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MEASURED SECTIONS AND ANALYSES OF URANIUM HOST ROCKS
OF THE DOCKUM GROUP, NEW MEXICO AND TEXAS

BENDIX FIELD ENGINEERING CORPORATION
Grand Junction Operations
Grand Junction, Colorado 81501

February 1977

PREPARED FOR THE U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
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and T. J. Reese

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INTRODUCTION

This report presents 27 measured sections from the Dockum Group of Late Triassic age, in the southern High Plains of eastern New Mexico and northwestern Texas (Fig. 1). Locations of the sections and descriptions of the thickness of sample intervals are presented in Appendix A. The sections were measured and sampled by Lucius Pitkin, Inc., personnel during geologic studies conducted for the Grand Junction office of the U.S. Energy Research and Development Administration (ERDA). Many of the measured sections are only partial; the intent in those cases was to measure the parts of sections that had prominent sandstone/conglomerate beds or that had uranium deposits. No attempt was made to relate rock color to a rock color chart; rock colors are therefore approximate.

Modal analyses (by thin-section examination) of sandstone and conglomerate samples are presented in Appendix B. Gamma-ray spectrometric analyses of the samples are presented in Appendix C.

PROCEDURES

FIELD WORK

Known uranium deposits were examined at five localities (10, 12, 13, 21, 24; App. A). Twenty-seven stratigraphic sections, including the five enumerated above, were measured and sampled (App. A). Most of these are partial sections. A total of 334 rock samples were collected during the section measuring.

LABORATORY WORK

Petrographic study included thin-section analysis for mineral composition and clay mineral, heavy mineral, and grain size analyses. The thin-section analyses are presented in Appendix B.

Complete semiquantitative emission spectrographic analysis for about 60 elements, and gamma-ray spectrometric analysis for uranium, thorium, and potassium were performed. The gamma-ray analyses are presented in Appendix C.

RESULTS

STRATIGRAPHY AND LITHOLOGY

Dockum Group

The Dockum Group (Triassic; Figs. 2 and 3) consists of fluvial, lacustrine, and paludal deposits. It is composed predominantly of sandstones, mudstones, and conglomerates. Thin limestone beds occur locally. The Dockum ranges from a feather-edge to more than 2,000 ft thick.

Exposed Dockum sandstones are light- to medium-gray, white, yellow, brown, red; predominantly very fine- to medium-grained, poorly to moderately sorted, subangular to subrounded, calcareous quartz sandstones. They consist of as much as 96 percent quartz grains. Chert, clay, feldspar, mica, heavy minerals, and sedimentary rock fragments are present. Colors are generally uniform but the rocks also are banded, streaked, speckled, spotted, and mottled. A small proportion of the sandstone is coarse grained. There is abundant clay content and, locally, granules and pebbles are common. Calcareous cement constitutes small proportions of some rocks and substantial proportions of others. Clays also cement some sandstones and conglomerates. Infrequently, hematite and limonite may serve as cement. There are substantial amounts of opaline silica cement in some sandstones, and dolomite cement is also present (Green, 1954).

Dockum Group conglomerates are of two main types: (1) siliceous-pebble conglomerates, which are widespread in the southern High Plains and (2) limestone-pebble conglomerates, which are present in the southeastern area but are less important toward the north, in the Texas Panhandle. The conglomerates are found mainly in the lower part of the Dockum. No extensive conglomerates or sandstones are found in the Chinle Formation south of the 33rd parallel (Adams, 1929).

Feldspar content of the sandstones and conglomerates ranges from traces up to about 20 percent (App. B). Many samples have less than 5 percent feldspar.

The shale and claystone of the Dockum are predominantly red; but they are also medium and dark gray, green, purple, and saffron yellow. The coloration is uniform to banded, streaked, speckled, and mottled. The contrast between the darker brownish-red, purple, and saffron yellow shale, claystone, and siltstone beds of the Dockum and the underlying, more uniformly brick-red Permian rocks is striking in the northeastern escarpment in the Texas Panhandle.

Jurassic Beds

Jurassic beds are present only in the northwesternmost part of the project area. They probably pinch out beneath Cretaceous and Tertiary beds within a short distance to the southeast of their outcrops, southeast of Tucumcari.

