

SECTION I. Stratigraphic sections of the Javelina Formation.

Measured section 1, (principal reference section) Javelina Formation, west side of Park Highway on south side of Dawson Creek, vicinity of Maxwell et al. (1967) measured section 15 (lower part), Lawson (1972) measured section 1, Lehman (1985) section 14 (plate 1), and Standhardt (1986) section DC-W; base of section at 29°17'40"N, 103°31'17"W; top of section at 29°17'32"N, 103°31'45"W.

unit	thickness (m)	description
123.3		total thickness of Javelina Formation
9	11.0	Slightly conglomeratic sandstone; yellowish brown; base with pebble conglomerate of carbonate nodules and chert; grades upward to medium and fine-grained sandstone with large-scale trough cross-bedding; upper 1 m is well-indurated dark brown, parallel-laminated, fine sandstone; forms a prominent hogback ridge along the south dip slope of "Big Wing Hill;" intertongues laterally to east with mudstone; top in contact with base of Black Peaks Formation.
8	6.7	Mudstone with carbonate nodules; light gray; lower part interbedded with white-light gray siltstone and very fine sandstone
7	12.0	Slightly conglomeratic sandstone; yellowish brown; well-indurated; base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone with large-scale trough cross-bedding; together with units 5 and 6 forms the prominent ridge along "Big Wing Hill"
6	2.0	Mudstone with carbonate nodules; light gray; lower part interbedded with white-light gray siltstone and very fine sandstone
5	15.0	Slightly conglomeratic sandstone; yellowish brown; well-indurated; base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone with large-scale trough cross-bedding; together with units 6 and 7 forms the prominent ridge along "Big Wing Hill"
4	21.6	Mudstone with carbonate nodules; alternating light gray and purple; lower part interbedded with white-light gray siltstone; central part truncated laterally by lenticular fine-very fine sandstone, white-light gray, thinly bedded
3	15.5	Slightly conglomeratic sandstone; light gray-white; poorly indurated; base with pebble conglomerate of carbonate nodules, sparse chert clasts, and petrified logs; grades upward to medium and fine-grained sandstone with large-scale trough cross-bedding; forms slight bench

- 2 17.5 Mudstone with carbonate nodules; alternating light gray and purple; lower part interbedded with white-light gray siltstone and very fine sandstone; upper purple bed has large barite nodules
- 1 22.0 Slightly conglomeratic sandstone; white-light gray with yellow-tan base; poorly indurated; two fining-upward sequences each with lower 0.3 m of sandy pebble conglomerate, clasts of carbonate nodules and sparse chert; abundant petrified logs; upper part fine to medium sandstone, parallel-laminated and trough cross-stratified; grades upward to thinly bedded light gray siltstone; forms low bench along base of exposure; in contact with underlying Aguja Formation.

Measured section 2, Javelina Formation east of Park Highway, south of Maverick Mountain on south side of Dawson Creek, vicinity of Lehman (1985) section 16 (plate 1); base of section at 29°18'05"N, 103°29'49"W; top of section 29°17'43"N, 103°30'03"W.

unit	thickness (m)	description
	130.5	total thickness of Javelina Formation
14	4.5	Slightly conglomeratic sandstone; tan to yellowish brown; base with pebble conglomerate of carbonate nodules, bone, and wood; grades upward to medium and fine-grained sandstone with large-scale trough cross-bedding; forms a prominent bench, top in contact with base of Black Peaks Formation.
13	7.0	Mudstone; tan to light gray; lower part interbedded with white-light gray siltstone and very fine sandstone
12	6.0	Slightly conglomeratic sandstone; light gray-white; poorly indurated; base with pebble conglomerate of carbonate nodules; grades upward to clayey fine-grained sandstone interbedded with mudstone; low trough cross-bedding; forms low bench
11	12.0	Mudstone with carbonate nodules; alternating light gray, dark gray, and red or purple; lower part interbedded with white-light gray clayey siltstone and very fine sandstone
10	6.5	Slightly conglomeratic sandstone; light gray-white; poorly indurated; base with pebble conglomerate of carbonate nodules; grades upward to fine-grained sandstone interbedded with mudstone; forms low bench

- 9 12.0 Mudstone with carbonate nodules; alternating tan to light gray, dark gray and purple; lower part interbedded with white-light gray clayey siltstone and very fine sandstone
- 8 7.5 Slightly conglomeratic sandstone; tan to yellowish brown; base with pebble conglomerate of carbonate nodules, bone, wood, and chert; lower part with mudstone partings on lateral accretion surfaces; grades upward to medium and fine-grained sandstone with large-scale trough cross-bedding; upper 1 m is well-indurated dark brown fine sandstone; forms a prominent ridge
- 7 19.0 Mudstone with carbonate nodules; alternating tan, light gray and dark gray; lower part interbedded with lenses of tan-light gray siltstone and clayey very fine sandstone with sparse thin conglomerate of nodules, bone, and wood; upper part with discontinuous thin purple bands and abundant carbonate nodules
- 6 14.5 Mudstone with carbonate nodules; tan to light gray; lower part interbedded with white-light gray siltstone and very fine sandstone; upper part with prominent alternating thin bands of pale blue, purple, and red
- 5 4.5 Sandstone; tan to light gray; poorly indurated; base with sparse pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone with abundant large-scale trough cross-bedding; forms a low ridge
- 4 14.0 Mudstone; alternating tan, light gray and dark gray, mottled purple in upper 1 m; lower part interbedded with lenses of white to light tan-gray clayey fine sandstone.
- 3 4.5 Slightly conglomeratic sandstone; light gray-white; poorly indurated; base with pebble conglomerate of carbonate nodules and carbonized wood; grades upward to fine-grained sandstone with mudstone partings; abundant soft sediment deformation structures; forms low bench
- 2 13.5 Mudstone with carbonate nodules; alternating light gray and purple; lower part interbedded with lenses of white-light gray siltstone and very fine sandstone having thin conglomerate of carbonate nodules, bone and petrified wood; upper part tan/yellow and lacking carbonate nodules
- 1 5.0 Slightly conglomeratic sandstone; pale pink with dark brown indurated horizons; poorly indurated; fining-upward with lower 0.1 m of sandy pebble conglomerate, petrified wood, clasts of carbonate nodules; upper part fine to medium sandstone, parallel-laminated and trough cross-stratified; lignite partings on lateral accretion surfaces; grades upward to

thinly bedded light gray siltstone; forms low bench along base of exposure; in contact with underlying Aguja Formation.

Measured section 3, Javelina Formation at "Sauropod Hills" southwest of Canoe Valley; base of section at 29°27'35"N, 103°09'27"W; top of section at 29°27'43"N, 103°10'44"W.

unit	thickness (m)	description
133.0		total thickness of Javelina Formation
11	8.5	Siltstone and sandstone; gray-green, thinly bedded, bioturbated siltstone; grades upward to dark brown, lenticular, bioturbated, concretionary thin beds of fine sandstone; uppermost bed of sandstone thickens to northwest, forms low bench; contact with Black Peaks Formation poorly exposed
10	12.5	Siltstone and sandstone; gray-green, thinly bedded, bioturbated siltstone; grades upward to dark brown, lenticular, bioturbated, concretionary thin beds of fine sandstone
9	6.0	Slightly conglomeratic sandstone; gray to yellowish brown with dark brown top; base with sparse lenses of pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated; upper 1 m is well-indurated dark brown, concretionary, bioturbated fine sandstone; forms a prominent hogback ridge, extensive along strike
8	16.5	Mudstone with carbonate nodules; alternating gray-green and purple; lower part interbedded with siltstone and very fine sandstone of unit 7
7	3.5	Sandstone; gray-green; thinly bedded and bioturbated; alternating with thin beds of siltstone; prominent inclined lateral-accretion bedding; grades laterally into light gray claystone of unit 6
6	25.5	Mudstone with carbonate nodules; light gray with one thin purple bed; lower part interbedded with gray siltstone and lenses of dark brown very fine sandstone; mostly covered
5	6.5	Slightly conglomeratic sandstone; gray to yellowish brown with dark brown top; well-indurated; lower 1 m with lenses of pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone with large-scale trough cross-bedding; forms a prominent ridge continuous along strike

4	20.5	Mudstone with carbonate nodules; light gray with one prominent purple bed; mostly covered
3	2.0	Sandstone; dark brown; lenticular, grades laterally into unit 2; medium to fine-grained, parallel-laminated with upper part bioturbated; forms slight bench
2	21.0	Mudstone with carbonate nodules; yellow at base, grading upward to light gray; lower part interbedded with yellow siltstone and very fine sandstone
1	10.5	Slightly conglomeratic sandstone; tan-yellow with dark brown top; lower 0.2 m of sandy pebble conglomerate, clasts of carbonate nodules and sparse chert; upper part fine to medium sandstone, bedding irregular and contorted with some trough cross-stratification; grades upward to thinly bedded yellow siltstone with thin lenses of dark brown sandstone; forms low bench along base of exposure; contact with underlying Aguja Formation exposed to northwest

Measured section 4, Javelina Formation east of Glenn Springs, in foothills of Chilicotal Mountain, vicinity of Lawson (1972) measured section 7; base of section at 29°10'34"N, 103°09'20"W; top of section at 29°10'30"N, 103°09'10"W.

unit	thickness (m)	description
	178.0	total thickness of Javelina Formation
13	8.0	Slightly conglomeratic sandstone; yellowish-gray with dark brown concretionary top; medium and fine-grained sandstone; base with pebble conglomerate of carbonate nodules; parallel-laminated and trough cross-bedded; grades upward to gray-green, thin beds of bioturbated siltstone interbedded with concretionary fine dark brown sandstone; forms a low bench; contact with Black Peaks Formation poorly exposed
12	47.0	Mudstone with carbonate nodules; light gray; lower part interbedded with gray-green siltstone and very fine sandstone; mostly covered
11	8.0	Slightly conglomeratic sandstone; yellowish-gray with dark brown concretionary top; medium and fine-grained sandstone; base with pebble conglomerate of carbonate nodules; parallel-laminated and trough cross-bedded; grades upward to gray-green, thin beds of bioturbated siltstone interbedded with concretionary fine dark brown sandstone; forms a prominent bench

- 10 3.0 Mudstone with carbonate nodules; light gray; lower part interbedded with gray-green siltstone and very fine sandstone
- 9 7.0 Slightly conglomeratic sandstone; yellowish-gray with dark brown concretionary top; medium and fine-grained sandstone; base with pebble conglomerate of carbonate nodules; parallel-laminated and trough cross-bedded; forms a prominent bench
- 8 10.0 Mudstone with carbonate nodules; light gray; lower part interbedded with gray-green siltstone and very fine sandstone
- 7 8.0 Slightly conglomeratic sandstone; yellowish-gray with dark brown concretionary top; medium and fine-grained sandstone; base with pebble conglomerate of carbonate nodules; parallel-laminated; grades upward to gray-green, thin beds of bioturbated siltstone interbedded with concretionary fine dark brown sandstone; forms a prominent bench
- 6 12.0 Mudstone with carbonate nodules; light gray; lower part interbedded with gray siltstone and very fine sandstone
- 5 3.0 Slightly conglomeratic sandstone; tan to yellowish gray, dark brown top; medium to fine-grained, parallel-laminated; forms slight bench; grades laterally to unit 4
- 4 7.0 Mudstone with carbonate nodules; light gray; lower part interbedded with gray siltstone; upper part truncated laterally to northeast by lenticular fine-very fine sandstone of unit 5
- 3 4.0 Slightly conglomeratic sandstone; tan to yellowish gray, dark brown top; base with pebble conglomerate of carbonate nodules and sparse chert clasts; grades upward to medium and fine-grained sandstone, parallel-laminated, large-scale broad trough cross-bedding; forms prominent bench
- 2 55.0 Mudstone with carbonate nodules; light gray grading upward to purple; lower part interbedded with gray siltstone and very fine sandstone; poorly exposed
- 1 6.0 Sandstone; tan to pale pink or orange; base poorly exposed; fine to medium-grained, sparse lenses of carbonate nodule conglomerate; ripple cross-laminated and trough cross-stratified; grades upward to thinly bedded light gray siltstone; forms low bench along base of exposure; contact with underlying Aguja Formation obscured by Glenn Springs laccolith.

Measured section 5, Javelina Formation north of McKinney Hills, vicinity of Maxwell et al. (1967) measured section 18, Lehman (1985) sections 8 and 9 (plate 2); base of section at 29°24'31"N, 103°05'27"W; top of section at 29°24'47"N, 103°06'01"W.

unit	thickness (m)	description
183.2		total thickness of Javelina Formation
13	4.8	Slightly conglomeratic sandstone; light gray with dark reddish-brown cap; lower 1 m with pebble conglomerate of carbonate nodules; medium and fine-grained sandstone, parallel-laminated; grades upward to well-indurated dark brown, bioturbated, fine sandstone; forms a prominent ridge; top in contact with Black Peaks Formation.
12	45.0	Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational with interbedded with pale green siltstone and very fine sandstone; mostly covered
11	13.2	Slightly conglomeratic sandstone; light gray with dark brown cap; lower 0.5 m with pebble conglomerate of carbonate nodules; medium and fine-grained sandstone, parallel-laminated, ripple cross-laminated; grades upward to interbedded pale green siltstone and well-indurated dark brown, parallel-laminated, fine sandstone with bioturbation; multiple sets with inclined lateral accretion surfaces; forms a prominent ridge.
10	7.0	Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational with interbedded with pale green siltstone and very fine sandstone
9	11.5	Slightly conglomeratic sandstone; light gray with dark brown cap; base with pebble conglomerate of carbonate nodules; medium and fine-grained sandstone, parallel-laminated; grades upward to interbedded pale green siltstone and well-indurated dark brown, parallel-laminated, fine sandstone with bioturbation; multiple sets with inclined lateral accretion surfaces; forms a prominent ridge.
8	10.5	Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational with interbedded with pale green siltstone and very fine sandstone
7	9.4	Slightly conglomeratic sandstone; pinkish-gray with dark brown cap; base with pebble conglomerate of carbonate nodules and mudstone clasts; grades upward to fine-grained sandstone, parallel-laminated and ripple cross-laminated; upper 2 m alternating light green siltstone with dark

		brown nodular bioturbated fine sandstone; forms a prominent ridge along entire length of outcrop
6	21.2	Mudstone with carbonate nodules; alternating light gray and purple; lower part interbedded with light gray siltstone and bioturbated very fine sandstone
5	6.5	Slightly conglomeratic sandstone; pinkish-gray; base with pebble conglomerate of carbonate nodules; grades upward to coarse and medium-grained sandstone with large-scale trough cross-bedding, parallel-lamination; forms a prominent ridge diminishing to southwest
4	24.5	Mudstone with carbonate nodules; light gray; lower part interbedded with light gray siltstone and a few thin beds of bioturbated gray sandstone
3	2.5	Slightly conglomeratic sandstone; tan-light gray with dark brown top; base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated and low-angle trough cross-bedded; forms bench
2	16.2	Mudstone with carbonate nodules; alternating light gray and purple; interbedded with reddish brown bioturbated, nodular, very fine sandstone
1	10.9	Conglomeratic sandstone; white-light gray; poorly indurated; two intervals of sandy pebble conglomerate, clasts of carbonate nodules and abundant chert; upper part medium to coarse sandstone, parallel-laminated and trough cross-stratified; grades upward to thinly bedded light gray siltstone and nodular bioturbated dark brown sandstone; forms low bench; in contact with underlying Aguja Formation.

