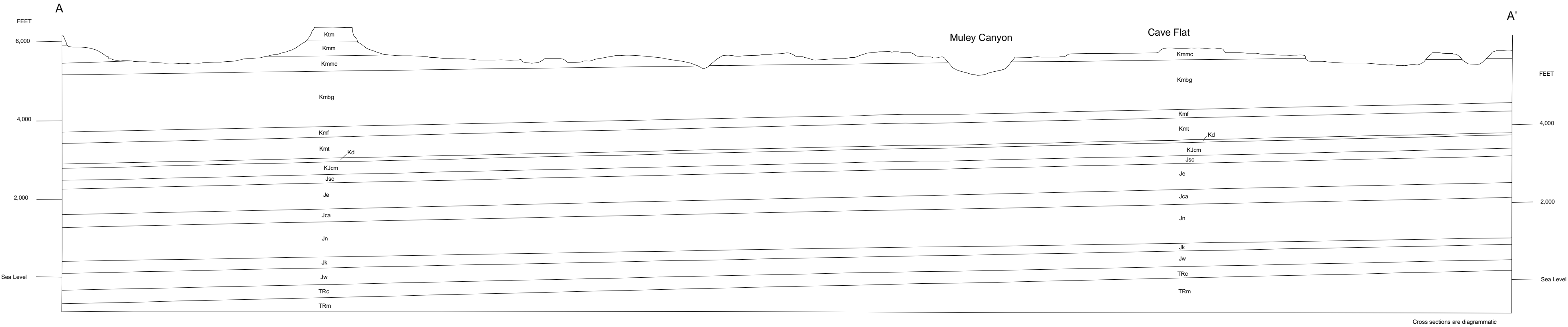
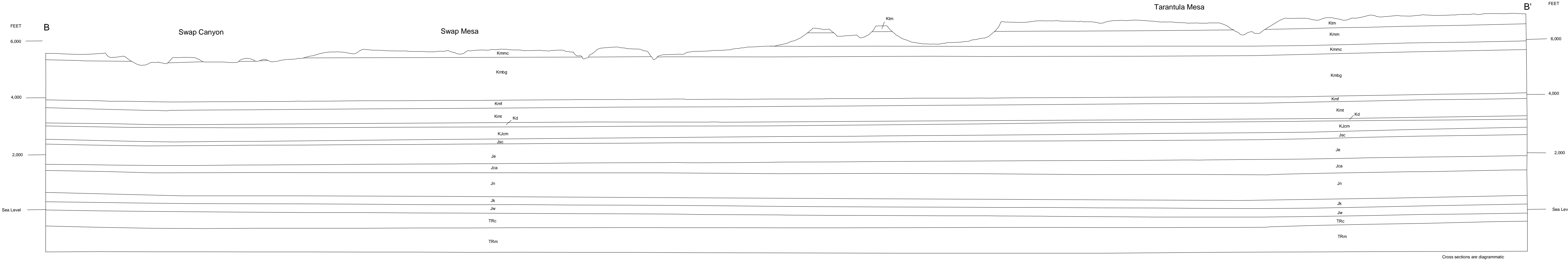


Open-File Report 406
Interim Geologic Map of the
Cave Flat Quadrangle, Utah
MT. PENNELL 2 NW QUADRANGLE
UTAH—GARFIELD CO.





INTERIM GEOLOGIC MAP OF THE CAVE FLAT (MT. PENNEL 2 NW)
QUADRANGLE, GARFIELD COUNTY, UTAH
by CURTIS SMITH
2003



INTERIM GEOLOGIC MAP OF THE CAVE FLAT (MT. PENNELL 2 NW) QUADRANGLE,
GARFIELD COUNTY, UTAH

Curtis Smith
IHS Energy
5333 Westheimer
Houston, TX 77056

This open-file release makes information available to the public during the review and production period necessary for a formal UGS publication. Because the release is subject to review and may not conform to UGS policy and editorial standards, it may be premature for an individual or group to take action based on the contents. This material will not be reproduced when the final product has been released.