Figure 2. General geology map, High Plains project area, New Mexico and Texas.

SYSTEM	SERIES	GROUP	FORMATION	MEMBER	THICKNESS * (Feet) Range/Avg.	CHARACTER
TERTIARY	UPPER MIOCENE & PLIOCENE		OGALLALA		0-415/180	Buff to pink, calcareous grit to soft limestone, sandy clay and sandstone with local basal conglomerate
CRETACEOUS	LOWER CRETACEOUS		UNDIFFERENTIATED		0-290/135	Shale with thin limestones, massive limestone, basal conglomeratic sandstone
JURASSIC	UPPER JURASSIC		ENTRADA SS. (?)		0-135/100	Yellow-gray to gray, fine-grained, calcareous sandstone with interbedded yellow-gray to red siltstone
TRIASSIC	UPPER TRIASSIC 20-2015/1155 *	DOCKUM	REDONDA (WINGATE ?)		0-450/125	Orange, gray to red, fine- to very fine-grained, calcareous sandstone with a thin basal, light gray sandy limestone
			CHINLE 20-1665/995 *	Upper Shale	0-410/180	Red and gray, sandy shale with local conglomeratic and silty shale
				Upper SS.	0-290/90	Red and gray, fine-grained, calcareous sandstone, siltstone, silty shale
				Middle Shale	0-870/435	Red to gray calcareous, sandy and silty shale
				Middle SS.	0-425/140	Gray, red, green and yellow, fine- to medium-grained, calcareous, locally cross-bedded, conglomeratic sandstone with some interbedded red shale
				Lower Shale	0-890/400	Red to gray and green shale with interbedded gray to red, very fine-grained sandstone and siltstone
			SANTA ROSA SANDSTONE		25-420/170	Yellow to gray and red, very fine- to medium-grained, calcareous and ferruginous, locally cross-bedded, locally silty or conglomeratic sandstone with some organic matter. Some interbedded red to variegated shale.
PERMIAN	OCHOAN		DEWEY LAKE REDBEDS		200-250 ¹	Orange-brown, laminated sandstone and siltstone
			RUSTLER		250-450 ¹	White, red-brown, gray; anhydrite, salt, dolomite, limestone, mudstone
			SALADO		0-2500 ¹	White, red, brown, green, deep orange; gypsum, mudstone, salt, potash
			CASTILE ³		2000 ± ¹	White, gray, black; gypsum, anhydrite, salt, limestone
	GUADALUPIAN	ARTESIA ⁴	TANSILL	QUARTERMASTER	125-320 ²	Light gray dolomite, siltstone, anhydrite
			YATES SS.		50-350 ²	Gray to buff sandstone, limestone; red, green shale, siltstone, dolomite
			SEVEN RIVERS		0-500 ²	White to gray gypsum, red sandstone and shale, limestone, dolomite
			QUEEN		300-400 ²	Interbedded red-brown sandstone, sandy dolomite and dolomite
			GRAYBURG		270-425 ²	Gray, pink, white dolomite, sandy dolomite, sandstone and anhydrite
			SAN ANDRES LS.		15-1200 ²	Light to dark gray, cherty limestone

*Quaternary deposits excluded.

¹Thickness and character modified from Kelley (1971). ²Thickness and character modified from Lochman-Balk (1972). ³Delaware Basin facies only. ⁴In central, southern, southwestern, western, and northwestern parts of the project area; correlates with the Whitehorse Group in eastern and southeastern parts of the project area and with the Quartermaster Formation in the eastern, northeastern, northern, and northwestern parts of the project area. The Alibates Lentil is in the upper part of the Quartermaster Formation.

Figure 3. Generalized stratigraphic section, southern High Plains, New Mexico and Texas.

Cretaceous Beds

Cretaceous beds consist predominantly of marine and marginal marine sediments. A wedge of Cretaceous shales, sandstones, limestones, and conglomerates, unconformably overlying the Dockum, thins and pinches out to the southeast, southeast of Tucumcari. Small to large remnants of Cretaceous strata lie mainly south of a line through Lubbock and Muleshoe, Texas. Some remnants occupy Tertiary divides and shallow valleys; others blanket hundreds of square miles. Thicknesses range from zero to 290 ft and average 130 ft.