Measured section 6, Javelina Formation south of Dagger Flat, vicinity of Lehman (1985) section 13 (plate 2); base of section at 29°28'04"N, 103°07'09"W; top of section at 29°27'53"N, 103°07'29"W.

unit	thickness (m)	description
	144.7	total thickness of Javelina Formation
15	3.0	Sandstone; light gray with dark reddish-brown cap; medium and fine-grained, parallel-laminated; grades upward to well-indurated dark brown, bioturbated, fine sandstone; forms a low bench; top in contact with Black Peaks Formation

- 14 12.0 Mudstone with carbonate nodules; light gray; lower part gradational with interbedded with siltstone, thin lenses of dark brown very fine sandstone near top
- 13 2.0 Sandstone; white to light gray-green; fine-grained, thickly bedded with extensive bioturbation; lenticular unit pinches out laterally
- 12 13.5 Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational with interbedded with siltstone and very fine sandstone
- 11 7.5 Sandstone; light gray with dark brown cap; lower 3 m medium and fine-grained sandstone, parallel-laminated; grades upward to well-indurated dark brown, massive and nodular fine sandstone with bioturbation; forms a prominent bench
- 10 6.5 Mudstone; tan-yellow and light gray; lower part gradational with interbedded with pale green siltstone
- 9 7.5 Sandstone; light gray-green with dark brown cap; medium and fine-grained sandstone, parallel-laminated; grades upward to well-indurated dark brown, parallel-laminated, fine sandstone; forms a low bench
- 8 10.0 Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational with interbedded with pale green siltstone and very fine sandstone
- 7 7.2 Siltstone and sandstone; alternating pale green-gray and dark reddish-brown; interbedded ripple cross-laminated siltstone and nodular bioturbated fine sandstone; multiple sets grading laterally to lenticular sandstone
- 6 6.5 Mudstone with carbonate nodules; alternating light gray and maroon; lower part interbedded with light gray siltstone and bioturbated very fine sandstone; grades laterally to unit 7
- 5 8.0 Slightly conglomeratic sandstone; tan-light gray with dark brown cap; scoured base, 1.5 m pebble-cobble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated and low-angle trough cross-bedded; upper 2 m interbedded light green siltstone with dark brown ripple cross-laminated and nodular bioturbated fine sandstone; forms a prominent ridge
- 4 37.5 Mudstone with carbonate nodules; alternating light gray and maroon; lower part interbedded with light gray siltstone and a few thin beds of bioturbated gray sandstone

3	6.5	Slightly conglomeratic sandstone; tan-light gray with dark brown top; scoured base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated and trough cross-bedded; upper 2 m is interbedded pale gray-green siltstone interbedded with nodular dark brown bioturbated fine sandstone, forms prominent bench
2	13.0	Mudstone with abundant carbonate nodules; alternating light gray and purple; covered in many areas
1	4.0	Slightly conglomeratic sandstone; tan-light gray with dark brown cap; scoured base with lenses of sandy granule conglomerate, clasts of carbonate nodules and mud clasts; abundant petrified logs; upper part medium sandstone, parallel-laminated and low-angle trough cross-stratified; grades upward to thinly bedded light gray; forms low bench; in contact with underlying Aguja Formation.

Measured section 7, Javelina Formation at "Pterodactyl Ridge", vicinity of Lawson (1972) section 4, Lehman (1985) section 14 (plate 2); base of section at 29°28'33"N, 103°08'14"W; top of section at 29°28'22"N, 103°08'53"W.

unit	thickness (m)	description
	174.3	total thickness of Javelina Formation
18	2.0	Slightly conglomeratic sandstone; white-light gray; poorly consolidated; base with sandy granule conglomerate of carbonate granules grading upward to fine-grained sandstone, parallel-laminated; lenticular unit, pinches out to southeast; forms a low bench; top in contact with Black Peaks Formation
17	9.0	Mudstone with carbonate nodules; alternating tan, light gray, and purple
16	2.5	Sandstone; dark brown, fine-grained, pervasively bioturbated, parallel-laminated; lenticular unit pinches out within unit 15
15	5.0	Mudstone with carbonate nodules; alternating tan, light gray, and purple; lower part gradational with interbedded with green-gray siltstone and concretionary dark brown very fine sandstone
14	28.5	Interbedded mudstone, siltstone, and sandstone; alternating thick intervals of pale green-gray bioturbated mudstone with light gray ripple cross-laminated siltstone and dark reddish-brown nodular parallel-laminated

- bioturbated fine sandstone; forms dip slope on the most prominent and laterally extensive hogback ridge in the area
- 13 15.0 Slightly conglomeratic sandstone; compound unit with three fining-upward sequences; tan-yellow with dark brown top; three intervals of sandy pebble-cobble conglomerate of carbonate nodules separated by medium and fine-grained sandstone, parallel-laminated and trough cross-bedded; grades upward to alternating pale green-gray ripple cross-laminated siltstone and dark reddish-brown nodular parallel-laminated bioturbated fine sandstone; forms the most prominent and laterally extensive hogback ridge in the area
- 12 12.5 Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational with interbedded with siltstone and very fine sandstone
- 11 2.5 Slightly conglomeratic sandstone; tan-light gray; scoured base, 0.5 m sandy granule-pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated and low-angle cross-stratified; entire unit pinches out to southeast; forms low bench
- 10 13.0 Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational with interbedded with pale green siltstone and lenticular dark brown, bioturbated, very fine sandstone
- 9 9.0 Slightly conglomeratic sandstone; light gray-tan; lower 1.5 m lenticular medium and fine-grained sandstone, parallel-laminated and trough cross-bedded with lenses of sandy granule-pebble conglomerate of carbonate nodules at base; grades upward to 7.5 m alternating pale green-gray ripple cross-laminated siltstone and dark reddish-brown nodular bioturbated fine sandstone; entire unit pinches out to southeast; forms a low bench
- 8 17.0 Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational with interbedded with pale green siltstone and dark brown, parallel-laminated, very fine sandstone
- 7 4.5 Slightly conglomeratic sandstone; tan-light gray with dark brown top; scoured base, 1.5 m sandy granule-pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated and low-angle trough cross-bedded; forms low bench
- 6 3.0 Mudstone with carbonate nodules; light gray-green and maroon; lower part interbedded with light gray siltstone and bioturbated very fine sandstone; grades laterally to unit 7
- 5 4.5 Slightly conglomeratic sandstone; tan-light gray; scoured base, 1.2 m sandy granule-pebble conglomerate of carbonate nodules; grades upward

to medium and fine-grained sandstone, parallel-laminated and low-angle trough cross-bedded; forms low bench

4	8.5	Mudstone with carbonate nodules; light gray; lower part interbedded with pale green siltstone and thick beds of bioturbated dark brown sandstone
3	9.8	Slightly conglomeratic sandstone; tan-light gray; scoured base with 0.2 m pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated and trough cross-bedded; upper 4 m is interbedded pale gray-green ripple cross-laminated siltstone interbedded with nodular dark brown bioturbated fine sandstone, forms prominent hogback ridge
2	24.0	Mudstone with carbonate nodules; light gray with discontinuous purple beds; thin bioturbated green fine sandstone bed near top; mostly covered
1	4.0	Slightly conglomeratic sandstone; tan-light gray; scoured base with lenses of sandy granule conglomerate, clasts of carbonate nodules and mud clasts; upper part coarse to medium sandstone, trough cross-stratified with soft-sediment deformation; forms low hogback; base in contact with underlying Aguja Formation.

Measured section 8, Javelina Formation north of Grapevine Hills, vicinity of Lehman (1985) section 6 (plate 2), and Straight (1996) section 2; base of section at 29°25'15"N, 103°12'19"W; top of section at 29°25'04"N, 103°12'09"W.

unit	thickness (m)	description
	124.3	total thickness of Javelina Formation
9	18.0	Sandstone; dark brown, medium to fine-grained, parallel-laminated and bioturbated; interbedded with light green siltstone; only exposed along southern edge of exposure; top in contact with Black Peaks Formation
8	7.5	Mudstone with carbonate nodules; alternating light gray and maroon; lower part interbedded with olive green siltstone and brown bioturbated very fine sandstone; mostly covered
7	10.0	Slightly conglomeratic sandstone; tan-light gray with dark brown top; scoured base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated and trough cross-bedded; upper 2 m is nodular dark brown bioturbated fine sandstone interbedded with pale green siltstone, forms most prominent hogback ridge in area

6	8.5	Mudstone with carbonate nodules; alternating light gray and maroon; lower part interbedded with light gray siltstone and bioturbated very fine sandstone; grades laterally to unit 5
5	8.0	Sandstone; tan-light gray, lenticular; medium to fine-grained, parallel-laminated and low-angle trough cross-bedded; grades upward to interbedded light green siltstone with dark brown ripple cross-laminated and nodular bioturbated fine sandstone; forms a prominent ridge extending entire length of exposure
4	12.5	Mudstone with carbonate nodules; alternating light gray and purple; includes 1 m lenticular bed of white tuff near base, and a few thin beds of bioturbated gray sandstone
3	3.2	Slightly conglomeratic sandstone; tan-light gray with dark brown top; scoured base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated and trough cross-bedded; upper 2 m is nodular dark brown bioturbated fine sandstone, forms a prominent bench
2	45.0	Mudstone with abundant carbonate nodules; alternating light gray and purple; mostly covered
1	11.6	Slightly conglomeratic sandstone; tan-light gray; scoured base with lenses of sandy pebble conglomerate of carbonate nodules; upper part medium to fine sandstone, parallel-laminated and trough cross-bedded; grades upward to thinly bedded light gray siltstone and fine sandstone; forms low bench; in contact with underlying Aguja Formation.

Measured section 9, Javelina Formation northwest of Paint Gap Hills, vicinity of Lawson (1972) Onion Flats measured section 2, and Lehman (1985) section 3 (plate 2); base of section at 29°24'32"N, 103°18'48"W; top of section at 29°24'54"N, 103°19'42"W.

unit	thickness (m)	description
	148.5	total thickness of Javelina Formation
11	6.0	Sandstone; yellowish-brown, friable, with local well indurated dark brown concretionary top; fine to very fine grained with clay partings, large-scale trough cross-bedding; top in contact with Black Peaks Formation
10	4.5	Mudstone with carbonate nodules; light gray and purple

- 9 6.0 Sandstone; white-light gray with yellowish-brown concretionary intervals, friable, fine to very fine grained with clay partings, large-scale trough cross-bedding; upper 1 m is interbedded with light gray mudstone
- 8 6.5 Mudstone with carbonate nodules; alternating light gray and red-purple; lower part interbedded with green-gray siltstone and very fine sandstone
- 7 13.5 Slightly conglomeratic sandstone; yellowish brown; scoured base with sparse sandy pebble conglomerate of carbonate nodules; grades upward to interbedded pale green siltstone and ripple cross-laminated very fine sandstone in laterally-inclined units up to 5 m thick; forms the most prominent and laterally continuous bench near top of exposure in the area
- 6 16.5 Mudstone with carbonate nodules; alternating light gray and red-maroon; upper part interbedded with lenses of white-light gray very fine sandstone up to 3 m thick
- 5 11.0 Slightly conglomeratic sandstone; yellowish brown; compound unit with two fining-upward sequences each with scoured base overlain by lenses of sandy pebble conglomerate of carbonate nodules; upper 5 m is medium and fine-grained white-light gray friable lenticular sandstone with large-scale trough cross-bedding; lower part of unit forms laterally extensive bench in area
- 4 29.0 Mudstone with carbonate nodules; alternating light gray and purple; lower part interbedded with pale green siltstone
- 3 12.5 Slightly conglomeratic sandstone; tan-yellow with dark brown well-indurated top; compound unit with two fining-upward sequences each with scoured base overlain by 0.3 m lenses of sandy pebble conglomerate, clasts of carbonate nodules; upper part medium to fine sandstone, parallel-laminated and trough cross-stratified; grades upward to alternating thin beds of green siltstone and nodular bioturbated fine sandstone; forms a laterally extensive bench along north bank of Tornillo Creek.
- 2 40.0 Mudstone with carbonate nodules; alternating light gray and purple; lower part interbedded with white-light gray siltstone and very fine sandstone; mostly covered
- 1 3.0 Slightly conglomeratic sandstone; yellowish-tan, friable; lower 0.3 m of sandy pebble conglomerate, clasts of carbonate nodules and sparse chert; upper part fine to very fine sandstone, parallel-laminated and trough cross-stratified; grades upward to thinly bedded light gray siltstone; forms low bench along base of exposure on south side of Tornillo Creek; in contact with underlying Aguja Formation.