OPEN-FILE REPORT 406
UTAH GEOLOGICAL SURVEY
a division of

UTAH DEPARTMENT OF NATURAL RESOURCES

March 2003

MAP AND CROSS-SECTION UNITS
Cave Flat (Mt. Pennell 2 NW) 7.5' quadrangle, Garfield County, Utah

Quaternary Deposits

Qe Windblown sand and loess

Qal Stream alluvium

Qap? Pediment-mantle(?) gravel

Cretaceous Rocks

Kb Beds on Tarantula Mesa (Kaiparowits? Formation)

Ktmu Upper part Tarantula Mesa Sandstone (Ktm-2 of Smith, 1983)

Ktml Lower part Tarantula Mesa Sandstone (Ktm-1 of Smith, 1983)

Kmmu Upper part Masuk Shale Member of Mancos Shale (Kmm-2 of Smith, 1983)

Kmml Lower part Masuk Shale Member of Mancos Shale (Kmm-1 of Smith, 1983)

Kmus Upper fluvial sandstone of Muley Canyon Sandstone Member of Mancos Shale
(Kmmc-3 of Smith, 1983)

Kmc Coal interval of Muley Canyon Sandstone Member of Mancos Shale (Kmmc-2 of
Smith, 1983)

Kmcu Upper coal interval of Muley Canyon Sandstone Member of Mancos Shale (Kmmc-2c
of Smith, 1983)

Kmcs Sandstone of coal interval of Muley Canyon Sandstone Member of Mancos Shale
(Kmmc-2b of Smith, 1983)

Kmcl Lower coal interval of Muley Canyon Sandstone Member of Mancos Shale (Kmmc-
2a of Smith, 1983)

Kmls Lower massive sandstone of Muley Canyon Sandstone Member of Mancos Shale
(Kmmc-1 of Smith, 1983)

Kbgu Upper part Bluegate Shale Member of Mancos Shale (Kmbg-2 of Smith, 1983)

Kbgl Lower part Bluegate Shale Member of Mancos Shale (Kmbg-1 of Smith, 1983)

Cretaceous Rocks on Cross Sections

Ktm Tarantula Mesa Sandstone

Kmm Masuk Shale Member of Mancos Shale

Kmmc Muley Canyon Sandstone Member of Mancos Shale

Kmbg Bluegate Shale Member of Mancos Shale

Kmf Ferron Sandstone Member of Mancos Shale

Kmt Tununk Shale Member of Mancos Shale

Kd Dakota Formation

Cretaceous and Jurassic Rocks on Cross Sections

KJcm Cedar Mountain and Morrison Formations

Jurassic Rocks on Cross Sections

Jsc Summerville and Curtis Formations

Je Entrada Formation

Jca Carmel Formation

Jn Navajo Sandstone (and Page Sandstone?)

Jk Kayenta Formation

Jurassic and Triassic Rocks on Cross Sections

Jw Wingate Sandstone

Triassic Rocks on Cross Sections

TRc Chinle Formation (and Shinarump Conglomerate Member)

TRm Moenkopi Formation

REFERENCES

Cave Flat quadrangle

Smith, Curtis, 1983, Geology, depositional environments, and coal resources of the Mt. Pennell 2 NW [Cave Flat] quadrangle, Garfield County, Utah: Provo, Brigham Young University Geology Studies, v. 30, part 1, p. 145-169.

Billingsley, G.H., Jr., Huntoon, P.W., and Breed, W.J., 1987, Geologic map of Capital Reef National Park and vicinity, Utah: Utah Geological and Mineral Survey Map 87, scale 1:62,500.


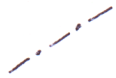





Stratigraphy

Eaton, J.G., 1990, Stratigraphic revision of Campanian (Upper Cretaceous) rocks in the Henry Basin, Utah: The Mountain Geologist, v. 27, no. 1, p. 27-38.