Cenozoic Beds

Tertiary sandstone, conglomerate, and sandy claystone compose the Ogallala Formation. The Ogallala ranges from a feather-edge to between 400 and 500 ft thick.

Thin lake deposits of sand, gravel, silt, and clay (locally bentonitic); sand dunes; and thin, local uraniferous ash beds compose the Pleistocene sediments of the project area. Recent sediments consist of sheet and dune sands and flood-plain alluvium.

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APPENDIX A
MEASURED STRATIGRAPHIC SECTIONS

APPENDIX A
MEASURED STRATIGRAPHIC SECTIONS

Reference no. 1

Palo Duro Canyon Number 1: 1.1 miles ESE of NW corner of Palo Duro State Park,
Randall Co., Texas

Dockum Group (incomplete):	<u>Feet</u>
16. <u>Sandstone</u> , clayey, banded light gray, fine-grained, subangular, soft, friable and vitreous; (weathered surface is smooth), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven, with ripple marks; open fractures. Lower contact sharp.	7.2
15. <u>Shale</u> , silty, banded gray and red (weathers to banded gray and red), soft, loose and earthy; (weathers soft, loose and earthy; weathered surface is rough). External appearance; medium bedded, tabular uneven; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp.	14.8
14. <u>Conglomerate</u> , sandy, uniform light gray; containing organic material or remains; hard, brittle and vitreous; (weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven, open fractures. Lower contact sharp.	8.2
13. <u>Shale</u> (85%), sandy, uniform light greenish gray (weathers to uniform medium gray), fine-grained, containing organic material or remains; soft, brittle and dull; (weathers soft, brittle and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; laminated, parallel even. Lower contact gradational.	6.8
13. <u>Conglomerate</u> (15%), uniform light greenish gray, medium-grained, subrounded, medium hard, brittle and dull; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; medium bedded, with planar cross-bedding, open fractures. Lower contact sharp.	6.8
12. <u>Shale</u> , silty, banded dark gray and red (weathers to banded dark red), subangular, soft, loose and earthy; (weathers soft, loose and earthy; weathered surface is rough, knobby), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp.	17.6
11. <u>Sandstone</u> , silty, mottled medium gray and red, fine-grained, medium hard, compact and earthy; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp.	15.1
10. <u>Sandstone</u> , clayey, uniform light green (weathers to uniform medium red), fine-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), clay cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact sharp.	19.5
9. <u>Conglomerate</u> , sandy, speckled light red and green (weathers to speckled light red), medium-grained, hard, compact and dull; (weathers hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular channel; internal appearance; medium bedded, parallel uneven, open fractures. Lower contact sharp.	4.0
8. <u>Shale</u> , sandy, banded gray and red (weathers to banded gray and red), fine-grained, soft, frangible and earthy; (weathers soft, frangible and earthy; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular even; internal appearance; very thin bedded, parallel even, open fractures.	31.6
7. <u>Shale</u> , sandy, banded dark red (weathers to banded dark red), fine-grained, soft, frangible and earthy; (weathers soft, frangible and earthy; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular even; internal appearance; very thin bedded, parallel even, open fractures. Lower contract gradational.	31.3
6. <u>Sandstone</u> , clayey, uniform light white (weathers to uniform light white), fine-grained, subangular, medium hard, friable and vitreous; (weathers medium hard, friable and vitreous; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; thin bedded, parallel even, open fractures. Lower contact sharp.	19.3

APPENDIX A (continued)

Reference no. 1 (continued)

