones, siltstone, shales; bedding 40 feet up from sample 184°/30°W; if not Tuxedni Group, may be Matanuska Formation (or Talkeetna?) unit estimated to be 200 feet thick.
79-83			6	440386	6858803	Elevation: 4,750 feet Tuxedni(?) Group, estimated 30 feet thick underlying Matanuska Formation; sandstone contains abundant mollusks, belemnites, *trigonia*, and one beautiful small ammonite that was collected. Too small to map. Tuxedni Group appears to be thinning to the southeast.
79-84			6	440459	6858657	Elevation: 4,670 feet Matanuska Formation, medium-grained sandstone. Bedding 200°/27°W
79-85	F79-85		6	444517	6863505	Elevation: 4,430 feet **Sample F79-85** – Rhyolite for Rb, Sr, Ba analysis. [Determined to be rhyolite by geochemical whole-rock analysis done after dissertation completed. See analyses.]
79-86	F79-86		6	450003	6864222	Elevation: 5,520 feet **Sample F79-86** – Felsic intrusive from talus at the base of the pinnacles. This sample is an example of abundant coarse-grained material; for potential thin section analysis; no geochem.

ACKNOWLEDGEMENTS

Map digitally redrafted by Jo Beth Allen
Indispensable contributions of field assistants Miriam Hill, Donna Hewitt, Steve McMillin, and Victoria Schurer
Reviewer Robert J. Gillis, Alaska Division of Geological & Geophysical Surveys
Numerous others are acknowledged in the dissertation

REFERENCES

Detterman, R.L., Plafker, George, Tysdal, R.B., and Hudson, Travis, 1976, Geology and surface features along the Castle Mountain fault system, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-738, 1 sheet, scale 1:63,360. http://dggs.alaska.gov/pubs/id/13295

Fuchs, W.A., 1980, Tertiary tectonic history of the Castle Mountain-Caribou fault system in the Talkeetna Mountains, Alaska: University of Utah, Salt Lake City, Ph.D. dissertation, 162 p., illust. (some color), maps. http://dggs.alaska.gov/pubs/id/27944

Table 1. Castle Mountain Fault project, whole-rock geochemistry. Materials available at DGGS Geologic Materials Center.