Measured section 10, Javelina Formation on northeastern side of Sierra Aguja, vicinity of Lehman (1985) section 1 (plate 1); base of section at 29°13'28"N, 103°37'25"W; top of section at 29°13'26"N, 103°37'29"W.

unit	thickness (m)	description
	28.7	partial thickness of Javelina Formation (top of formation not present)
4	3.0	Mudstone with sparse carbonate nodules; dark reddish brown; top of unit in contact with base of Chisos Formation (Alamo Creek Basalt Member)
3	6.2	Slightly conglomeratic sandstone; light gray-white; poorly indurated; base with pebble conglomerate of carbonate nodules and sparse chert granules; grades upward to medium and fine-grained sandstone, trough cross-stratified; forms slight bench.
2	9.0	Mudstone with carbonate nodules; alternating light gray and purple; lower part interbedded with white-light gray siltstone and very fine sandstone.
1	10.5	Slightly conglomeratic sandstone; white-light gray with yellow-tan base; poorly indurated; lower 0.2 m of sandy pebble conglomerate, clasts of carbonate nodules and chert; upper part fine to medium sandstone, trough cross-stratified; central thick bed of dark brown well indurated parallel-laminated fine sandstone; grades upward to thinly bedded light gray siltstone; forms low bench; base in contact with underlying Aguja Formation.

Measured section 11, Javelina Formation on south side of Rough Run Creek near Dogie Mountain; base of section at 29°19'18"N, 103°27'24"W; top of section at 29°19'22"N, 103°27'19"W.

unit	thickness (m)	description
	49.0	partial thickness of Javelina Formation (base not exposed)
5	1.6	Slightly conglomeratic sandstone; light gray-white with large yellow limonite concretions; poorly indurated; base with sparse granule conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, trough cross-stratified; grades upward to gray siltstone; top in contact with base of Black Peaks Formation
4	6.0	Mudstone with sparse carbonate nodules; tan to yellowish-gray

- 3 11.8 Slightly conglomeratic sandstone interbedded with mudstone; light gray-white; poorly indurated; base with sparse granule-pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, trough cross-stratified; includes thick beds of gray mudstone; forms slight bench.
- 2 12.6 Mudstone with carbonate nodules; alternating light gray, white, and purple; prominent red bed near base; lower part with thin beds of white-light gray siltstone and very fine sandstone.
- 1 17.0 Slightly conglomeratic sandstone interbedded with mudstone; tan to yellowish-gray; poorly indurated; three fining-upward intervals separated by mudstone beds; each with lower 20 to 40 cm of sandy pebble conglomerate, clasts of carbonate nodules; upper part very fine to fine sandstone, trough cross-stratified; grades upward to thinly bedded light yellowish-gray siltstone; forms low bench; base of formation not exposed, in fault contact with Black Peaks Formation.

SECTION II. Stratigraphic sections of the Black Peaks Formation.

Measured section 12, (principal reference section) Black Peaks Formation on western Tornillo Flat, vicinity of Maxwell et al. (1967) measured section 33, Schiebout (1974) measured section A-A'; base of section at 29°27'48"N, 103°11'00"W; top of section at 29°26'21"N, 103°10'31"W.

unit	thickness (m)	description
	300.5	total thickness of Black Peaks Formation
19	30.0	Mudstone with carbonate nodules; alternating tan-light gray and purple; prominent 10 m thick purple bed at top; forms extensive badlands; top in contact with Hannold Hill Formation (Exhibit Sandstone Member)
18	10.5	Sandstone; light gray; friable, thinly bedded, fine to medium-grained, interfingers with gray mudstone; grades upward to siltstone; forms a low bench
17	51.0	Mudstone with carbonate nodules; alternating tan, light gray, black, purple, and red; forms extensive badlands
16	10.5	Sandstone; white-light gray; friable with well-indurated concretionary top, gradational base with interbedded fine sandstone and gray mudstone; grades upward to fine and medium-grained sandstone; forms buttes and

mesas; the most prominent, laterally extensive, bench-forming unit in the area

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| 15 | 40.5 | Mudstone with carbonate nodules; alternating tan-light gray, purple, and black; two thin white sandstone beds in middle of unit; lower and upper part interbedded with gray siltstone |
| 14 | 2.5 | Sandstone; white-light gray; friable with well-indurated concretionary top, gradational base with interbedded fine sandstone and gray mudstone; grades upward to fine and medium-grained sandstone; thickness of interfingering mudstone beds increases to southeast; forms a laterally extensive bench in the area |
| 13 | 10.5 | Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational interbedded with tan siltstone; thin bed of dark green medium sandstone near top |
| 12 | 4.5 | Sandstone; yellow-light gray; friable, scoured base with lenses of sandy granule conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained sandstone, low-angle trough cross-stratified; abundant petrified logs; forms low bench (= upper "log jam sandstone") |
| 11 | 4.0 | Mudstone with carbonate nodules; alternating light gray and purple; lower part gradational interbedded with siltstone and very fine sandstone |
| 10 | 7.5 | Slightly conglomeratic sandstone; yellow-light gray; friable, scoured base with sandy granule-pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, low-angle trough cross-stratified; abundant petrified logs; forms low bench, laterally continuous to southeast (= lower "log jam sandstone") |
| 9 | 11.5 | Mudstone with carbonate nodules; tan to light gray |
| 8 | 2.5 | Sandstone; light gray; coarse and medium-grained, friable, thinly bedded and parallel-laminated; grades upward to ripple cross-laminated, fine sandstone interbedded with gray mudstone |
| 7 | 34.0 | Mudstone with carbonate nodules; alternating light gray, dark gray, black, and red; partly covered |
| 6 | 9.0 | Sandstone; white-light gray; coarse and medium-grained friable, parallel-laminated and trough cross-bedded; upper 1 m is well-indurated dark brown, ripple cross-laminated, fine sandstone interbedded with gray mudstone, forms low bench |

5	6.0	Mudstone with carbonate nodules; light gray and purple; lower part interbedded with light gray siltstone
4	18.0	Mudstone with carbonate nodules; light gray and purple; lower part interbedded with gray siltstone; at top is 3.5 m lens of friable yellow-light gray fine sandstone; partly covered
3	8.0	Slightly conglomeratic sandstone; white-light gray; scoured base with 0.2 m granule conglomerate of carbonate nodules and chert; grades upward to coarse and medium-grained friable sandstone, parallel-laminated and trough cross-bedded; upper 1 m is well-indurated dark brown ripple cross-laminated fine sandstone interbedded with gray mudstone, forms low bench
2	12.0	Mudstone with carbonate nodules; alternating light gray, dark gray, black, and red; partly covered
1	28.0	Mudstone with carbonate nodules; light gray and dark gray; mostly covered; at top is 3 m lens of white-light gray, friable, medium to fine-grained sandstone; base in contact with underlying Javelina Formation.

Measured section 13, Black Peaks Formation, north of Canoe Valley on Tornillo Flat; base of section at 29°28'24"N, 103°08'57"W; top of section at 29°27'57"N, 103°09'22"W.

unit	thickness (m)	description
	267.0	total thickness of Black Peaks Formation
16	32.0	Mudstone with carbonate nodules; alternating light gray and purple; prominent 10 m thick purple bed at top; top in contact with Hannold Hill Formation (Exhibit Sandstone Member)
15	5.5	Sandstone; light gray; friable, thinly bedded, fine to medium-grained, interfingers with gray mudstone; grades upward to siltstone; forms a low bench
14	40.0	Mudstone with carbonate nodules; alternating light gray and dark gray, very uniformly bedded; two purple beds near top
13	7.5	Sandstone; yellowish-gray; friable with well-indurated concretionary top, scoured base with sparse sandy granule-pebble conglomerate of carbonate nodules; grades upward to fine and medium-grained sandstone;

- interbedded with thinly bedded siltstone at top; forms a laterally extensive bench in the area
- 12 22.0 Mudstone with carbonate nodules; alternating light gray, dark gray, and purple; prominent black bed at top; lower part gradational interbedded with tan sandstone
- 11 6.5 Sandstone; light yellowish-gray; friable with well-indurated concretionary top, scoured base with sparse sandy granule-pebble conglomerate of carbonate nodules; grades upward to fine and medium-grained sandstone; together with unit 9 forms a laterally extensive bench in the area
- 10 11.0 Mudstone with carbonate nodules; light gray with prominent black bed at top; lower part gradational with thin beds of very fine white sandstone
- 9 8.0 Sandstone; light yellowish-gray; friable with well-indurated concretionary top, scoured base with sparse sandy granule-pebble conglomerate of carbonate nodules; grades upward to fine and medium-grained sandstone; together with unit 11 forms a laterally extensive bench in the area
- 8 55.0 Mudstone with carbonate nodules; alternating light gray and dark gray; very uniformly bedded
- 7 5.5 Sandstone; yellow-light gray, friable with dark brown well-indurated interval near top, scoured base; grades upward to medium and fine-grained sandstone with large trough cross-bedding; abundant petrified logs near top; forms low bench (= upper "log jam sandstone")
- 6 6.5 Mudstone; light yellowish-gray
- 5 6.0 Slightly conglomeratic sandstone; yellow-light gray, friable with dark brown well-indurated interval near top, scoured base with sparse sandy granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained sandstone with large trough cross-bedding; abundant petrified logs near top; forms prominent hogback ridge (= lower "log jam sandstone")
- 4 22.5 Mudstone with carbonate nodules; alternating light gray and dark gray with thin nodular white fine sandstone beds; very evenly bedded
- 3 3.2 Sandstone; white-light gray; scoured base with sparse granule conglomerate of carbonate nodules and chert; grades upward to coarse and medium-grained friable sandstone, parallel-laminated and trough cross-bedded; upper 0.5 m is well-indurated dark reddish-brown concretionary fine sandstone; interbedded with gray mudstone, forms low bench

- 2 13.3 Mudstone with carbonate nodules; light gray and dark gray with discontinuous purple beds
- 1 22.5 Mudstone with carbonate nodules; alternating yellow-gray, dark gray, black, red, and purple; at top is 4 m lens of yellowish-white, friable, medium to fine-grained sandstone; base in contact with underlying Javelina Formation.

Measured section 14, Black Peaks Formation, north of Grapevine Hills, vicinity of Straight (1996) measured section 4; base of section at 29°25'05"N, 103°12'09"W; top of section at 29°25'10"N, 103°11'08"W.

unit	thickness (m)	description
	442.8	total thickness of Black Peaks Formation
15	90.0	Mudstone with carbonate nodules; light gray and purple; prominent 10 m thick purple bed at top; mostly covered, top in contact with Hannold Hill Formation (Exhibit Sandstone Member)
14	6.0	Sandstone; light gray; friable, thinly bedded, fine to medium-grained; lenticular, interfingers with gray mudstone; grades upward to siltstone; forms a low bench
13	125.0	Mudstone with carbonate nodules; alternating light gray and purple, very uniform near base and interbedded with siltstone and sandstone layers; several prominent red-maroon layers with carbonate concretions; black beds in middle and near top; mostly covered, intermittent exposures
12	7.0	Sandstone; tan-yellow, friable, with dark brown well-indurated top; scoured base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated with low-angle trough cross-bedding, bioturbated at top; forms prominent hogback ridge
11	56.0	Mudstone with carbonate nodules; light gray and purple; lower part gradational and interbedded with yellow sandstone; mostly covered
10	8.5	Sandstone; yellow, friable with dark brown well-indurated top; scoured base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained clayey sandstone, trough cross-bedded; interbedded with gray mudstone, together with unit 8 forms prominent hogback ridge

9	1.5	Mudstone; purple and light gray
8	8.5	Sandstone; yellow, friable; scoured base with pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained clayey sandstone, trough cross-bedded; together with unit 10 forms prominent hogback ridge
7	7.0	Mudstone; alternating light gray and purple
6	2.0	Sandstone; white-light gray, friable; lenticular, trough cross-bedded; grades laterally to interbedded gray mudstone and siltstone
5	30.0	Mudstone with carbonate nodules; alternating light gray and purple; prominent black bed near base; lower part has several prominent carbonate concretion zones
4	7.5	Sandstone; yellowish gray, very friable; scoured base with granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained clayey sandstone, trough cross-bedded; interbedded with gray mudstone, forms low hogback ridge
3	30.0	Mudstone; alternating light gray and purple; very evenly bedded
2	6.8	Sandstone; white-light gray, friable; scoured base with sparse granule conglomerate of carbonate nodules and chert; grades upward to coarse and medium-grained sandstone, trough cross-bedded; upper 0.3 m is well-indurated dark reddish-brown parallel-laminated fine sandstone; interbedded with gray mudstone, forms low hogback ridge
1	57.0	Mudstone with carbonate nodules; alternating light gray and purple; lower 20 m very uniformly bedded; prominent thin bed of sandy limestone with gastropod steinkerns near top; base in contact with underlying Javelina Formation.