	<u>Feet</u>
5. Sandstone, uniform light white (weathers to uniform light grayish white), sub-angular, containing organic material or remains; medium hard, friable and vitreous; (weathers medium hard, friable and vitreous; weathered surface is rough, knobby). External appearance; thin bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp.	19.1
4. Shale, uniform medium yellow (weathers to uniform medium yellow), medium hard, plastic and earthy; (weathers medium hard, plastic and earthy; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; very thick bedded, massive, open fractures. Lower contact gradational.	40.2
3. Shale, banded dark purple and red (weathers to banded dark purple and red), soft, plastic and earthy; (weathers soft, plastic and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; very thin bedded, parallel even, open fractures. Lower contact gradational.	32.1
2. Sandstone, mottled light white (weathers to mottled light white), coarse-grained, subrounded, soft, friable and dull; (weathers soft, friable and dull; weathered surface is rough), clay cement. External appearance; very thick bedded, tabular even; internal appearance; very thick bedded, massive, open fractures. Lower contact sharp.	12.7
Total Dockum Group Thickness.....	279.5
Permian Quartermaster Formation (incomplete):	
1. Shale (80%), banded medium red (weathers to banded medium red), soft, plastic and earthy; (weathers soft, plastic and earthy; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, tabular even; internal appearance; laminated, parallel even, open fractures.	14.8
1. Siltstone (20%), sandy, banded light white and gray (weathers to banded light white and gray), fine-grained, subangular, soft, plastic and waxy; (weathers soft, plastic and waxy; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular even; internal appearance; thick bedded, parallel even, open fractures.	14.8
Total Section Thickness.....	294.3

Reference no. 2

Palo Duro Canyon Number 2: Offset about 1550 ft. west of Palo Duro Canyon No. 1

Tertiary Ogallala Formation (incomplete):

11. Sandstone, uniform light yellow (weathers to uniform light yellow), medium-grained, subangular, very hard, compact and vitreous; (weathers very hard, compact and vitreous), siliceous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thick bedded, massive, silica-filled fractures. Lower contact sharp.	10.0
10. Covered.....	26.5

Dockum Group:

9. Sandstone, silty, uniform light grayish yellow (weathers to uniform light reddish gray), coarse-grained, subangular, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp.	9.8
8. Shale, silty, uniform medium red (weathers to uniform medium red), subangular, soft, loose and earthy; (weathers soft, loose and earthy; weathered surface is smooth). External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.	9.2

APPENDIX A (continued)

Reference no. 2 (continued)

	Feet
7. Conglomerate, clayey, spotted gray and green (weathers to spotted gray), medium-grained, subangular, containing organic material or remains; hard, compact and vitreous; (weathers hard, compact and vitreous; weathered surface is rough), calcareous cement. External appearance; thick bedded, lenticular channel; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	12.8
6. Sandstone, silty, banded light red and gray (weathers to banded light red and gray), fine-grained, subangular, soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; very thin bedded, parallel even, open fractures. Lower contact gradational.	13.6
5. Conglomerate, sandy, uniform light greenish gray (weathers to uniform light reddish gray), subangular, medium hard, brittle and dull; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp.	6.8
4. Shale, uniform dark red (weathers to uniform dark red), subangular, soft, loose and earthy; (weathers soft, loose and earthy; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.	16.5
3. Shale, sandy, uniform dark red (weathers to uniform dark red), subangular, soft, loose and earthy; (weathers soft, loose and earthy; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.	12.5
2. Shale, sandy, uniform dark red (weathers to uniform dark red), soft, loose and earthy; (weathers soft, loose and earthy; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.	12.0
1. Sandstone, shaly, uniform light gray (weathers to uniform light gray), fine-grained, soft, brittle and vitreous; (weathers soft, brittle and vitreous; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, with ripple marks; open fractures. Lower contact sharp.	8.1

The top of Unit 1 is approximately equivalent to the top of Unit 16, Reference No. S001646.

Dockum Group Thickness (incomplete).....	101.3
Total Section Thickness.....	137.8

Reference no. 3

Salt Fork: 0.5 miles NNE of Texas State Road 207, 4.35 miles north of Prairie Dog Town Fork of Red River, Armstrong Co., Texas

Tertiary Ogallala Formation(?):

18. Conglomerate, sandy, uniform light yellowish gray, medium-grained, subrounded, hard, compact and vitreous; (weathered surface is rough), siliceous cement. External appearance; medium bedded, tabular even; internal appearance; thin bedded, parallel even, open fractures. Lower contact sharp.	2.5
17. Covered.....	5.5
Dockum Group:	
16. Sandstone, uniform light gray (weathers to uniform light gray), fine-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth). External appearance; thick bedded, lenticular bed; internal appearance; thin bedded, parallel even, open fractures.	8.0