Coal

Dames and Moore, 1980, Coal resource occurrence and coal development potential maps of the NW quarter of the Mt. Pennell 15-minute quadrangle, Garfield County, Utah: U.S. Geological Survey Open-File Report 80-117, 42 p., scale 1:24,000.

MAP AND CROSS-SECTION SYMBOLS

-  Contact, Quaternary contacts dashed where approximately located
-  Contact in Muley Canyon Member of Mancos Shale, used between upper and lower sandstones of Muley Canyon Member (Kmus-Kmls) where intervening coal interval (Kmc) can't be shown on cliff faces on map
-  Contact in coal interval of Muley Canyon Member of Mancos Shale, used where upper and lower coal-bearing intervals can be shown separately on map
- 
 - Structural axes
 - syncline
 - monocline
-  Structure contour line—dashed where datum (base of lower coal interval of Muley Canyon Sandstone Member of Mancos Shale) is above ground surface; 100 foot contour interval
- 
 - Strike and dip of strata
 - inclined
 - horizontal
-  Line of cross section, approximately located

SMITH APPENDIX

These are the measured sections that Smith (1983) stated were the appendix to his paper and were available from Brigham Young University. Note however that not all measured sections shown on figure 10 in Smith (1983) are in his appendix.

Measured section A:

Blue Gate Shale Member of Mancos Shale measured east of Stevens Narrows (Mount Ellen 15' quadrangle) with Loren Morton.

<u>Unit</u>	<u>Description</u>	<u>Thickness</u>	<u>Total</u>
Muley Canyon Sandstone Member of Mancos Shale:			
	Sandstone: yellowish gray, weathers to grayish orange, very fine subrounded grains, moderately well sorted, laminated to very thin bedding, cliff former.	5.0 m	5.0+ m
Blue Gate Shale			
8	Sandstone and shale: interbedded. Shale: dark gray, weathers to light gray soil, laminated, gypsiferous, forms punky soil, slope former. Sandstone: yellowish gray, weathers to grayish orange, very fine subangular grains, moderately well sorted, very thin bedded to laminated, ripple laminations, cross laminations, wood and plant fragments along bedding planes, forms shoulders and ledges, weathers to a platy rubble, gypsum, iron-oxide, and calcite cement.	28.0 m	465.0 m
7	Shale: dark gray, weathers to a light gray soil, laminated, gypsiferous, forms punky soil, slope former.	24.0 m	437.0 m
6	Shale and siltstone: interbedded. Shale: dark gray, weathers to a bluish gray soil, laminated to thinly laminated, bentonitic, gypsiferous, papery to shaly, forms slope. Siltstone: brown, weathers to grayish orange, laminated to very thin bedded, forms ledges or produces platy rubble on surface, iron-oxide and calcite cement; siltstone beds are 1-3 meters thick and occur every 15-20 meters.	79.0 m	413.0 m
5	Shale: brownish black, weathers bluish gray, highly calcareous and gypsiferous, contains bentonitic beds, laminated, papery, forms slope; several thin to medium beds of calcareous siltstone present.	100.0 m	334.0 m
4	Silty mudstone: interbedded olive brown and medium gray, weathers to light orange-brown, contains calcite, hematite, limonite, and gypsum, forms slope near base of cuesta.	31.0 m	234.0 m

3	Shale: poorly exposed, olive brown, weathers to grayish brown, gypsiferous, contains bentonitic, carbonaceous, and silty horizons, poorly preserved pelecypods, slope former.	170.0 m	203.0 m
2	Shale: dark gray, weathers to bluish gray soil, carbonaceous, calcareous, thinly laminated to laminated, forms slope and badlands topography.	33.0 m	33.0 m
1	Pebbly sandstone: yellowish gray, weathers lighter, medium to coarse angular grains, poorly sorted, composition is sandy matrix (85%), pebbles (5-15%), and hematite (5%), moderately indurated, calcite cement; this unit indicates an unconformity at the base of the Blue Gate Shale.	0.1 m	0.1 m
		Total Thickness: 465.0 m	
Ferron Sandstone Member of Mancos Shale		not measured	

Measured section 5:

Type section of Muley Canyon Sandstone Member of Mancos Shale (SE 1/4SW 1/4, section 16, T. 33 S., R. 9 E.).