Measured section 15, Black Peaks Formation, south of Dagger Flat on Javelina Creek, vicinity of upper part of Lawson (1972) measured section 6, Lehman (1985) section 11 (plate 2); base of section at 29°25'51"N, 103°06'15"W; top of section at 29°25'31"N, 103°06'48"W.

unit	thickness (m)	description
	205.0	partial thickness of Black Peaks Formation (top of formation not exposed)

- 12 19.0 Sandstone; light gray; friable with well-indurated concretionary top, scoured base with sparse sandy granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to fine and medium-grained sandstone, trough cross-bedded; highest stratigraphic unit exposed in the area; forms a laterally extensive bench
- 11 11.0 Mudstone with carbonate nodules; light gray and tan; lower part gradational with thin beds of very fine yellow sandstone
- 10 12.0 Sandstone; light gray; friable with well-indurated concretionary top, scoured base with sparse sandy granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to fine and medium-grained sandstone, trough cross-bedded; forms a laterally extensive bench in the area
- 9 14.5 Mudstone with carbonate nodules; light gray and tan; lower part gradational with thin beds of very fine yellow sandstone
- 8 7.0 Sandstone; yellow-light gray, friable with dark brown well-indurated interval near top, scoured base; grades upward to medium and fine-grained sandstone with large trough cross-bedding; petrified logs near top; forms low bench (= upper "log jam sandstone")
- 7 6.0 Mudstone; light gray; interbedded with yellow siltstone and thin sandstone beds
- 6 6.0 Sandstone; yellow-light gray, friable; scoured base with sparse granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained sandstone, parallel-laminated with low-angle cross-bedding; petrified logs near top; forms low bench (= lower "log jam sandstone")
- 5 50.0 Mudstone with carbonate nodules; alternating light yellowish-gray, dark gray, maroon, and purple; very uniformly bedded; thin lenticular brown sandstone beds near middle
- 4 6.0 Sandstone; yellow-light gray; scoured base; grades upward to coarse and medium-grained friable sandstone, parallel-laminated and trough cross-bedded; top is well-indurated dark reddish-brown bioturbated fine sandstone; forms low bench
- 3 28.0 Mudstone with carbonate nodules; yellow-gray and light gray; mostly covered
- 2 4.5 Sandstone; white-light gray; scoured base; grades upward to coarse and medium-grained friable sandstone, parallel-laminated and low-angle

cross-bedded; upper 0.3 m is well-indurated dark reddish-brown concretionary fine sandstone; forms low bench

- 1 41.0 Mudstone with carbonate nodules; yellow-gray and light gray; mostly covered; base in contact with underlying Javelina Formation.

Measured section 16, Black Peaks Formation, on south flank of syncline west of Glenn Springs in headwaters of Juniper Draw, vicinity of Lawson (1972) section 7; base of section at 29°09'23"N, 103°11'52"W; top of section at 29°10'18"N, 103°11'41"W.

unit	thickness (m)	description
	192.0	partial thickness of Black Peaks Formation (top of formation not exposed)
6	12.0	Slightly conglomeratic sandstone; yellow-light gray, friable; scoured base with granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained sandstone, parallel-laminated with low-angle cross-bedding; two fining-upward sequences separated by 1.5 m of interbedded gray mudstone and siltstone; both units contain petrified logs; highest stratigraphic unit exposed in the area; forms high mesa (= lower and upper "log jam sandstone")
5	41.0	Mudstone with carbonate nodules; alternating light gray, dark gray, and purple; very uniformly bedded
4	10.0	Sandstone; yellow-light gray; scoured base; medium and fine-grained, parallel-laminated; top is well-indurated dark reddish-brown concretionary and bioturbated fine sandstone; interbedded with light gray siltstone; thins and pinches out to south; forms prominent cliffs in area
3	56.0	Mudstone with carbonate nodules; light gray with purple beds near top
2	11.0	Sandstone; yellow-light gray; scoured base with sparse granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to coarse and medium-grained friable sandstone, parallel-laminated and low-angle cross-bedded; upper 1 m interbedded with gray mudstone; forms low hogback ridge
1	62.0	Mudstone with carbonate nodules; tan and light gray with a few purple and black beds near base; partly covered; base in contact with underlying Javelina Formation.

Measured section 17, Black Peaks Formation west of Tornillo Creek near mouth of Hannold Draw, vicinity of Maxwell et al. (1967) measured section 26; Lower 100 m measured on north side of Hannold Draw, upper 300 m on south side of Hannold Draw; base of section at 29°22'55"N, 103°06'53"W; top of section at 29°22'58"N, 103°07'20"W.

unit	thickness (m)	description
	409.7	partial thickness of Black Peaks Formation (top of formation not exposed)
16	50.0	Mudstone; alternating light gray and purple, very uniform color bands; top in contact with base of Canoe Formation (Big Yellow Sandstone Member)
15	3.0	Sandstone; light gray, friable; scoured base with pebble conglomerate of carbonate nodules; grades upward to coarse and medium-grained sandstone; lenticular unit exposed at base of prominent escarpment in area; top interbedded with light gray siltstone
14	105.0	Mudstone with carbonate nodules; light gray and purple; mostly covered
13	4.5	Sandstone; light gray-white, friable; top is well-indurated dark reddish-brown; scoured base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone; trough cross-bedded and parallel-laminated; top interbedded with light gray siltstone; forms a low bench
12	74.0	Mudstone with carbonate nodules; alternating light gray and purple, very uniform lower 40 m; two prominent black claystone beds near top; three thin friable white sandstone lenses, each 1 to 1.5 m thick hold up low benches near base and top
11	4.7	Sandstone; light gray-tan, friable; top is well-indurated orange-brown; scoured base with pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained sandstone, trough cross-bedded; interbedded with light gray siltstone; together with units 8 through 10 forms the most prominent hogback ridge in the area (= upper "log jam sandstone")
10	4.7	Mudstone; light gray, grading upward to purple; interbedded with light gray siltstone
9	3.8	Sandstone; light gray-tan, friable; scoured base with pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained sandstone, trough cross-bedded; interbedded with light gray

mudstone; together with units 8 through 11 forms the most prominent hogback ridge in the area (= lower "log jam sandstone")

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| 8 | 8.0 | Sandstone; light gray-tan, friable; scoured base with pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained clayey sandstone, 4.8 m thick; thins and pinches out to south, overlain and interbedded with light gray mudstone 3.2 m thick; together with units 9 through 11 forms the most prominent hogback ridge in the area |
| 7 | 50.0 | Mudstone with carbonate nodules; alternating light gray and purple; very uniformly bedded; lower 40 m mostly covered |
| 6 | 9.5 | Sandstone; yellow-light gray, friable; scoured base with pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained clayey sandstone, trough cross-bedded; top interbedded gray mudstone and siltstone; forms low bench |
| 5 | 25.0 | Mudstone with carbonate nodules; alternating light gray and purple; prominent black bed near middle; partly covered |
| 4 | 5.0 | Sandstone; white-light gray, friable; scoured base with sparse granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained clayey sandstone; interbedded with gray siltstone and mudstone, pinches out to south; forms low bench |
| 3 | 20.0 | Mudstone with carbonate nodules; light gray with purple bed near top; partly covered |
| 2 | 4.5 | Sandstone; white-light gray, friable; scoured base with sparse granule conglomerate of carbonate nodules and chert; grades upward to coarse and medium-grained sandstone; upper 0.3 m is well-indurated dark reddish-brown parallel-laminated fine sandstone; lenticular, interbedded with gray mudstone, pinches out to south; forms low bench |
| 1 | 38.0 | Mudstone with carbonate nodules; light gray with purple bed near top; lower 30 m partly covered; base in contact with underlying Javelina Formation. |

Measured section 18, Black Peaks Formation, northwest of McKinney Hills, vicinity of Maxwell et al. (1967) section 35, Lehman (1985) measured section 9 (plate 2); base of section at 29°24'48"N, 103°05'59"W; top of section at 29°24'46"N, 103°06'48"W.

unit	thickness (m)	description
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- 448.0 total thickness of Black Peaks Formation
- 13 65.0 Mudstone with carbonate nodules; light gray and purple; prominent thick purple bed at top; lower 50 m mostly covered; top in contact with Hannold Hill Formation (Exhibit Sandstone Member)
- 12 12.0 Sandstone; tan-yellow, friable; scoured base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, parallel-laminated with low-angle trough cross-bedding; forms low bench
- 11 145.0 Mudstone with carbonate nodules; light gray with prominent black bed 30 m from top; lower 120 m mostly covered
- 10 9.0 Sandstone; yellow, friable with dark brown well-indurated top; scoured base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, trough cross-bedded; interbedded with gray mudstone; forms prominent hogback ridge
- 9 76.0 Mudstone with carbonate nodules; alternating purple and light gray; very uniformly bedded
- 8 8.0 Sandstone; yellowish gray with dark brown top, friable; scoured base with granule-pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained clayey sandstone, trough cross-bedded; interbedded with gray mudstone, forms low ridge
- 7 5.0 Mudstone; light gray, interbedded with tan siltstone
- 6 9.0 Sandstone; yellowish gray, friable; scoured base with granule-pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained clayey sandstone, trough cross-bedded; interbedded with gray mudstone, forms low ridge (= upper "log jam sandstone")
- 5 4.0 Mudstone; alternating light gray and white, interbedded with tan siltstone; three small mafic plugs (the Black Peaks) are intruded within units 4, 5, and 6
- 4 6.0 Sandstone; yellowish gray with dark brown top, very friable; scoured base with granule-pebble conglomerate of carbonate nodules and clay clasts; grades upward to medium and fine-grained clayey sandstone, trough cross-bedded; interbedded with gray mudstone, forms low hogback ridge (= lower "log jam sandstone")
- 3 47.0 Mudstone with carbonate nodules; alternating light gray and purple, one black bed near base, three prominent black beds near top

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| 2 | 3.0 | Sandstone; white-light gray, friable; lenticular; scoured base with sparse granule conglomerate of carbonate nodules and chert; grades upward to coarse and medium-grained sandstone; upper 0.3 m is well-indurated dark reddish-brown parallel-laminated fine sandstone; pinches out into gray siltstone and mudstone, forms low bench |
| 1 | 59.0 | Mudstone with carbonate nodules; alternating light gray and purple, three prominent wine-red beds near top; lower 40 m very uniformly bedded; thin bed of dark green coarse sandstone 47 m above base; base in contact with underlying Javelina Formation. |

Measured section 19, Black Peaks Formation, northwest of Paint Gap Hills, vicinity of Lawson (1972) Onion Flat measured section 2 and Lehman (1985) measured section 2 (plate 2); base of section at 29°24'44"N, 103°20'08"W; top of section at 29°24'57"N, 103°20'30"W.

unit	thickness (m)	description
	28.0	partial thickness of Black Peaks Formation (top of formation not exposed)
3	4.0	Mudstone with carbonate nodules; alternating light gray and purple, caps highest conical hill in area, uppermost unit exposed
2	14.5	Mudstone with carbonate nodules; alternating light gray and purple, thin black bed near middle; thick lenticular bed of sandstone at top, white-light gray, friable, scoured base with sparse granule conglomerate of carbonate nodules and chert; grades laterally to white siltstone-very fine sandstone; upper 0.2 m is well-indurated yellowish-brown parallel-laminated fine sandstone; forms low bench along northern border of exposures
1	9.5	Mudstone with carbonate nodules; light gray with prominent thick black mudstone bed near base; thick lenticular bed of light gray-white medium sandstone at top, grades laterally into white siltstone-very fine sandstone; base in contact with underlying Javelina Formation.

Measured section 20, Black Peaks Formation, south side of Dawson Creek a west of Park Highway, vicinity of Maxwell et al. (1967) measured section 14 (upper part), Lawson (1972) measured section 1 (upper part), Lehman (1985) section 15 (plate 1, upper part), and Standhardt (1986) section DC-W; base of section at 29°17'31"N, 103°31'45"W; top of section at 29°17'29"N, 103°31'52"W.

unit	thickness (m)	description
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	66.9	partial thickness of Black Peaks Formation (top of formation not exposed)
5	22.5	Mudstone with carbonate nodules; alternating light gray and dark gray, with thin discontinuous red beds in upper part; top in contact with base of Canoe Formation (Big Yellow Sandstone Member)
4	1.5	Sandstone; white-light gray, medium to fine-grained, friable, scoured base with sparse granule conglomerate of carbonate nodules; lenticular, thins and grades laterally to white siltstone-very fine sandstone
3	15.1	Mudstone with carbonate nodules; alternating light gray, dark gray, and red; uniform color bands, continuous laterally
2	5.0	Slightly conglomeratic sandstone; white-light gray, friable, scoured base with sparse granule conglomerate of carbonate nodules and chert, grades upward to medium and fine-grained sandstone, thins and grades laterally to white siltstone-very fine sandstone; upper 0.2 m is well-indurated dark brown parallel-laminated concretionary fine sandstone; forms low bench along valley floor
1	22.8	Mudstone with carbonate nodules; alternating light gray, red, and black, very uniform color bands, continuous laterally; abundant barite nodules near top; upper 3 m truncated laterally by unit 2; base in contact with underlying Javelina Formation.

Measured section 21, Black Peaks Formation, on Rough Run Creek south of Dogie Mountain; base of section at 29°19'24"N, 103°27'24"W; top of section at 29°20'03"N, 103°27'22"W.

unit	thickness (m)	description
	179.8	partial thickness of Black Peaks Formation (top of formation not present)
12	10.0	Mudstone with carbonate nodules; light gray, mostly covered; top in contact with Chisos Formation (Alamo Creek Basalt Member)
11	8.0	Sandstone; yellowish gray, friable; scoured base with granule-pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained clayey sandstone, trough cross-bedded; upper part interbedded with gray siltstone and mudstone (= lower "log jam sandstone")

10	45.0	Mudstone with carbonate nodules; alternating light gray, purple, and red; several prominent black beds and thin lenses of friable white very fine sandstone in lower half; upper half mostly covered
9	3.0	Slightly conglomeratic sandstone; white-light gray, friable, scoured base with sparse granule conglomerate of carbonate nodules and chert, grades upward to medium and fine-grained sandstone, thins and grades laterally to white siltstone-very fine sandstone; local lenses of well-indurated dark yellowish-brown parallel-laminated concretionary fine sandstone
8	16.5	Mudstone with sparse carbonate nodules; dark gray
7	7.3	Sandstone; light gray-white, friable; two thick beds, each up to 2 m; interbedded with red mudstone; grades upward to light gray siltstone
6	8.6	Mudstone with carbonate nodules; alternating light gray, dark gray, and red
5	3.0	Sandstone; light gray-white, friable, with dark brown concretions; interbedded with gray siltstone and mudstone
4	3.0	Sandy Pebble Conglomerate; light gray-white, well indurated, lenticular; scoured base with pebble-cobble conglomerate of rounded sandstone clasts and carbonate nodules; grades upward and laterally to medium and fine-grained clayey sandstone, trough cross-bedded; interbedded with gray mudstone
3	46.5	Mudstone with carbonate nodules; alternating light gray, purple, and red; one black bed 10 m above base and one at top of unit; upper 2 m truncated laterally by unit 4
2	5.1	Sandstone; white-light gray, friable, lenticular, medium-grained; upper 0.3 m is well-indurated yellowish-orange concretionary parallel-laminated fine sandstone; pinches out laterally into gray siltstone and mudstone
1	23.8	Mudstone with carbonate nodules; alternating light gray, purple, and red; two prominent black beds near top; partly covered, base in contact with underlying Javelina Formation.