APPENDIX A (continued)

Reference no. 3 (continued)

	Feet
15. Covered.....	10.0
14. Sandstone, conglomeratic, uniform light gray (weathers to uniform light gray), fine-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough). External appearance; very thick bedded, lenticular bed; internal appearance; very thin bedded, parallel even, with ripple marks; open fractures. Lower contact sharp.	19.0
13. Sandstone, silty, mottled medium gray and red (weathers to mottled medium gray and red), fine-grained, soft, frangible and dull; (weathers soft, frangible and dull; weathered surface is rough). External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact gradational.	9.5
12. Sandstone, silty, banded medium gray and red, fine-grained, soft, frangible and dull; (weathers soft, frangible and dull; weathered surface is rough). External appearance; thin bedded, tabular even; internal appearance, very thin bedded, parallel even, open fractures. Lower contact gradational.	16.4
11. Shale, sandy, banded medium yellow and red (weathers to banded medium red), sub-angular, soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; thin bedded, tabular even; internal appearance; very thin bedded, parallel even, open fractures. Lower contact gradational.	17.4
10. Sandstone, uniform light white (weathers to uniform light gray), fine-grained, subangular, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; very thick bedded, lenticular bed; internal appearance; thin bedded, parallel even, open fractures. Lower contact sharp.	8.5
9. Shale, sandy, banded gray and red (weathers to banded gray and red), subangular, soft, loose and dull; (weathers soft, loose and dull; weathered surface is rough, knobby), calcareous cement. Open fractures.	6.1
8. Sandstone, uniform light gray (weathers to uniform light yellowish gray), fine-grained, subangular, very hard, brittle and vitreous; (weathers very hard, brittle and vitreous; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp.	4.2
7. Shale, sandy, yellow and red (weathers to yellow and red), subrounded, soft, loose and dull; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. Open fractures.	9.3
6. Sandstone, uniform light yellowish white (weathers to uniform light yellow), fine-grained, subangular, medium hard, compact and vitreous; (weathers medium hard, compact and vitreous; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, lenticular bed; internal appearance; medium bedded, parallel even, open fractures. Lower contact gradational.	13.2
5. Covered.....	10.0
4. Shale, banded dark green and purple (weathers to banded dark green and purple), soft, loose and dull; (weathers soft, loose and dull), calcareous cement. External appearance; thick bedded, tabular even; internal appearance; laminated, parallel even, open fractures. Lower contact gradational.	5.0
3. Sandstone, uniform light white (weathers to uniform light white), medium-grained, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; tabular even; internal appearance; very thick bedded, massive, open fractures.	20.5
2. Sandstone, shaly, uniform light reddish white (weathers to uniform light reddish white), fine-grained, subangular, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough, knobby). External appearance; thick bedded, tabular even; internal appearance; thin bedded, parallel even, open fractures. Lower contact gradational.	7.5

APPENDIX A (continued)

Reference no. 3 (continued)

Feet

Permian Quartermaster Formation:

1. Siltstone, shaly, uniform medium red (weathers to uniform medium red), subangular, soft, loose and earthy; (weathers soft, loose and earthy; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; laminated, open fractures.	4.5
Dockum Group Thickness.....	173.6
Total Section Thickness.....	186.1

Reference no. 4

Tule Canyon Number 1: 1/4 mile below "The Narrows", Tule Canyon, Briscoe Co., Texas

Dockum Group (incomplete):