<u>Unit</u>	<u>Description</u>	<u>Thickness</u>	<u>Total</u>
Masuk Shale Member of Mancos Shale			
	Mudstone and siltstone: slope former.	not measured	
Muley Canyon Sandstone:			
22	Sandstone: grayish orange, weathers to pale red, very fine subangular grains, well sorted, composition is mostly quartz with minor chert, massive channels, trough cross-bedding, abundant siderite and limonite nodules, lower contact undulating, hematite-rich cap, cliff former, calcite and iron-oxide cement.	4.0 m	107.2 m
21	Sandstone and sandy mudstone: interbedded. Sandstone: grayish orange lenticular. Mudstone: brownish gray, carbonaceous, laminated, slope former.	0.8 m	103.2 m
20	Sandstone: grayish orange, fine subangular grains, moderately well sorted, composition is mostly quartz with minor chert, massive channels, trough cross-bedding, siderite and limonite concretions cliff former, moderately indurated, iron-oxide cement.	10.0 m	102.4 m
19	Sandstone: grayish orange, fine to medium subangular grains, moderately sorted, composition is quartz with minor chert, massive channels, trough cross-bedding, abundant siderite and limonite concretions, minor lenses of	20.0 m	92.4 m

	carbonaceous mudstone, cliff former, poorly indurated to friable, iron-oxide cement.		
18	Sandstone, mudstone, coal, and ironstone: interbedded. Sandstone: grayish orange, fine subangular grains, moderately well sorted, composition is mostly quartz and hematite, medium lenticular bedding, abundant siderite concretions. Mudstone: brownish gray, silty, carbonaceous. Coal: thickness 0.5 m, grades laterally into mudstone; entire unit consists of medium interbeds and forms slope.	1.5 m	72.4 m
17	Sandstone: very light gray, weathers very pale orange, very fine to fine subangular grains, moderately sorted, composition is mostly quartz with minor chert, massive channels, trough cross-bedding, siderite and limonite concretions, contains minor mudstone lenses, minor interbedded jet laminations, cliff former, iron-oxide and calcite cement.	12.0 m	70.9 m
16	Sandstone: grayish orange, weathers very pale orange, very fine to fine subangular grains, moderately well sorted, composition is mostly quartz with some chert, massive channels, trough cross-bedding, siderite concretions, forms ledges and slopes, poorly indurated to friable, calcite and iron-oxide cement.	4.0 m	58.9 m
15	Coal: sub-bituminous, cleated, low sulfur, lower contact gradational.	0.3 m	54.9 m
14	Mudstone: brownish gray, carbonaceous, slightly silty, laminated but becomes more rooted up-section, abundant macerated plant fragments between laminations, slope former.	2.7 m	54.6 m
13	Coal: buried, slightly cleated.	0.8 m	51.9 m
12	Sandstone: yellowish gray, very fine to fine subangular grains, moderately well sorted, composition is mostly quartz, very thin bedded, contains minor carbonaceous mudstone lenses, slope former, calcite and hematite cement.	2.7 m	51.1 m
11	Mudstone and sandstone: interbedded: Mudstone (70%): brownish black, carbonaceous, gypsiferous, macerated plant material, rooted. Sandstone (30%): silt to very fine grains, very thin bedded, forms slope.	1.6 m	48.4 m
10	Coal: thin bedded, flaggy, shaley in places, forms slope.	0.8 m	46.8 m
9	Mudstone: brownish black, weathers to brownish gray, silty, carbonaceous, macerated plant fragments, slope former.	1.7 m	46.0 m