NOTE	SAMPLE #	ZN	EASTING	NORTHING	DESCRIPTION	SiO_2	Al_2O_3	Fe_2O_3	CaO	Mg0	Na_2O	K_2O	TiO_2	MnO	P_2O_5	BaO	SrO	ZrO_2	LOI	TOTAL	Rb (ppm)	Sr (ppm)	Ba (ppm)	Rock Sample	Geochem Pulp	Thin Section
79-2	F79-2	6	464841	6850408	rhyolite	73.72	12.47	4.73	0.93	0.03	5.93	1.50	0.05	0.08	0.02	0.05	< 0.01	0.02	0.00	99.51	60	70	500	X	X	X
79-3	F79-3	6	464637	6850373	rhyolite	75.20	12.79	3.12	0.87	0.03	5.82	2.18	0.04	0.06	0.02	0.06	< 0.01	0.01	0.07	100.27	80	60	600	X	X	
79-4	F79-4	6	464432	6850323	rhyolite	73.52	12.62	4.70	0.72	0.05	5.82	2.28	0.05	0.07	0.02	0.06	< 0.01	0.01	-0.36	99.56	80	60	600	X	X	
79-20	F79-20	6	435960	6860609	rhyolite	76.60	12.96	1.97	0.13	0.18	4.03	1.83	0.16	0.02	0.06	0.04	< 0.01	0.01	0.76	98.74	30	70	300	X	X	
79-22	F79-22	6	436353	6860829	rhyolite	75.70	13.12	2.07	0.61	1.04	3.63	1.80	0.18	0.06	0.05	0.06	0.01	0.01	1.63	99.99	20	140	600	X	X	
79-23	F79-23	6	436457	6861123	rhyolite	76.63	13.02	1.45	0.61	0.33	4.91	1.57	0.17	0.03	0.06	0.03	< 0.01	0.01	1.47	100.30	20	60	200	X	X	
79-24	F79-24	6	435256	6858578	dacite	67.27	13.49	3.51	4.50	0.21	4.90	0.65	0.35	0.11	0.02	NA	NA	NA	5.00	100.01	10	240	300	X		
79-45	F79-45	6	436131	6857967	dacite	68.89	14.42	4.67	2.19	0.22	5.16	1.46	0.12	0.07	0.07	0.04	0.02	0.03	2.85	100.21	20	190	300	X	X	
79-46	F79-46	6	440294	6858177	dacite	69.16	13.58	3.90	2.21	0.06	4.67	1.50	0.09	0.07	0.05	0.05	0.02	0.02	3.15	98.52	20	150	400	X	X	
79-47	F79-47	6	440228	6858145	dacite	70.13	14.02	5.45	1.75	0.23	5.46	0.92	0.10	0.07	0.05	0.02	0.01	0.02	2.22	100.46	10	120	200	X	X	X
79-51	F79-51	6	444881	6866015	rhyolite	72.71	13.51	3.91	0.55	0.13	5.83	2.48	0.06	0.06	0.06	0.09	0.01	< 0.01	0.23	99.64	60	110	700	X	X	
79-53	F79-53	6	450460	6857088	rhyolite	77.20	11.63	2.82	0.73	0.39	4.05	2.52	0.10	0.04	0.01	0.16	0.01	0.02	0.91	100.59	40	120	1200	X	X	
79-54	F79-54	6	450350	6857404	dacite	68.83	14.20	4.07	2.43	0.59	5.56	1.51	0.35	0.14	0.12	0.09	0.02	0.02	2.10	100.03	20	150	600	X	X	
79-55	F79-55	6	449827	6857059	dacite	69.80	13.94	3.54	2.48	0.50	4.49	1.54	0.33	0.12	0.11	0.06	0.01	0.01	2.90	99.85	20	130	400	X	X	
79-56	F79-56	6	449784	6857094	dacite	75.95	11.64	2.46	1.63	0.40	3.24	1.99	0.12	0.05	0.06	0.11	0.01	0.02	2.33	100.00	40	110	1000	X	X	
79-64	F79-64	6	443509	6860507	dacite	62.84	15.49	4.69	4.88	0.78	3.63	0.38	0.34	0.05	0.10	0.01	0.02	0.02	6.67	99.89	10	210	100	X	X	X