17. Sandstone, conglomeratic, uniform light red (weathers to uniform light red), medium-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; medium bedded, massive, open fractures.	4.0
16. Shale, sandy, uniform medium red (weathers to uniform medium red), subangular, soft, compact and earthy; (weathers soft, compact and earthy; weathered surface is rough), calcareous cement. Open fractures.	6.0
15. Sandstone, silty, medium gray (weathers to light red), fine-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, lenticular bed; internal appearance; laminated, massive, open fractures. Lower contact gradational.	15.0
14. Covered.....	10.0
13. Sandstone, uniform light reddish white (weathers to uniform light red), medium-grained, subangular, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; very thick bedded, lenticular channel; internal appearance; thick bedded, massive, open fractures. Lower contact sharp.	23.0
12. Sandstone, uniform light reddish white (weathers to uniform light red), medium-grained, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; very thick bedded, lenticular channel; internal appearance; thick bedded, massive, open fractures. Lower contact sharp.	20.0
11. Sandstone, mottled yellow and white (weathers to uniform medium red), fine-grained, subrounded, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), ferruginous cement. External appearance; thick bedded, lenticular bed; internal appearance; thin bedded, with planar cross-bedding, open fractures. Lower contact sharp.	14.0
10. Claystone, silty, mottled medium yellow and gray (weathers to mottled medium yellow and gray), containing organic material or remains; soft, frangible and waxy; (weathers soft, frangible and waxy; weathered surface is smooth), ferruginous cement. External appearance; medium bedded, lenticular bed; internal appearance; laminated, with disturbed, irregular bedding, open fractures. Lower contact sharp.	2.0
9. Sandstone, mottled yellow and white (weathers to uniform light red), fine-grained, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; medium bedded, lenticular bed; internal appearance; thin bedded, parallel even, open fractures.	3.0
8. Covered.....	26.0
7. Sandstone, speckled white and red (weathers to speckled red), medium-grained, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; very thick bedded, lenticular bed; internal appearance; thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	14.0

APPENDIX A (continued)

Reference no. 4 (continued)

	Feet
6. <u>Conglomerate</u> , speckled white and gray (weathers to speckled white and gray), hard, compact and vitreous; (weathers hard, compact and vitreous; weathered surface is rough), clay cement. External appearance; medium bedded, lenticular bed; internal appearance; thin bedded, with disturbed, irregular bedding, open fractures. Lower contact sharp.	3.0
5. <u>Sandstone</u> , silty, uniform light gray (weathers to uniform gray), fine-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth). External appearance; very thick bedded, tabular even; internal appearance; open fractures.	16.0
4. <u>Sandstone</u> (55%), silty, uniform light reddish gray (weathers to uniform light red), fine-grained, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; medium bedded, tabular even; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp.	7.5
4. <u>Shale</u> (45%), silty, mottled medium green and red (weathers to mottled medium green and red), compact and dull; (weathers compact and dull; weathered surface is smooth), calcareous cement. External appearance; medium bedded, tabular even; internal appearance; laminated, parallel even, open fractures.	7.5
3. Covered.....	12.5
2. <u>Sandstone</u> , uniform greenish white (weathers to uniform white), fine-grained, sub-angular, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; medium bedded, tabular uneven; internal appearance; thin bedded, parallel uneven, open fractures. Lower contact sharp.	3.0
Dockum Group Thickness.....	179.0
Permian Quartermaster Formation (incomplete):	
1. <u>Siltstone</u> , banded medium red (weathers to banded medium red), medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular even; internal appearance; very thin bedded, parallel even, open fractures.	12.0
Total Section Thickness.....	191.0

Reference no. 5

Tule Canyon Number 2: Along east side of Farm Road 284 at Tule Canyon, Briscoe Co., Texas

Quaternary Tule Formation (incomplete):

15. <u>Sandstone</u> , uniform light gray (weathers to uniform light white), fine-grained, subangular, soft, friable and dull; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; open fractures.	5.0
Dockum Group (incomplete):	
14. <u>Shale</u> , uniform dark red (weathers to uniform dark red), soft, compact and waxy; (weathers soft, compact and earthy; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, massive, open fractures.	25.0
13. Covered.....	8.0
12. <u>Sandstone</u> , mottled yellow and gray (weathers to mottled light yellow and gray), fine-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	18.0
11. <u>Sandstone</u> , uniform light gray (weathers to uniform light grayish red), fine-grained, subangular, containing organic material or remains; soft, friable and vitreous; (weathers soft, friable and dull), calcareous cement. External appearance; very thick bedded, lenticular bed; internal appearance; thick bedded, parallel uneven, open fractures. Lower contact sharp.	15.0

APPENDIX A (continued)

Reference no. 5 (continued)