8	Coal: buried.	0.3 m	44.3 m
7	Sandstone: very pale orange, weathers to buff, fine subangular grains, moderately sorted, horizontally laminated, lower half shows hummocky stratification, upper half shows low-angle trough cross-bedding, hematite-rich cap, cliff former, friable, bleached, limonite cement.	17.0 m	44.0 m
6	Sandstone: grayish orange, weathers orange, fine to medium subangular grains, moderately sorted, laminated and hummocky stratification, inclusions of bleached sand at base of unit, cliff former, poorly indurated, limonite cement.	4.0 m	27.0 m
5	Sandstone: yellowish gray, weathers to grayish orange, fine subangular grains, moderately well sorted, gypsiferous, forms ledges and slopes.	6.0 m	23.0 m
4	Sandstone: orange, weathers to grayish orange, fine subangular grains, moderately sorted, horizontal and hummocky stratification, lower part of unit is bioturbated, cliff former, moderately indurated.	2.0 m	17.0 m
3	Sandstone: grayish orange, weathers to yellowish gray, very fine subangular grains, moderately well sorted, minor laminations, intense bioturbation, lower contact is undulating, forms cliff, well indurated, calcite cement.	4.0 m	15.0 m
2	Sandstone and mudstone: interbedded. Sandstone: weathers to yellowish gray, silt to fine grains. Mudstone: brownish black, carbonaceous; entire unit consists of thin to medium interbeds and forms slope.	5.0 m	11.0 m
1	Sandstone: grayish orange, fine subangular grains, moderately well sorted, horizontal and ripple laminations, bioturbated, soft-sediment deformation into lower unit, forms cliff, well indurated, calcite cement.	6.0 m	6.0 m
Total Thickness: 107.2 m			
Blue Gate Shale Member of Mancos Shale:			
	Mudstone, siltstone and sandstone: interbedded.	30 m	30+ m
	Mudstone: brownish black, weathers to greenish gray, carbonaceous, gypsiferous, laminated to thin bedded, soft-sediment deformation.		
	Sandstone and siltstone: increase up-section; overall slope former.		

Measured section 7:

Muley Canyon Sandstone Member of Mancos Shale measured at west fork, Muley Canyon (SE1/4, section 19, T. 33

S., R. 9 E.)

<u>Unit</u>	<u>Description</u>	<u>Thickness</u>	<u>Total</u>
Masuk Shale Member of Mancos Shale			
	Mudstone and siltstone: interbedded, slope former.	5.0 m	5.0+ m
Muley Canyon Sandstone			
14	Sandstone: grayish orange, weathers yellowish gray, massive channels, forms cliff.	10.0 m	80.4 m
13	Sandstone: grayish orange, weathers to yellowish gray, fine to medium subrounded grains, moderately sorted, composition is mostly quartz with some chert, massive channels, cross-bedding, limonite and siderite nodules, hematite-rich cap, cliff former, iron-oxide cement.	11.0 m	70.4 m
12	Sandstone: very pale to pale orange, weathers to yellowish gray, fine to medium subrounded grains, moderately sorted, composition is quartz, massive channels, trough cross-bedding, iron-stone cap, ledge former, poorly indurated, calcite and hematite cement.	9.0 m	59.4 m
11	Sandstone, mudstone and coal: interbedded, poorly exposed. Sandstone (65%): grayish orange weathers to grayish orange, silt to very fine grains, thin bedded, iron-oxide cement. Mudstone (30%): brownish black, weathers to greenish gray, carbonaceous, silty to sandy in places, laminated to rooted, abundant macerated plant fragments, soft-sediment deformation. Coal (5%): 0.3 m thick.	6.0 m	50.4 m
10	Sandstone: yellowish gray, very fine to fine subangular grains, moderately sorted, horizontal, inclined, and rippled laminations, siderite and limonite concretions, cliff former, calcite cement.	18.0 m	44.4 m
9	Coal: vitreous, minor gypsum, cleated, pinches out, forms slope.	0.6 m	26.4 m
8	Mudstone: brownish black, weathers to medium gray, carbonaceous, sandy, thinly laminated in middle of unit, rooted at top and bottom of unit, plant fragments along bedding planes, undulating upper contact, forms ledgy slopes.	1.6 m	25.8 m
7	Coal: vitreous, flaky, low sulfur, laterally continuous, forms slope.	0.4 m	24.2 m
6	Mudstone: brownish black, weathers to medium gray, carbonaceous, sandy, horizontally laminated, minor rooting, slope former.	0.5 m	23.8 m
5	Sandstone: light gray, weathers to light gray, very fine grains, minor hematite, contains minor coal lense, lithology changes laterally, slope former.	0.7 m	23.3 m