79-65	F79-65	6	443184	6860202	dacite	63.83	16.01	5.23	4.57	0.58	3.83	0.17	0.37	0.07	0.09	0.02	0.02	0.01	4.24	99.04	10	200	200	X	X	
79-68	F79-68	6	441231	6862234	rhyolite	76.02	11.90	3.21	0.58	0.22	5.67	0.14	0.12	0.04	0.05	0.02	0.01	0.01	0.73	98.73	10	110	100	X	X	
78-70	F78-70	6	441115	6862214	rhyolite	75.47	12.56	3.99	0.66	0.31	5.57	0.52	0.13	0.05	0.05	0.03	< 0.01	0.02	0.68	100.04	20	80	200	X	X	
79-74	F79-74	6	443708	6858801	dacite	60.59	15.57	4.71	7.41	0.30	0.09	< 0.10	0.35	0.07	0.10	0.01	< 0.01	0.02	11.00	100.19	10	70	100	X	X	
79-79	F79-79	6	444858	6860050	dacite	63.50	15.44	6.29	3.83	1.08	4.75	0.39	0.33	0.22	0.08	0.04	0.03	0.01	2.90	98.89	10	310	400	X	X	
79-85	F79-85	6	444517	6863505	rhyolite	72.20	13.58	3.78	1.15	0.26	4.30	1.57	0.08	0.06	0.06	0.05	0.01	0.01	1.87	99.00	50	80	400	X	X	
B-35	B-2-PAL	6	437463	6862035	rhyolite	75.09	12.21	1.40	0.46	0.34	5.96	0.84	0.12	0.10	0.03	0.02	< 0.01	< 0.01	1.05	97.64	35	75	150	X	X	
B-121	SB-13	6	439968	6859891	borderline gabbroic diorite-monzodiorite	50.92	16.44	11.89	6.05	3.65	3.88	1.79	1.25	0.24	0.25	0.14	0.05	0.01	3.11	99.66	30	430	800	X	X	
B-130	SB-14	6	436888	6858395	borderline rhyolite-dacite	70.89	14.31	3.16	1.61	0.16	4.36	0.49	0.13	0.06	0.06	0.03	0.02	0.03	4.06	99.36	25	150	250	X	X	X
B-160	SB-18	6	446101	6869589	basalt, amygdaloidal	47.27	17.18	10.01	5.35	6.47	4.13	0.63	1.28	0.21	0.34	0.05	0.02	0.02	5.60	98.56					X	
B-181	SB-21	6	445882	6866010	rhyolite	73.91	13.72	1.69	0.66	0.17	5.57	2.06	0.06	0.05	0.05	0.10	0.01	< 0.01	1.26	99.32	70	90	950	X	X	X
B-182	SB-22-II	6	445647	6865357	dacite, porphyry phase	67.94	15.72	3.91	2.41	0.83	6.60	0.87	0.38	0.09	0.13	0.05	0.02	0.01	1.64	100.60	35	210	450	X	X	X
B-191	SB-11ALT.	6	440132	6858164	rhyolite	71.53	14.07	3.45	1.31	0.19	6.62	0.46	0.10	0.06	0.05	0.03	0.02	0.02	2.20	100.10	25	145	250	X	X	X
B-191	SB-11	6	440132	6858164	rhyolite	71.00	13.91	3.13	1.83	0.05	5.82	0.35	0.10	0.06	0.04	0.02	0.01	0.02	3.21	99.57	25	110	200	X	X	X
K-44	S-7	6	418411	6856731	vesicular basalt; fine-grained, light green (chloritic), green phenocrysts (olivine?- going to chlorite)	59.79	15.32	8.13	2.95	2.01	7.66	< 0.10	1.37	0.16	0.31	< 0.01	0.04	0.02	1.87	99.63					X	
??	1-12	6	From dike between mile		dacite?	67.17	13.46	7.05	1.92	0.67	5.27	1.90	0.34	0.11	0.08	0.08	0.02	0.03	1.47	99.56	60	170	700	X	X	