Measured section 22, Javelina Formation and lower part of Black Peaks Formation, south of Pena Mountain near Chimneys Trail in valley of eastern tributary of Alamo Creek; section is mostly covered; base of section at 29°12'35"N, 103°31'13"W; top of section at 29°11'35"N, 103°31'21"W.

unit	thickness (m)	description
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168.0	partial thickness of Black Peaks Formation (top of formation not present)
8 84.0	Mudstone with carbonate nodules; mostly covered; lower 8 m exposed consists of alternating purple and light gray mudstone; interbedded with yellow-gray siltstone and very fine sandstone; top of unit in contact with Chisos Formation (Alamo Creek Basalt Member).
7 10.0	Slightly conglomeratic sandstone; yellow-light gray; friable, scoured base with sandy granule-pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone, low-angle trough cross-stratified; abundant petrified logs; forms prominent cuesta (= "log jam sandstone").
6 74.0	Mudstone with carbonate nodules; mostly covered; lower 5 m exposed consists of alternating red, pink, and light gray mudstone; interbedded with white-light gray siltstone and very fine sandstone; in contact with underlying Javelina Formation.
138.0	total thickness of Javelina Formation
5 9.0	Slightly conglomeratic sandstone; yellowish brown; well-indurated; base with pebble conglomerate of carbonate nodules; grades upward to medium and fine-grained sandstone with large-scale trough cross-bedding; forms lower part of prominent ridge capped by terrace gravel.
4 19.0	Mudstone with carbonate nodules; alternating light gray and purple; lower part interbedded with white-light gray siltstone.
3 5.0	Slightly conglomeratic sandstone; yellow and light gray; poorly indurated; base with pebble conglomerate of carbonate nodules; in-situ petrified stumps in lower part; grades upward to medium and fine-grained sandstone; forms low bench capped by terrace gravel on drainage divide near abandoned ranch house.
2 96.0	Mudstone with carbonate nodules; mostly covered; alternating light gray and purple; lower few meters interbedded with white-light gray siltstone and very fine sandstone; only intermittent exposures.
1 9.0	Slightly conglomeratic sandstone; yellow to tan; poorly indurated; fining-upward sequence with lower 0.3 m of sandy pebble conglomerate, clasts of carbonate nodules and sparse chert; abundant petrified logs throughout; upper part fine to medium sandstone, parallel-laminated and trough cross-stratified; grades upward to thinly bedded light gray siltstone; forms a low

cuesta slightly above valley floor; in contact with underlying Aguja Formation.

SECTION III. Stratigraphic sections of the Hannold Hill Formation.

Measured section 23, (principal reference section) Hannold Hill Formation, east Park Highway on south side of Tornillo Creek, vicinity of Maxwell et al. (1967) measured section 30; base of section at 29°24'29"N, 103°08'05"W; top of section at 29°23'59"N, 103°08'03"W.

unit	thickness (m)	description
	44.6	total thickness of Hannold Hill Formation
4	18.1	(upper mudstone interval) mudstone; alternating light gray and purple; lower 1 m with thin beds of light gray very fine sandstone; top in contact with Big Yellow Sandstone Member of Canoe Formation
3	3.5	(upper sandstone interval) sandstone; light gray; medium to fine-grained with trough cross-bedding and parallel-lamination; forms prominent bench
2	19.0	(lower mudstone interval) mudstone; alternating light gray and purple; lower 5 m with interbedded white-light gray siltstone and very fine sandstone
1	3.0	(Exhibit Sandstone Member) conglomeratic sandstone; light gray; lower 50 cm is sparse sandy pebble conglomerate with clasts of limestone and chert; upper medium to coarse sandstone, horizontal and trough cross-stratified; forms prominent bench, base in contact with underlying Black Peaks Formation.

Measured section 24, Hannold Hill Formation at Canoe Valley (modified from Beatty, 1992), vicinity of Maxwell et al. (1967) section 32; base of section at 29°27'12"N, 103°08'44"W; top of section at 29°27'35"N, 103°09'14"W.

unit	thickness (m)	description
	70.2	total thickness of Hannold Hill Formation

4	31.5	(upper mudstone interval) mudstone; lower 15 m yellow-gray; upper 12 m light gray; top in contact with Big Yellow Sandstone Member of Canoe Formation
3	7.0	(upper sandstone interval) sandstone; gray; medium to fine-grained with extensive large-scale trough cross-bedding; forms prominent bench
2	27.2	(lower mudstone interval) mudstone; gray with thin pink interval; lower 10 m mostly covered; upper 15 m has thin beds of white-light gray silty very fine sandstone
1	4.5	(Exhibit Sandstone Member) conglomeratic sandstone; gray; lower imbricated pebble-cobble conglomerate with clasts of limestone, chert, petrified wood, and quartz sandstone; upper medium to coarse sandstone, horizontal and trough cross-stratified; forms prominent bench, base in contact with underlying Black Peaks Formation.

Measured section 25, Hannold Hill Formation on Exhibit Ridge northwest of Fossil Bone Exhibit (modified from Beatty, 1992), vicinity of Maxwell et al. (1967) section 31; base of section at 29°25'32"N, 103°08'35"W; top of section at 29°25'33"N, 103°08'39"W.

unit	thickness (m)	description
	26.2	total thickness of Hannold Hill Formation
4	9.0	(upper mudstone interval) interbedded mudstone and sandstone; thick beds of light gray mudstone with carbonized plant fragments; thin beds of tan fine-very fine sandstone, parallel-laminated; top in contact with Big Yellow Sandstone Member of Canoe Formation
3	7.5	(upper sandstone interval) sandstone; tan-gray; medium to fine-grained parallel-laminated and tabular cross-stratified
2	8.0	(lower mudstone interval) mudstone; light gray; lower 1 m has thin beds of white-light gray silty very fine sandstone
1	1.7	(Exhibit Sandstone Member) conglomeratic sandstone; gray; lower 20 cm has sparse lenses of pebble conglomerate with clasts of limestone, chert, petrified wood, and quartz sandstone; upper 1 m is medium sandstone, parallel-laminated and trough cross-stratified; forms prominent bench, base in contact with underlying Black Peaks Formation.

Measured section 26, Hannold Hill Formation, west of Park Highway on south side of Tornillo Creek (modified from Beatty, 1992), vicinity of Maxwell et al. (1967) section 29; base of section at 29°24'44"N, 103°08'35"W; top of section at 29°24'35"N, 103°08'42"W.

unit	thickness (m)	description
	50.1	total thickness of Hannold Hill Formation
4	20.6	(upper mudstone interval) mudstone; alternating light gray and purple; upper 1.6 m tan; lower 10 m interbedded with siltstone-very fine sandstone, white-light gray, parallel-laminated; top in contact with Big Yellow Sandstone Member of Canoe Formation
3	11.5	(upper sandstone interval) conglomeratic sandstone; lower 2.9 m sandy conglomerate with boulders of sandstone and pebbles of limestone and chert; upper 8.6 m white-light gray, medium to fine-grained sandstone with tabular and trough cross-bedding; forms prominent bench
2	13.4	(lower mudstone interval) mudstone; maroon with 1.9 m medium gray interval; lower 1 m has thin beds of white-light gray siltstone - very fine sandstone
1	4.6	(Exhibit Sandstone Member) conglomeratic sandstone; white-light gray; lower 30 cm sparse pebble conglomerate with clasts of limestone, chert, and petrified wood; upper medium to coarse sandstone, tabular and trough cross-stratified; forms prominent bench, base in contact with underlying Black Peaks Formation.

Measured section 27, Hannold Hill Formation, on Tornillo Creek northwest of Grapevine Hills (modified from Beatty, 1992); base of section at 29°25'31"N, 103°10'15"W; top of section at 29°25'23"N, 103°10'20"W.

unit	thickness (m)	description
	64.6	total thickness of Hannold Hill Formation
4	26.3	(upper mudstone interval) mudstone; alternating gray and red, thin beds of light gray siltstone; top in contact with Big Yellow Sandstone Member of Canoe Formation
3	4.7	(upper sandstone interval) conglomeratic sandstone; yellow-gray; lower 3 m pebble-cobble conglomerate with clasts of limestone and chert; upper 1

		m medium to fine-grained sandstone, parallel-laminated; forms prominent bench
2	24.0	(lower mudstone interval) mudstone; alternating gray and purple with thin lenticular light gray siltstone beds near top; lower 1 m has thin beds of white-light gray silty very fine sandstone
1	9.6	(Exhibit Sandstone Member) conglomeratic sandstone; white-light gray; lower 10 cm sparse sandy pebble conglomerate with clasts of limestone and chert; upper medium to coarse sandstone, horizontal and tabular cross-stratified; forms prominent bench, base in contact with underlying Black Peaks Formation.

Measured section 28, Hannold Hill Formation, north of Grapevine Spring (modified from Beatty, 1992); base of section at 29°25'09"N, 103°11'07"W; top of section at 29°25'05"N, 103°10'57"W.

unit	thickness (m)	description
	33.0	total thickness of Hannold Hill Formation
4	14.0	(upper mudstone interval) mudstone; alternating light gray and red, with interbedded white-light gray fine sandstone, parallel-laminated; top in contact with Big Yellow Sandstone Member of Canoe Formation
3	5.0	(upper sandstone interval) sandstone; white-light gray; medium to fine-grained, thinly bedded, parallel-laminated; forms prominent bench
2	8.0	(lower mudstone interval) mudstone; light gray, lower 1 m with thin beds of white-light gray siltstone-very fine sandstone
1	6.0	(Exhibit Sandstone Member) sandstone; white-light gray; lower part has sparse lenses of pebble conglomerate with clasts of limestone and chert; upper part is medium to coarse sandstone, horizontal and trough cross-stratified; forms prominent bench, base in contact with underlying Black Peaks Formation.

Measured section 29, Hannold Hill Formation, north flank of Cottonwood Draw; base of section at 29°23'59"N, 103°07'27"W; top of section at 29°23'50"N, 103°07'29"W.

unit	thickness (m)	description
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12.0	partial thickness of Hannold Hill Formation (top of formation not present)
2	9.0 (lower mudstone interval) mudstone; light gray with purple bed near top, lower 1 m with thin beds of white-light gray siltstone-very fine sandstone; top of unit in contact with Big Yellow Sandstone Member of Canoe Formation.
1	3.0 (Exhibit Sandstone Member) sandstone; white-light gray; lower part has sparse lenses of pebble conglomerate with clasts of limestone and chert; upper part is medium to coarse sandstone, horizontal bedding; forms low bench, base in contact with underlying Black Peaks Formation.

SECTION IV. Additional stratigraphic sections of the Tornillo Group.

Measured section 30, upper part of Javelina Formation and lower part of Black Peaks Formation north of Burro Mesa on south side of Rough Run Creek, modified from Cobb (2016, figure 2.2, p. 49); base of section at 29°16'59"N, 103°25'53"W; top of section at 29°20'27"N, 103°26'18"W.

unit	thickness (m)	description
169.0	partial thickness of Black Peaks Formation (top of formation not present)	
10	18.0	Siltstone and mudstone; yellowish-brown; highest unit exposed in area
9	18.0	Sandstone; yellowish-brown to white, friable, with local lenses of conglomeratic sandstone at base and well indurated dark brown concretionary top; fine to very fine grained with clay partings, large-scale trough cross-bedding; forms low scarp near top of exposures in area
8	23.0	Mudstone with carbonate nodules; alternating bands of light gray, red, black, and white
7	28.0	Mudstone; dark gray to light gray; lower part interbedded with gray siltstone, thinly bedded; upper part with lenticular white to light gray fine sandstone up to 4 m thick with dark reddish brown concretions at top
6	2.0	Sandy pebble-cobble conglomerate; yellowish brown; scoured base with large clasts of sandstone, carbonate nodules, and charcoal; varies in thickness from 10 cm up to 2 m; grades upward to interbedded yellow siltstone and ripple cross-laminated very fine sandstone
5	22.0	Slightly conglomeratic sandstone; white to yellowish brown; fining-upward sequence with scoured base overlain by lenses of sandy pebble

conglomerate of carbonate nodules; dark reddish-brown concretions in middle of unit; upper 10 m is medium to fine-grained white-light gray friable lenticular sandstone with thin bedding and trough cross-bedding, grading upward to gray siltstone; lower part of unit forms laterally extensive scarp with hoodoos in area

4	58.0	Mudstone with carbonate nodules; light gray to dark gray; lower part interbedded with dark gray parallel-laminated siltstone, upper part with extensive 4 m thick red mudstone bed overlain by 5 m thick dark gray to black mudstone bed
	17.0	partial thickness of Javelina Formation (base not exposed)
3	9.0	Slightly conglomeratic sandstone; tan-yellow with dark brown well-indurated base; base with lenses of sandy pebble conglomerate, clasts of carbonate nodules; upper part fine to very fine sandstone, parallel-laminated and trough cross-stratified; grades upward to alternating thin beds of gray siltstone; forms a laterally extensive scarp in area
2	2.0	Mudstone with carbonate nodules; light gray
1	6.0	Slightly conglomeratic sandstone; yellowish-tan, friable; lower part with lenses of sandy pebble conglomerate, clasts of carbonate nodules; upper part fine to very fine sandstone, parallel-laminated and trough cross-stratified; grades upward to thinly bedded light gray siltstone; forms low bench along base of exposure; lowest unit exposed in area (contact with Aguja Formation is not exposed).