4	Mudstone: brownish black, weathers to medium gray, carbonaceous, silt and sand increase up-section, rooted to laminated, abundant plant fragments, forms shoulder.	0.8 m	22.6 m
3	Coal: vitreous, cleated, no sulfur on cleats, laterally continuous, carbonaceous mudstone split from 0.3-0.4 meters, slope former.	0.8 m	21.8 m
2	Sandstone: very pale orange, weathers to light gray, very fine subrounded grains, moderately well sorted, composition is mostly quartz with some calcite and hematite, horizontally laminated, forms mounds, calcite and iron-oxide cement.	5.0 m	21.0 m
1	Sandstone: grayish orange, weathers to yellowish gray, fine to medium subangular grains, moderately sorted, composition is mostly quartz, horizontal and hummocky stratification, hematite concretions, cliff former, moderately to poorly indurated, calcite and hematite cement.	16.0 m	16.0 m

Total Thickness: 80.4 m

Blue Gate Shale Member of Mancos Shale

Shale (85%) and sandstone (15%): interbedded, sandstone shows slight increase up-section, upper contact slightly undulating, forms slope.	20.0 m	20.0+ m
---	--------	---------

Measured section 2:

Masuk Shale Member of Mancos Shale located on the southeast corner of Tarantula Mesa (SE1/4, section 10 [sic, section 27], T. 33 S., R. 9E.)

<u>Unit</u>	<u>Description</u>	<u>Thickness</u>	<u>Total</u>
Tarantula Mesa Sandstone	Sandstone: grayish orange, weathers to grayish orange, medium to fine grained, moderately sorted, composition is mostly quartz, contains limonite and hematite horizontally laminated, lower part of unit contains minor mudstone lenses and ball and pillow structures, blocky to friable, forms cliff.	5.0 m	5.0+ m
Masuk Shale			
24	Sandstone and shale: interbedded. Sandstone: yellowish gray, weathers to pale reddish brown, very fine grained, horizontal to ripple laminated, moderately indurated, blocky, ledge former, calcite cement. Shale: carbonaceous, laminated, papery, soft-sediment deformation, slope former.	5.5 m	171.5 m