NOTE: DATUM is NAD 1927 UTM

TECHNICAL SERVICE LABORATORIES
1301 FENSTER DRIVE, MISSISSAUGA, ONTARIO L4W 1A2
TELEPHONE : (416) 625 - 1544

CERTIFICATE OF ANALYSIS

T6509

T.S.L. REPORT No. : T - 6509 -
T.S.L. File No. : JUN25I

Invoice # 25492

YOUR REFERENCE : CALCULATE FEO & FE2O3

SAMPLE #	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	TiO2	MnO	P2O5	BaO	SrO	ZrO2	LOI	TOTAL
F-79-2	73.72	12.47	4.73	.93	.03	5.93	1.50	.05	.08	.02	.05	< .01	.02	0.00	99.51
F-79-3	75.20	12.79	3.12	.87	.03	5.82	2.18	.04	.06	.02	.06	< .01	.01	0.07	100.27
F-79-4	73.52	12.82	4.70	.72	.05	5.82	2.28	.05	.07	.02	.06	< .01	.01	-0.36	99.56
F-79-20	76.60	12.96	1.97	.13	.18	4.03	1.83	.16	.02	.06	.04	< .01	.01	0.76	98.74
F-79-22	75.70	13.12	2.07	.61	1.04	3.63	1.80	.18	.06	.05	.06	.01	.01	1.63	99.99
F-79-23	76.63	13.02	1.45	.61	.33	4.91	1.57	.17	.03	.06	.03	< .01	.01	1.47	100.30
F-79-45	68.89	14.42	4.87	2.19	.22	5.16	1.46	.12	.07	.07	.04	.02	.03	2.85	100.21
F-79-46	69.16	13.58	3.90	2.21	.06	4.67	1.50	.09	.07	.05	.05	.02	.02	3.15	98.52
F-79-47	70.13	14.02	5.45	1.75	.23	5.46	.92	.10	.07	.05	.02	.01	.02	2.22	100.46
F-79-51	72.71	13.51	3.91	.55	.13	5.83	2.48	.06	.06	.06	.09	.01	< .01	0.23	99.64
F-79-53	77.20	11.63	2.82	.73	.39	4.05	2.52	.10	.04	.01	.16	.01	.02	0.91	100.59
F-79-54	68.83	14.20	4.07	2.43	.56	5.56	1.51	.35	.14	.12	.09	.02	.02	2.10	100.03
F-79-55	69.80	13.94	3.54	2.48	.50	4.49	1.54	.33	.12	.11	.06	.01	.01	2.90	99.85
F-79-56	75.95	11.64	2.46	1.63	.40	3.24	1.99	.12	.05	.06	.11	.01	.02	2.33	100.00
F-79-64	62.84	15.49	4.69	4.88	.78	3.83	.38	.34	.05	.10	.01	.02	.02	6.67	99.89
F-79-65	63.83	16.01	5.23	4.57	.58	3.83	.17	.37	.07	.09	.02	.02	.01	4.24	99.04
F-79-68	76.02	11.90	3.21	.59	.22	5.67	.14	.12	.04	.05	.02	.01	.01	0.73	98.73
F-79-70	75.47	12.58	3.99	.66	.31	5.57	.52	.13	.05	.05	.03	< .01	.02	0.68	100.04
F-79-74	60.59	15.57	4.71	7.41	.30	.09	< .10	.35	.07	.10	.01	< .01	.02	11.00	100.19
F-79-79	63.50	15.44	6.29	3.83	1.08	4.75	.39	.33	.22	.08	.04	.03	.01	2.90	98.89

DATE .

SIGNED : Paul E Bursener

Paul E. Bursener P. Eng.

TECHNICAL SERVICE LABORATORIES

1301 FEWSTER DRIVE, MISSISSAUGA, ONTARIO L4W 1A2
TELEPHONE : (416) 625 - 1544

CERTIFICATE OF ANALYSIS

WILLIAM A. FUCHS
1555 Ridgeview Dr. Unit #8
RENO NEVADA U.S.A.
89509

YOUR REFERENCE :

T.S.L. REPORT No. : T - 6509 - Z
T.S.L. File No. : JUN251

Invoice #25492

SAMPLE #	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	TiO2	MnO	P2O5	BaO	SrO	ZrO2	LOI	TOTAL
F-79-85	72.20	13.58	3.78	1.15	.26	4.30	1.57	.08	.06	.06	.05	.01	.01	1.87	99.00
SB-13	50.92	16.44	11.89	6.05	3.65	3.88	1.79	1.25	.24	.25	.14	.05	.01	3.11	99.68
SB-18	47.27	17.18	10.01	5.35	6.47	4.13	.63	1.28	.21	.34	.05	.02	.02	5.60	98.56
1-12	67.17	13.46	7.05	1.92	.67	5.27	1.90	.34	.11	.08	.08	.02	.03	1.47	99.55
S-7	59.79	15.32	8.13	2.95	2.01	7.66	< .10	1.37	.16	.31	< .01	.04	.02	1.87	99.63
SB-11ALT.	71.53	14.07	3.45	1.31	.19	6.62	.46	.10	.06	.05	.03	.02	.02	2.20	100.10
SB-11	71.00	13.91	3.13	1.83	.05	5.82	.35	.10	.06	.04	.02	.01	.02	3.21	99.57
SB-14	70.89	14.31	3.16	1.61	.16	4.36	.49	.13	.06	.06	.03	.02	.03	4.06	99.36
SB-21	73.91	13.72	1.69	.66	.17	5.57	2.06	.06	.05	.05	.10	.01	< .01	1.26	99.32
SB-22-II	67.94	15.72	3.91	2.41	.83	6.60	.87	.38	.09	.13	.05	.02	.01	1.64	100.60
B-2-PAL	75.09	12.21	1.40	.46	.34	5.96	.84	.12	.10	.03	.02	< .01	< .01	1.05	97.64

DATE : 25-JUN-84

SIGNED : Paul E. Bursener

Paul E. Bursener P. Eng.