Measured section 31, Javelina Formation and lower Black Peaks Formation north bank of Tornillo Creek on Rosillos Mountain Ranch, modified from Adams (2014, appendix I, p. 75-78); base of section at 29°26'21"N, 103°15'48"W; top of section at 29°27'03"N, 103°16'21"W.

unit	thickness (m)	description
	50.5	partial thickness of Black Peaks Formation
10	4.5	Sandstone; yellowish gray, very friable; grades upward to medium and fine-grained clayey sandstone, massive, with abundant petrified logs; forms low hogback ridge ("log jam sandstone"); highest unit exposed in area (top of formation not exposed)

- 9 46.0 Mudstone with carbonate nodules; alternating beds of light gray, purple/maroon and white
- 114.0 total thickness of Javelina Formation
- 8 20.0 Slightly conglomeratic sandstone; tan-yellow and friable with dark brown well-indurated beds; compound unit with two fining-upward sequences each with scoured base overlain by lenses of sandy pebble conglomerate, clasts of carbonate nodules; parallel-laminated and trough cross-stratified; grades upward to alternating beds of massive yellow siltstone and fine sandstone; forms a prominent laterally extensive bench near top of exposure in the area.
- 7 9.0 Mudstone; light gray
- 6 7.5 Sandstone; dark brown, ferruginous; medium to fine grained; with trough cross-bedding and ripple cross-lamination; grades upward to interbedded white mudstone and ripple cross-laminated, bioturbated brown very fine sandstone; forms a prominent continuous bench
- 5 39.5 Mudstone with carbonate nodules; alternating light gray, green, and purple; some thin beds of fine dark brown sandstone
- 4 7.5 Slightly conglomeratic sandstone; yellowish brown; fining-upward sequence, scoured base with lenses of sandy pebble conglomerate comprised of carbonate nodules, overlain by coarse sandstone with large-scale trough cross-bedding; grades upward to green mudstone interbedded with thin beds of fine sandstone, laminated, ripple cross-laminated, and burrowed; lower part of unit forms laterally extensive bench in area
- 3 20.0 Mudstone with carbonate nodules; alternating light gray and purple.
- 2 7.5 Mudstone; light blue, with alternating thin beds of green siltstone and bioturbated, ripple cross-laminated fine sandstone; grades upward to yellow bioturbated fine sandstone with dark brown ferruginous top.
- 1 3.0 Slightly conglomeratic sandstone; tan brown, friable; fining-upward, base with clasts of carbonate nodules; upper part fine sandstone, parallel-laminated, ferruginous and bioturbated; forms low bench along base of exposure on north side of Tornillo Creek; in contact with underlying Aguja Formation.

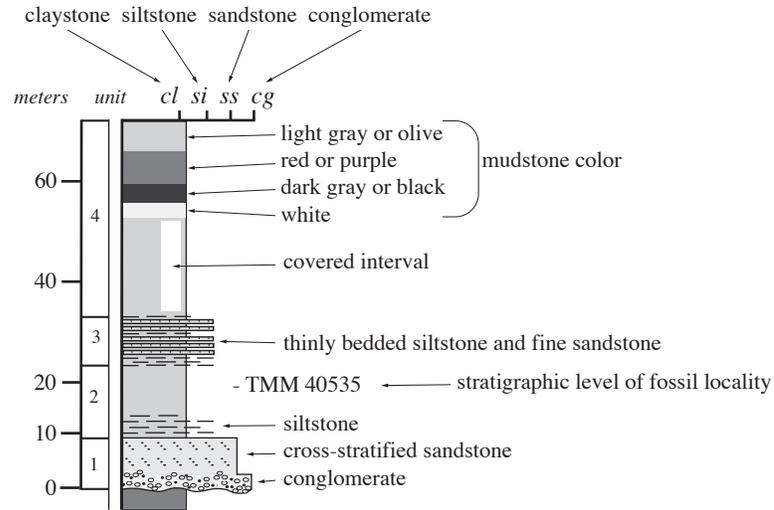
Measured section 32, Javelina Formation east of Paint Gap Hills, modified from Wick (2014, figure 1, p. 8); base of section at 29°24'59"N, 103°17'09"W; top of section at 29°25'14"N, 103°17'49"W.

unit	thickness (m)	description
	165.0	total thickness of Javelina Formation
11	30.0	Sandstone; yellowish-brown, friable, with local well indurated dark brown concretionary beds; fine to very fine grained with clay partings, thin bedding and large-scale trough cross-bedding; interbedded with yellow mudstone and siltstone, top in contact with Black Peaks Formation
10	14.0	Mudstone with carbonate nodules; light gray and purple
9	6.0	Sandstone; yellowish-brown with concretionary intervals, friable, fine to very fine-grained with clay partings, thinly bedded and trough cross-bedded; upper part contains petrified logs
8	38.0	Mudstone with carbonate nodules; alternating light gray-green, purple, and red near top; mostly covered
7	18.0	Slightly conglomeratic sandstone; yellowish brown; compound unit with two fining-upward sequences each with scoured base overlain by lenses of sandy pebble conglomerate of carbonate nodules; medium to fine-grained, trough cross-bedded and parallel laminated, interbedded with light gray green mudstone and thin beds of fine sandstone; lower part of unit forms the most prominent and laterally continuous scarp near top of exposure in the area
6	14.0	Mudstone with carbonate nodules; light gray green; upper part interbedded with lenses of very fine parallel-laminated sandstone up to 1 m thick
5	15.0	Slightly conglomeratic sandstone; yellowish brown; compound unit with two fining-upward sequences each with scoured base overlain by lenses of sandy pebble conglomerate of carbonate nodules; medium to fine-grained and parallel laminated, interbedded with light gray green mudstone; lower part of unit forms laterally extensive scarp in area
4	9.0	Mudstone with carbonate nodules; light gray green; interbedded with fine ripple cross-laminated siltstone
3	6.0	Slightly conglomeratic sandstone; tan-yellow with dark brown well-indurated top; fining-upward sequence with scoured base overlain by

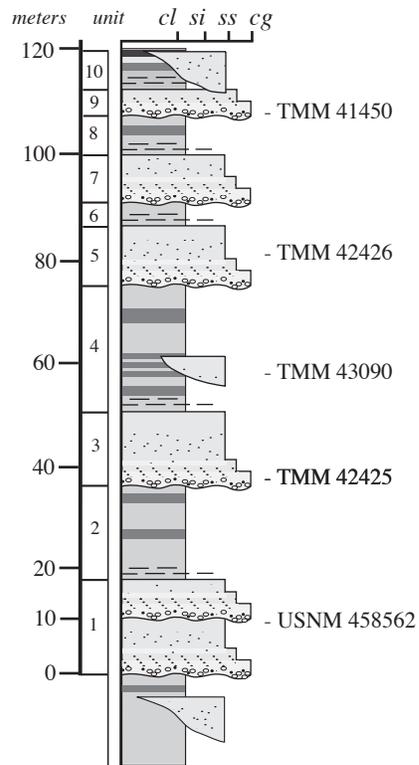
lenses of sandy pebble conglomerate, clasts of carbonate nodules, parallel-laminated and trough cross-stratified; forms a low scarp

- 2 6.0 Mudstone with carbonate nodules; light gray green; mostly covered
- 1 9.0 Slightly conglomeratic sandstone; tan-yellow with dark brown well-indurated top; fining-upward sequence with scoured base overlain by lenses of sandy pebble conglomerate, clasts of carbonate nodules and chert; upper part medium to fine sandstone, parallel-laminated and trough cross-stratified; forms a laterally extensive cliff with hoodoos along south bank of Tornillo Creek; in contact with underlying Aguja Formation.

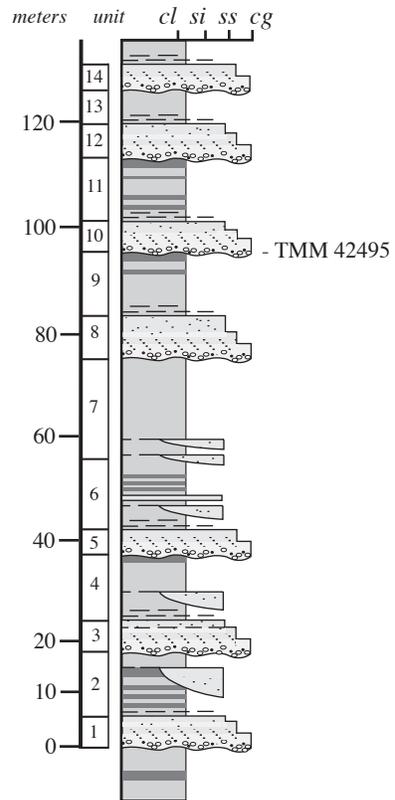
LEGEND FOR STRATIGRAPHIC SECTIONS



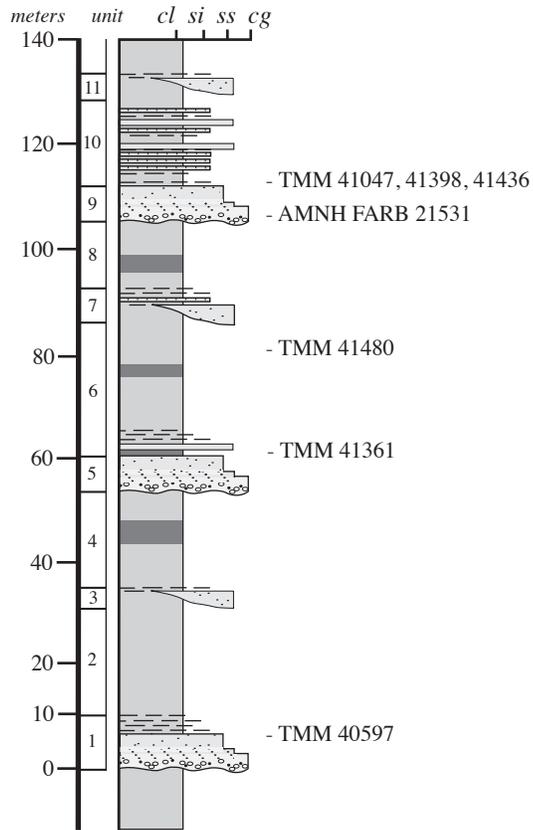
section #1
 DAWSON CREEK WEST (Javelina Formation)



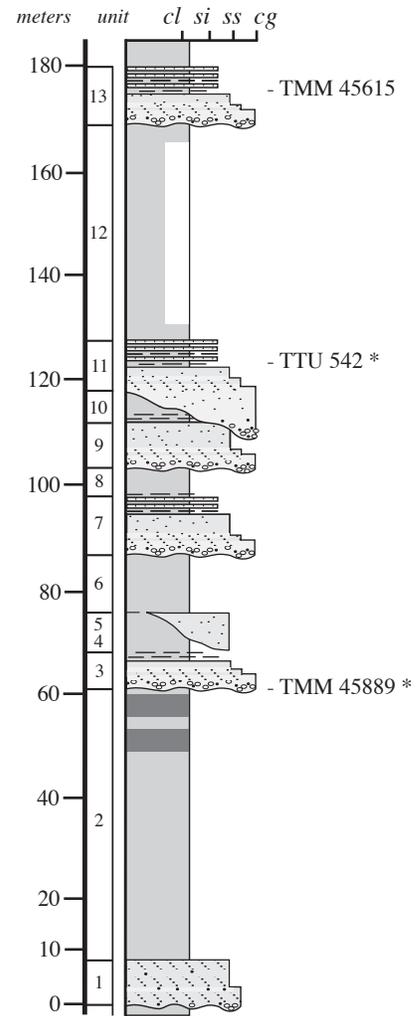
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DAWSON CREEK EAST (Javelina Formation)



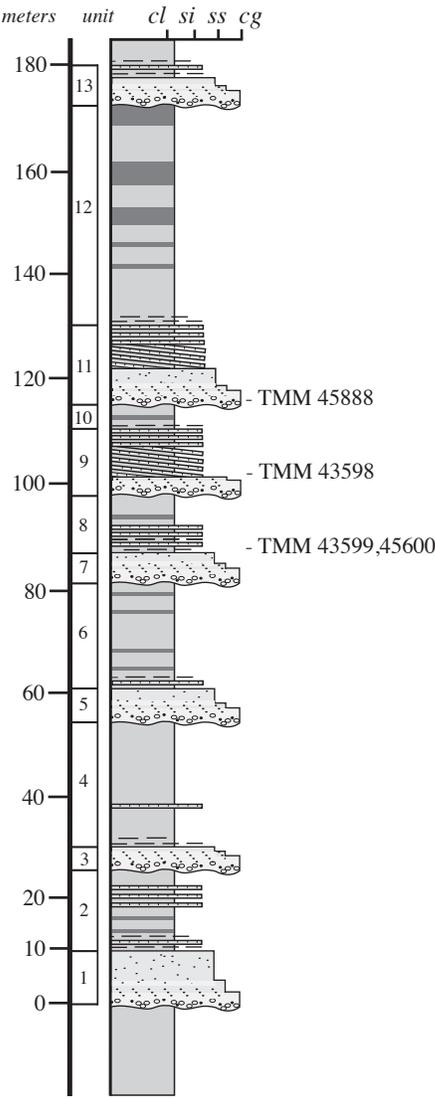
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'SAUROPOD HILLS' (Javelina Formation)