23	Sandstone: yellowish gray, weathers to pale reddish brown, very fine to fine subrounded grains, moderately sorted, ripple laminations, herring-bone structures, channeled, slightly bioturbated, slaty, ledge former, calcite cement.	3.0 m	166.0 m
22	Shale: brownish black, weathers to a light gray soil, gypsiferous, thinly laminated, papery, slope former.	7.0 m	163.0 m
21	Sandstone: grayish orange, weathers slightly darker, very fine to fine subrounded grains, moderately well sorted, ripple laminations, low-angle bimodal cross-bedding, thins laterally, lower contact undulating, ledge former.	3.5 m	156.0 m
20	Mudstone: brownish black to greenish gray, weathers to brownish gray soil, carbonaceous, contains abundant gypsum, sulfur and macerated plant material, rooted, slope former.	5.0 m	152.5 m
19	Silty sandstone and mudstone: interbedded. Sandstone: yellowish gray, abundant limonite, thin bedded, slope former. Mudstone: poorly exposed, gypsiferous.	10.0 m	147.5 m
18	Sandstone: light brown, very fine subangular quartz grains, moderately sorted, wavy laminations, hematite-rich sandstone cap, ledge former, calcite cement.	3.0 m	137.5 m
17	Mudstone and sandstone: interbedded. Mudstone: calcareous, gypsiferous, limonitic, ripple laminated. Sandstone: very fine subrounded grains, herring-bone structures, ripple laminations, soft-sediment deformation; entire unit forms slope.	2.0 m	134.5 m
16	Mudstone: poorly exposed, brownish black, weathers to light gray soil.	21.0 m	132.5 m
15	Sandstone: well indurated, ripple laminated, forms shoulder, calcite and iron-oxide cement.	7.0 m	111.5 m
14	Mudstone: weathers to a brownish gray soil, gypsiferous, limonitic, bentonite horizon, thinly laminated to rooted, abundant plant fragments, contains thin coal seam.	13.0 m	104.5 m
13	Sandstone: reddish brown to light gray, very fine subrounded quartz grains, moderately sorted, horizontal and ripple laminations, ledge former, calcite and iron-oxide cement.	1.0 m	91.5 m
12	Conglomerate and mudstone: cobbles, pebbles, coarse and medium sand grains in a clayey matrix, very angular clasts, poorly sorted, abundant limonite nodules.	1.5 m	90.5 m
11	Sandstone and mudstone: interbedded, poorly exposed, light gray soil,	6.5 m	89.0 m

	contains a bentonitic soil, unit coarsens upward, slope former.		
10	Sandstone: grayish orange, very fine to fine subangular grains, moderately sorted, laminated to thin bedded, ripple laminated, unit thins laterally, undulating lower contact, ledgy slope former, calcite cement.	2.5 m	82.5 m
9	Mudstone and siltstone: interbedded, poorly exposed, weathers to a grayish orange soil, contains abundant limonite and minor gypsum, slope former.	11.5 m	80.0 m
8	Mudstone and minor interbedded sandstone: buried, weathers to a yellowish gray and grayish orange soil; mudstone: gypsiferous, carbonaceous, hematitic, forms slope; sandstone: very fine to fine grains, thin bedded.	12.0 m	68.5 m
7	Mudstone: brownish black, weathers to a yellowish gray soil, carbonaceous, contains gypsum and limonite, silty, laminated, forms slope.	7.0 m	56.5 m
6	Sandstone: yellowish gray, weathers to pale red, very fine to fine angular grains, channeling, cross-bedding, soft-sediment deformation into lower unit, cliff former, calcite and iron-oxide cement.	6.0 m	49.5 m
5	Sandstone and mudstone: interbedded. Mudstone (80%): weathers light brown, laminated, forms slope, calcite and gypsum cement. Sandstone: grayish orange, bimodal cross-bedding, soft-sediment deformation into mudstone, ledge and slope former; sandstone increases up-section.	14.5 m	43.5 m
4	Shale: light gray, gypsiferous, laminated, forms slope.	3.0 m	29.0 m
3	Shale: dark brown, weathers to a light brown soil, gypsiferous, laminated, slope former, contains minor sandstone lenses.	15.0 m	26.0 m
2	Sandstone: grayish orange, weathers to grayish orange, fine subangular grains, moderately well sorted, cross-bedding, channels, ironstone cap, soft-sediment deformation into lower unit, ledge former, limonite cement.	3.0 m	11.0 m
1	Mudstone: greenish gray, weathers to a light greenish gray soil, calcareous, gypsiferous, rooted, slope former.	8.0 m	8.0 m
		Total Thickness:	171.5 m
Muley Canyon Sandstone Member of Mancos Shale			not measured

Measured section B:

Type section of the Tarantula Mesa Sandstone (NE1/4SE1/4, section 35, T. 32 S., R. 9 E.)