F 79-24	SiO2	Al2O3	Fe2O3	FeO	CaO	MgO	Na2O	K2O	TiO2	MnO	P2O5	LOI
	67.27	13.49	1.11	2.40	4.50	0.21	4.90	0.65	0.35	0.11	0.02	5.00

QZ	IL	MT	AP	AN	AB	OR	DI	HE	WO	PL	AG
26.98	0.66	1.61	0.05	12.92	41.44	3.84	1.13	5.86	0.52	54.35	6.98

ROCK TYPE : THOLEIITIC DACITE, POTASSIUM POOR SERIES

F 79-24 (No LOI)	SiO2	Al2O3	Fe2O3	FeO	CaO	MgO	Na2O	K2O	TiO2	MnO	P2O5	LOI
	70.81	14.20	1.16	2.53	4.73	0.22	5.16	0.68	0.37	0.12	0.02	5.26

QZ	IL	MT	AP	AN	AB	OR	DI	HE	WO	PL	AG
28.40	0.70	1.68	0.05	13.60	43.62	4.05	1.19	6.18	0.54	57.22	7.37

ROCK TYPE : THOLEIITIC DACITE, POTASSIUM POOR SERIES

ITEM	SAMPLE NUMBER	Fe2O3 (%)	FeO (%)	MgO (%)	CaO (%)	Na2O (%)
7	F79-24	1.1	2.4	.21	4.5	4.9

ITEM	SAMPLE NUMBER	K2O (%)	LOI (%)	TiO2 (%)	P2O5 (%)
7	F79-24	.65	5.	.35	.02

ITEM	SAMPLE NUMBER	SiO2 (%)	Al2O3 (%)	MnO (%)	F (%)
7	F79-24	0.	0.	.11	.02
25	F79-24 STEEL	67.3	13.5	0.	0.

Gordon H. VanSickle
Manager

NOTE: 0 = Analysis not requested.

SKYLINE LABS, INC.
SPECIALISTS IN EXPLORATION GEOCHEMISTRY
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF ANALYSIS

JOB NO. MKD 003
JANUARY 21, 1980

William A. Fuchs
428 Fifth Avenue, Apt. 6
Salt Lake City, Utah 84103

Analysis of 1 Pulp Sample

ITEM	SAMPLE NO.	CO2 (%)
1	F-79-24	3.3

Gordon H. VanSickle
Manager

WEST JORDAN OFFICE

ROCKY MOUNTAIN GEOCHEMICAL CORP.

1323 W. 7900 SOUTH • WEST JORDAN, UTAH 84084 • PHONE: (801) 255-3558

Certificate of Analysis

RMGC Numbers:
Local Job No.: 78-24-30-SI
Foreign Job No.:
Invoice No.: M 93505

Date: October 24, 1978

Client: William Fuchs
428 5th Avenue, Apt #6
Salt Lake City, Utah 84103

Client Order No.: none

Report On: 2 Rock Samples

Submitted by: William Fuchs

Date Received: 10/9/78

Analysis: Major Oxides

Analytical Methods:

Remarks:

cc: enc.
file (2)
GJC/lw

ND = None Detected 1 ppm = 0.0001% 1 Troy oz./ton = 34.286 ppm 1 ppm = 0.0292 Troy oz./ton

Client William Fuchs Date 10/24/78 RMGC Job No. 78-24-30-SL

		S-7	SB-18
SiO_2	%	61.1	47.5
Al_2O_3	%	16.3	18.5
Fe_2O_3	%	6.98	8.86
CaO	%	2.13	4.73
MgO	%	1.82	6.66
K_2O	%	0.14	0.59
Na_2O	%	6.55	4.12
NmO	%	0.15	0.21
TiO_2	%	1.10	0.98
P_2O_5	%	1.02	0.81
LOI	%	3.33	6.85
	%		