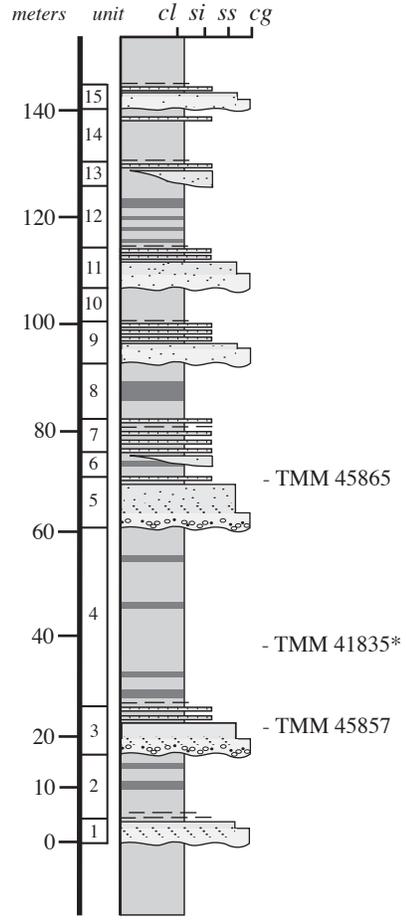
section #4
GLENN SPRINGS (Javelina Formation)



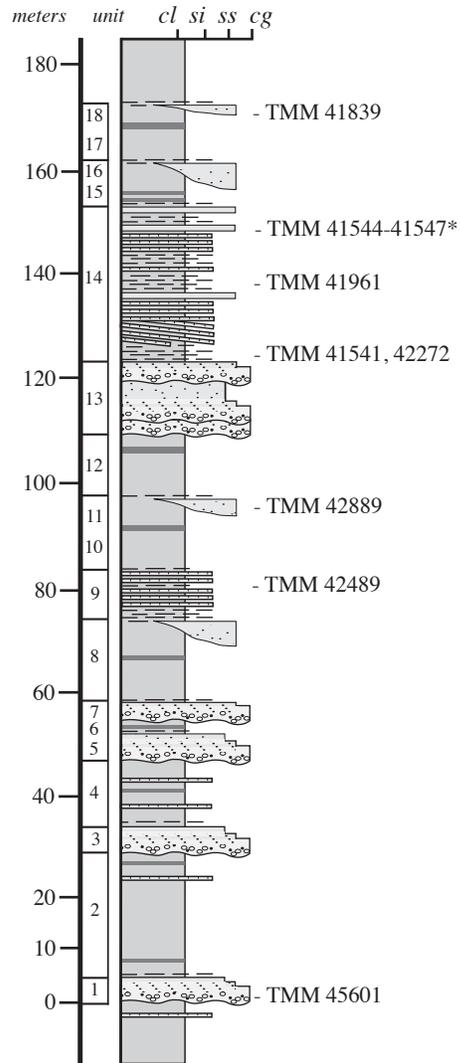
section #5
McKINNEY HILLS (Javelina Formation)



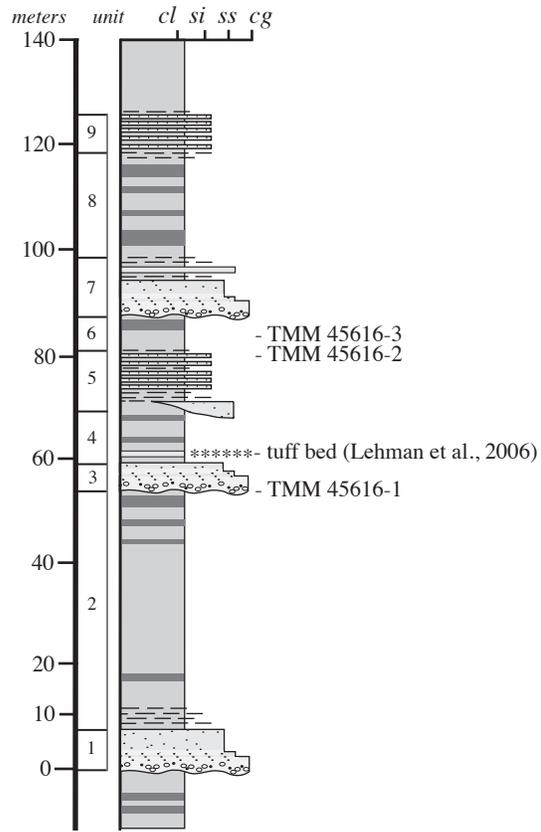
section #6
 DAGGER FLAT SOUTH (Javelina Formation)



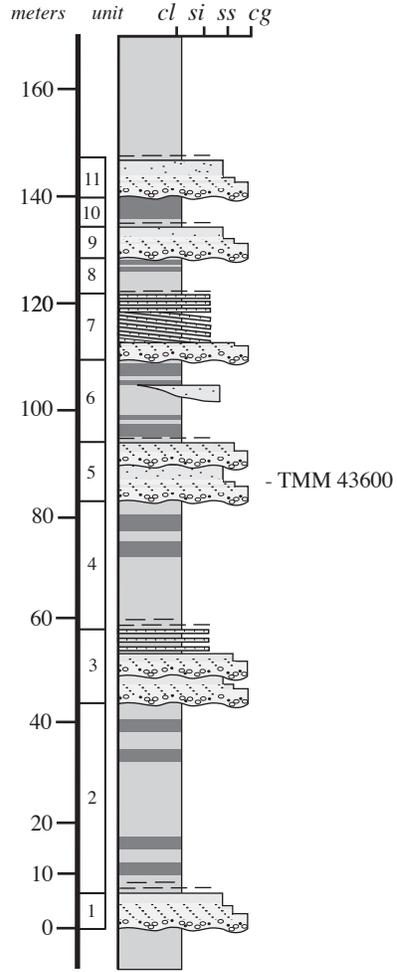
section #7
 'PTERODACTYL RIDGE' (Javelina Formation)



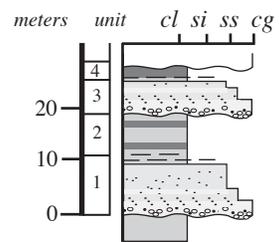
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GRAPEVINE HILLS NORTH (Javelina Formation)



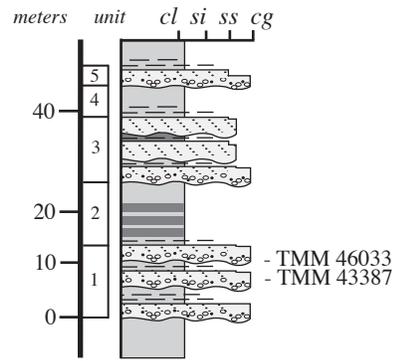
section #9
PAINT GAP HILLS NORTH (Javelina Formation)



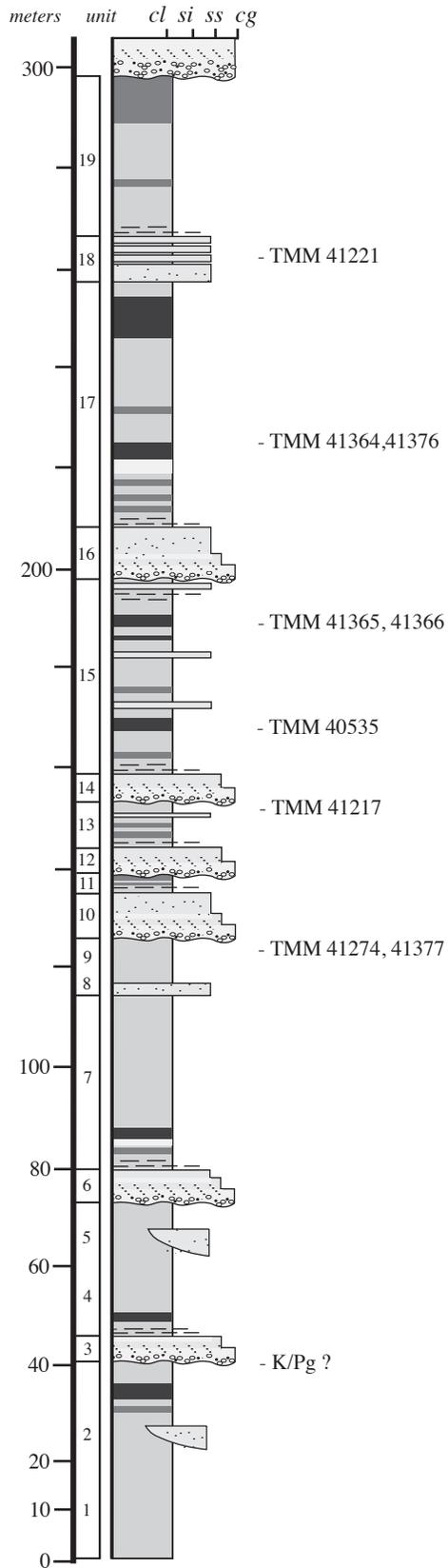
section # 10
SIERRA AGUJA (Javelina Formation)



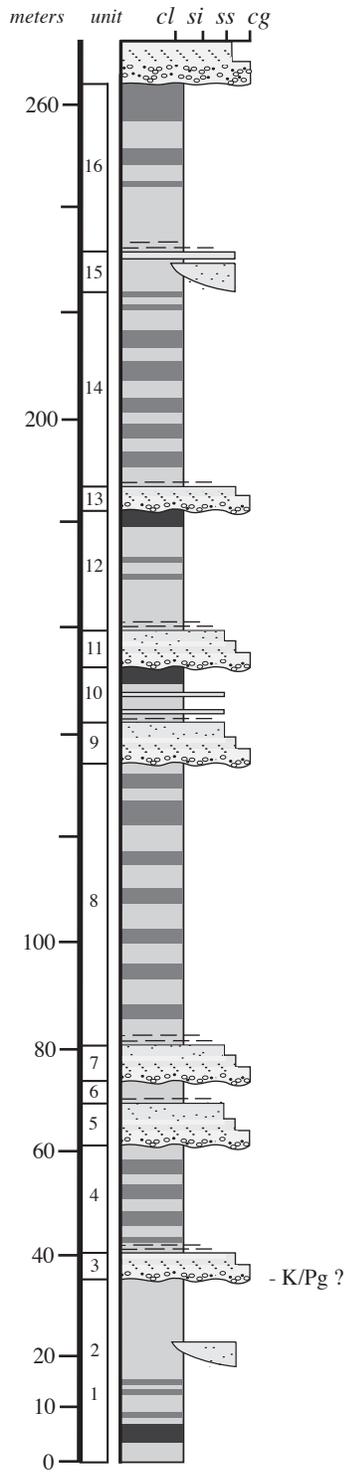
section # 11
ROUGH RUN CREEK WEST (Javelina Formation)



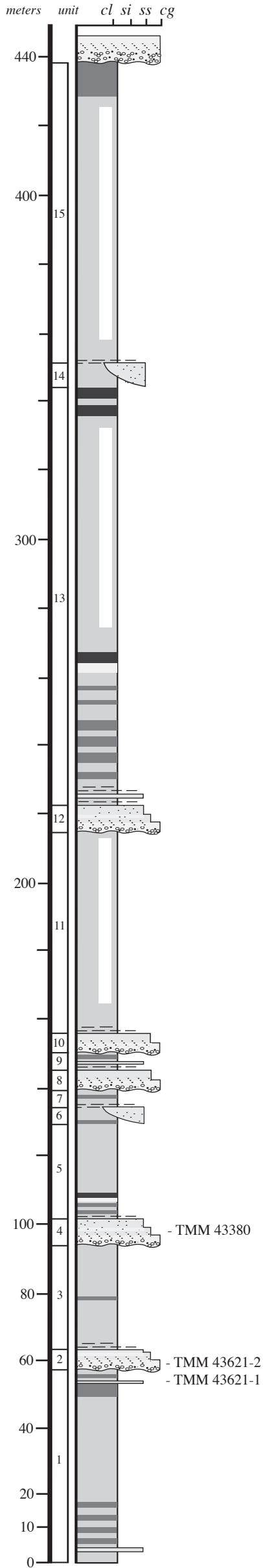
section # 12
TORNILLO FLAT WEST (Black Peaks Formation)



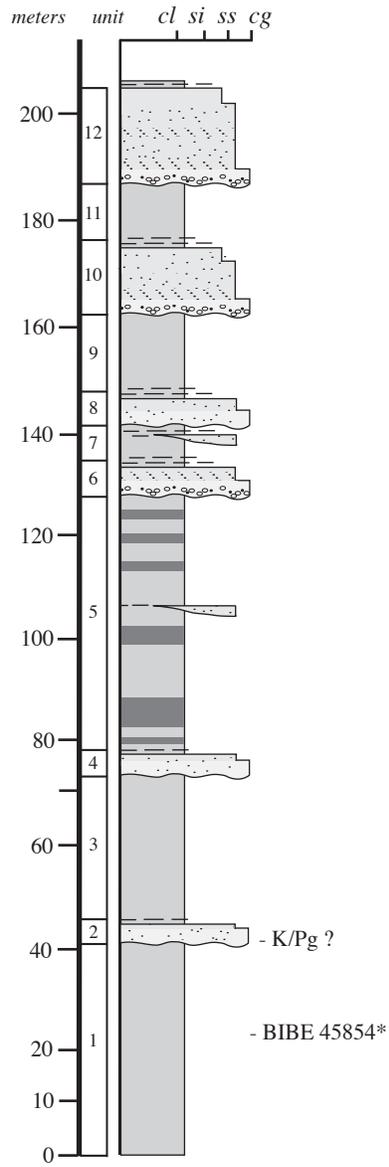
section # 13
CANOE VALLEY NORTH (Black Peaks Formation)