<u>Unit</u>	<u>Description</u>	<u>Thickness</u>	<u>Total</u>
Tarantula Mesa Sandstone			
11	Sandstone: grayish orange, weathers to alternating pale orange and light gray beds, very fine to fine angular grains, moderately well sorted, composition is limonite-stained quartz, massive channels, trough cross-bedded, hematite concretions, hematite-rich beds at four intervals, ledgy slope former, limonite cement.	24.0 m	124.5 m
10	Sandstone: grayish orange, weathers pale orange to light gray, fine to medium subrounded grains, moderately sorted, composition is mostly quartz, limonite and hematite concretions, massive channels, trough cross-bedded, forms ledgy slopes, poorly indurated to friable, limonite cement.	15.0 m	100.5 m
9	Sandstone: grayish orange, fine to medium angular grains, moderately sorted, composition is quartz, abundant hematite and limonite concretions, trough cross-bedded, massive channels, hematite-rich cap, cliff former.	8.0 m	85.5 m
8	Conglomerate and sandstone: interbedded. Conglomerate (40%): yellowish gray, weathers to pale red, very coarse sand grains, granules, and small pebbles, well rounded, poorly sorted, composition is mostly chert, poorly indurated. Sandstone (60%): grayish orange, very fine to fine grains, composition is mostly quartz with some chert, hematite and limonite concretions, cross-bedded, forms cliff.	12.0 m	77.5 m
7	Sandstone: light gray weathers to pale red, very fine to fine angular grains, moderately sorted, composition is mostly quartz, minor hematite and limonite concretions, very thick to massive channels, cross-bedded, horizontal and climbing ripples, hematite-rich cap, cliff former, silica cement.	17.0 m	65.5 m
6	Sandstone: pale orange to light gray, weathers to pale red, fine subangular grains, moderately well sorted, composition is mostly quartz, massive channels, cross-bedded, horizontal and climbing ripples, forms cliff, silica cement.	22.0 m	48.5 m
5	Sandstone: very fine to coarse angular grains, poorly sorted, composition is 80% quartz, 10% chert, and 10% altered feldspar, hematite and limonite concretions, massive channels, horizontal and climbing ripples, cross-bedded, minor bioturbation, minor interbedded jet laminations, cliff former.	9.0 m	26.5 m

4	Mudstone and silty sandstone: interbedded. Mudstone: brownish black, weathers to brownish gray, laminated, gypsiferous, contains ironstone horizon. Sandstone: yellowish gray, thin bedded; entire unit contains ball and pillow structures and coarsens upward, forms slope.	1.5 m	17.5 m
3	Sandstone: grayish orange, weathers to yellowish gray, very fine to fine angular grains, moderately sorted, composition is mostly quartz, hematite concretions, massive channels, horizontal ripples, cross-bedding, bioturbation, lower half of unit forms cliff while upper half forms slope, calcite cement.	9.0 m	16.0 m
2	Sandstone: grayish orange, weathers to yellowish gray, very fine to fine subangular grains, moderately well sorted, composition is mostly quartz, massive bedding, low-angle cross-laminations, minor hematite concretions, forms slope, unit thins laterally, friable, calcite cement.	3.0 m	7.0 m
1	Sandstone: grayish orange, weathers to yellowish gray, silt to very fine angular grains, composition is quartz (95%) and iron minerals (5%), ripple and deformed laminations , low-angle cross-bedding, undulating lower contact, unit thickens and thins laterally, contains minor mudstone lenses, forms cliff, poorly indurated, calcite cement.	4.0 m	4.0 m
Total Thickness: 124.5 m			
Masuk Shale Member of Mancos Shale:			
	Mudstone and sandstone: interbedded.	not measured	