By Jim Cardwell
Jim Cardwell

TECHNICAL SERVICE LABORATORIES
1301 FEWSTER DRIVE, MISSISSAUGA, ONTARIO L4W 1A2
TELEPHONE : (416) 625 - 1544

CERTIFICATE OF ANALYSIS

WILLIAM A. FUCHS

T.S.L. REPORT No. : T - 8509
T.S.L. File No. : JUL302

YOUR REFERENCE :

SAMPLE #	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	TiO2	MnO	P2O5	BaO	SrO	ZrO2	LOI	TOTAL
B-2-PAL	74.74	13.07	1.40	.45	.35	6.50	.69	.12	.11	.02	.03	< .01	< .01	1.05	98.53

Redo because of low total on first whole rock analysis.

DATE : 30-JUL-84

SIGNED : P.E. Bursener

Paul E. Bursener P. Eng.

SKYLINE LABS, INC.
SPECIALISTS IN EXPLORATION GEOCHEMISTRY
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF ANALYSIS

JOB NO. MKD 002
JANUARY 8, 1980

William A. Fuchs
428 Fifth Avenue, Apt. 6
Salt Lake City, Utah 84103

Analysis of 25 Pulp Samples

ITEM	SAMPLE NUMBER	Rb (ppm)	Sr (ppm)	Ba (ppm)
1	F79-2	60.	70.	500.
2	F79-3	80.	60.	600.
3	F79-4	80.	60.	600.
4	F79-20	30.	70.	300.
5	F79-22	20.	140.	600.
6	F79-23	20.	60.	200.
7	F79-24	10.	240.	300.
8	F79-45	20.	190.	300.
9	F79-46	20.	150.	400.
10	F79-47	10.	120.	200.
11	F79-51	60.	110.	700.
12	F79-53	40.	120.	1200.
13	F79-54	20.	150.	600.
14	F79-55	20.	130.	400.
15	F79-56	40.	110.	1000.
16	F79-64	10.	210.	100.
17	F79-65	10.	200.	200.
18	F79-68	10.	110.	100.
19	F79-70	20.	80.	200.
20	F79-74	10.	70.	100.
21	F79-79	10.	310.	400.
22	F79-85	50.	80.	400.
23	1-12	60.	170.	700.
24	Sb-13	30.	430.	800.

SKYLINE LABS, INC.
SPECIALISTS IN EXPLORATION GEOCHEMISTRY
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

D-1

REPORT OF ANALYSIS

JOB NO. MKD 001
November 9,1978

William A. Fuchs
428 Fifth Avenue, Apt. 6
Salt Lake City, Utah 84103

Analysis of 7 Rock Chip Samples

ITEM	SAMPLE NO.	Sr (ppm)	Rb (ppm)	Ba (ppm)
1	B-2	75.	35.	150.
2	SB-11	110.	25.	200.
3	SB-11 ALT.	145.	25.	250.
4	SB-14	150.	25.	250.
5	SB-15	130.	25.	250.
6	SB-21	90.	70.	950.
7	SB-22	210.	35.	450.

Gordon H. VanSickle
Manager

Western Analytical, Inc.

4195 South 500 West #79 • Salt Lake City, Utah 84107 • (801) 261-1961

CERTIFICIATE OF ANALYSIS

April 14, 1980

P80-94

Mr. William Fuchs
428 5th Avenue # 6
Salt Lake City, Utah 84103

Dear Mr. Fuchs:

Transmitted herewith are the analytical data for the samples you delivered to our laboratory for analysis.

Element	F-79-3 PPM	F-79-4 PPM	F-79-24 PPM	F-79-56 PPM	T-4 PPM
Cu		7	5		
Pb*		20	9		
Zn		295	120		
Mo		0.8	<.4		
Be		<1	<1		
As		12	8		
Hg (ppb)		135	105		
Ag*		0.5	<.5		
Au		<.05	<.05		
U	<.5	<.5	<.5	0.7	1.9
F		0.008%			

E. H. Phillips
Laboratory Director

Charges: $57.40

< (less than)

EHP/amp