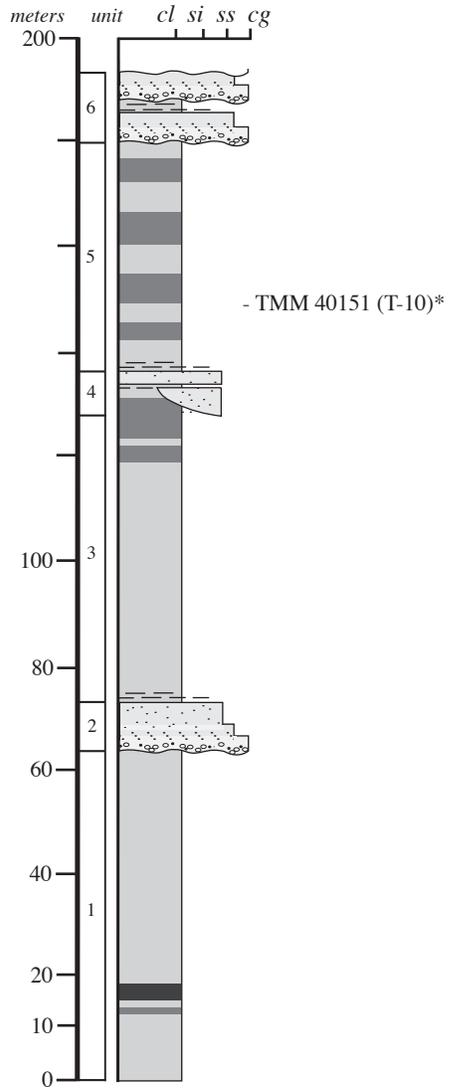
section # 14
 GRAPEVINE HILLS NORTHEAST (Black Peaks Formation)



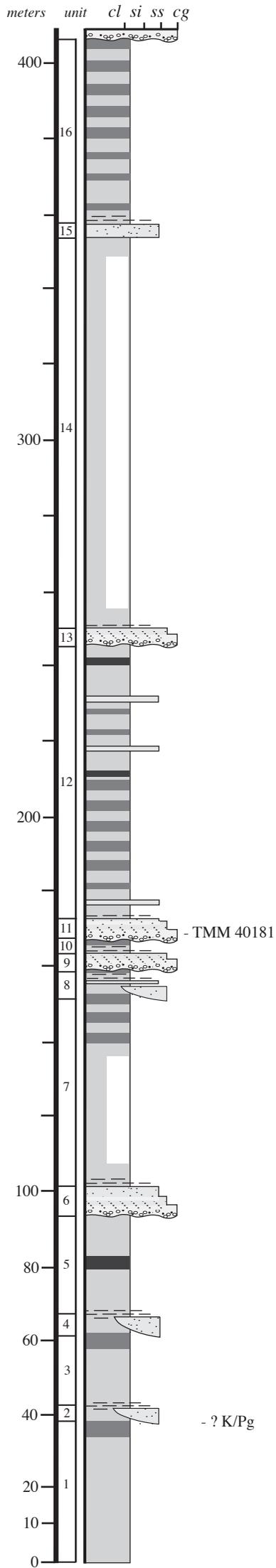
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DAGGER FLAT SOUTH (Black Peaks Formation)



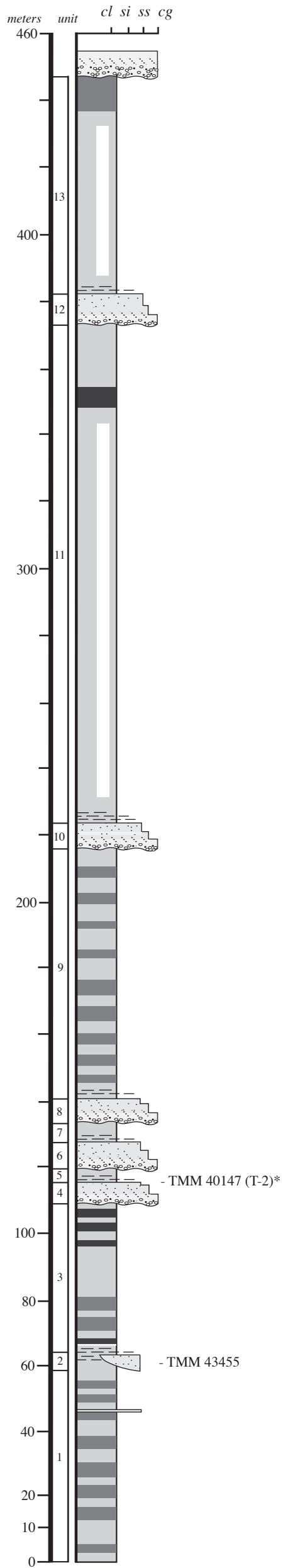
section # 16
GLENN SPRINGS WEST (Black Peaks Formation)



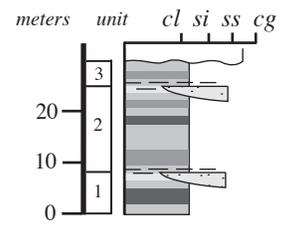
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HANNOLD DRAW (Black Peaks Formation)



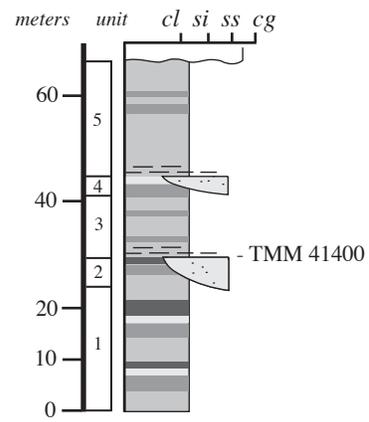
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McKINNEY HILLS NORTHWEST (Black Peaks Formation)



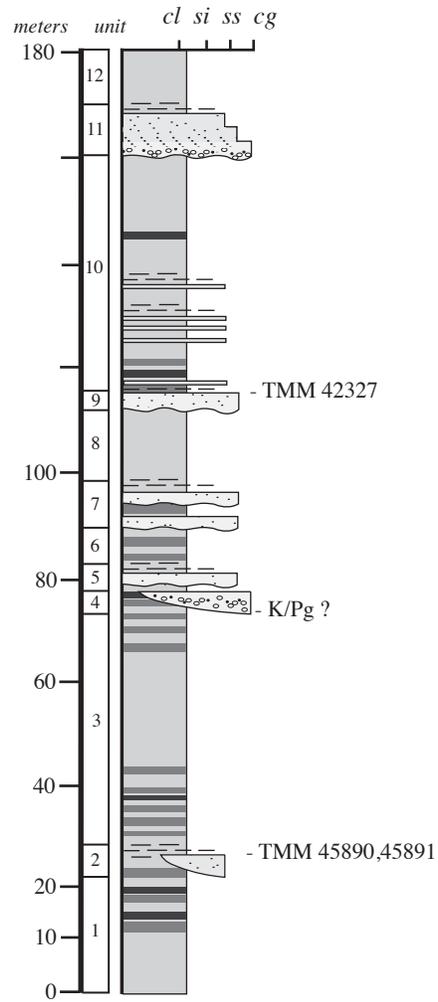
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PAINT GAP HILLS NORTHWEST (Black Peaks Formation)



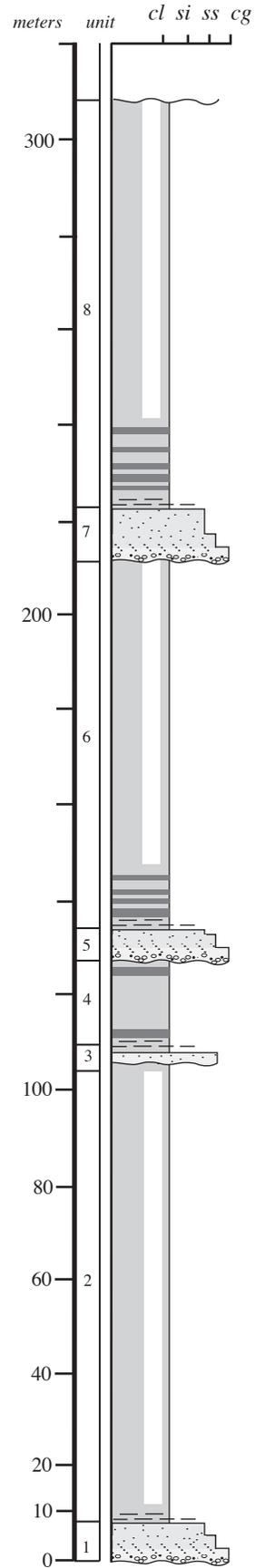
section # 20
DAWSON CREEK SOUTH (Black Peaks Formation)



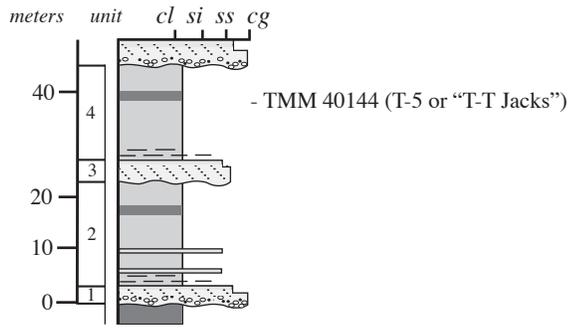
section # 21
ROUGH RUN CREEK DOGIE SOUTH (Black Peaks Formation)



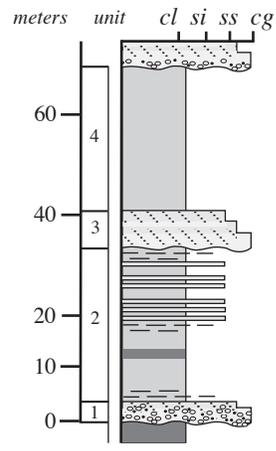
section # 22
PENA MT SOUTH (Javelina and lower Black Peaks Formation)



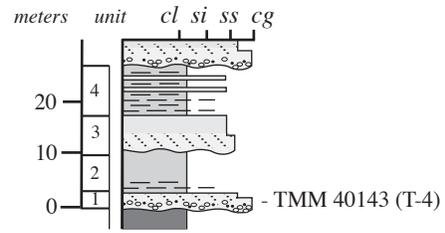
section # 23
EAST PARK HIGHWAY (Hannold Hill Formation)



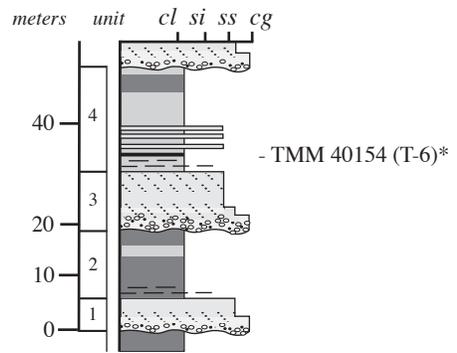
section # 24
CANOE VALLEY (Hannold Hill Formation)



section # 25
EXHIBIT RIDGE (Hannold Hill Formation)

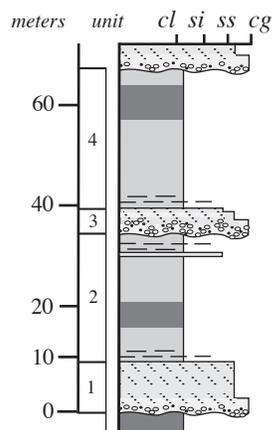


section # 26
WEST PARK HIGHWAY (Hannold Hill Formation)

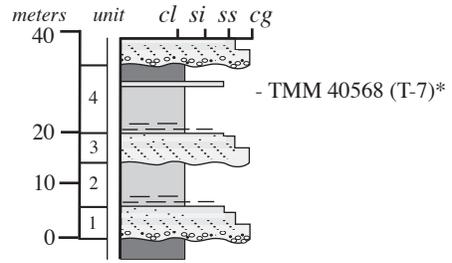


section # 27

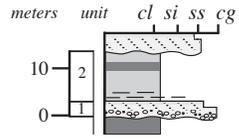
TORNILLO CREEK (Hannold Hill Formation)



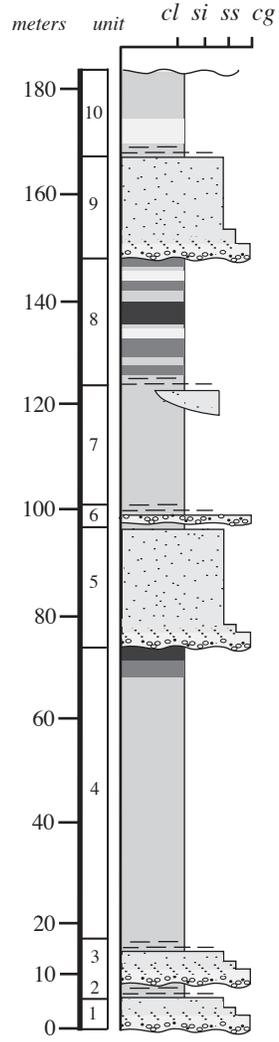
section # 28
GRAPEVINE SPRING EAST (Hannold Hill Formation)



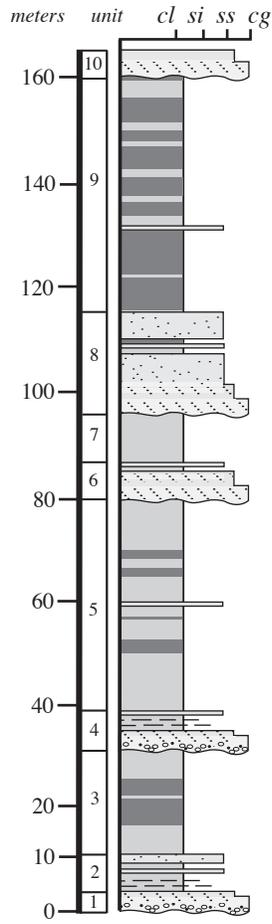
section # 29
COTTONWOOD CREEK (Hannold Hill Formation)



section # 30
ROUGH RUN CREEK EAST (upper Javelina & lower Black Peaks Formation)



section # 31
ROSILLOS MT RANCH (Javelina & lower Black Peaks Formation)



section # 32
PAINT GAP HILLS EAST (Javelina Formation)