	<u>Feet</u>
10. Conglomerate, clayey, banded medium gray and red (weathers to banded medium red), subangular, medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is rough, pitted), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven. Lower contact gradational.	5.5
9. Sandstone, uniform light gray (weathers to uniform light reddish gray), fine-grained, subangular, medium hard, friable and vitreous; (weathers medium hard, friable and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven, open fractures. Lower contact sharp.	16.5
8. Shale, sandy, uniform dark red (weathers to uniform dark red), medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; very thin bedded, parallel uneven, sulfate-filled fractures. Lower contact gradational.	21.9
7. Shale, sandy, uniform dark red (weathers to uniform dark red), medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; very thin bedded, parallel uneven, calcite-filled fractures. Lower contact gradational.	20.0
6. Siltstone, shaly, banded dark red (weathers to banded dark red), medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven, calcite-filled fractures. Lower contact gradational.	20.0
5. Shale (60%), silty, uniform medium red (weathers to uniform medium red), subangular, soft, frangible and dull; (weathers soft, frangible and dull; weathered surface is rough), calcareous cement. Open fractures.	18.0
5. Sandstone (40%), uniform light gray (weathers to uniform light gray), fine-grained, subrounded, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact gradational.	18.0
4. Sandstone, conglomeratic, uniform light greenish gray (weathers to uniform light gray), soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact gradational.	12.0
3. Shale, silty, banded medium gray and red (weathers to uniform light red), subangular, soft, frangible and dull; (weathers soft, frangible and dull; weathered surface is smooth), calcareous cement. Internal appearance; laminated, open fractures.	5.5
2. Sandstone, uniform light gray (weathers to uniform light red), fine-grained, subangular, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact sharp.	8.0
1. Shale, silty, banded medium gray and red (weathers to banded medium gray and red), soft, friable and dull; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures.	4.0
Dockum Group Thickness (incomplete).....	197.4
Total Section Thickness.....	202.4

APPENDIX A (continued)

Reference no. 6

South Draw: Along Texas State Highway 256, 12 miles east of Silverton, Briscoe Co., Texas

Tertiary Ogallala Formation (incomplete):

Feet

18. Sandstone, calcareous, uniform light brown (weathers to mottled medium brown), medium-grained, subangular, very hard, brittle and vitreous; (weathers very hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; medium bedded, massive. Lower contact sharp and irregular. 12.0

Dockum Group:

17. Shale, sandy, banded light brown (weathers to uniform light brown), fine-grained, subangular, soft, loose and waxy; (weathers soft, loose and earthy; weathered surface is rough). External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp and irregular. 16.0
16. Shale, sandy, banded light brown (weathers to uniform light brown), fine-grained, subangular, soft, loose and waxy; (weathers soft, loose and earthy; weathered surface is rough). External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp and irregular. 16.0
15. Shale, silty, banded medium gray and red (weathers to banded medium brown and red), fine-grained, subangular, soft, compact and waxy; (weathers soft, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact gradational. 20.0
14. Shale, sandy, banded medium red (weathers to uniform medium brownish red), fine-grained, soft, compact and waxy; (weathers soft, brittle and earthy; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact gradational. 12.5
13. Shale, silty, banded medium green and red (weathers to streaked medium brown and red), fine-grained, subrounded, soft, compact and waxy; (weathers soft, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp and irregular. 15.0
12. Siltstone, sandy, banded green and red (weathers to streaked brown and red), fine-grained, subangular, medium hard, compact and vitreous; (weathers soft, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, with trough-shaped cross-bedding. Lower contact gradational. 11.5
11. Sandstone, silty, streaked light green and gray (weathers to mottled medium red and gray), fine-grained, subangular, medium hard, compact and vitreous; (weathers medium hard, friable and earthy; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. 2.5
10. Sandstone, banded light green and gray (weathers to uniform medium gray), fine-grained, subrounded, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven. Lower contact sharp. 25.5
9. Shale, sandy, banded medium red (weathers to mottled medium gray and red), fine-grained, subangular, soft, compact and waxy; (weathers soft, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven. Lower contact sharp. 14.5
8. Sandstone, banded light gray (weathers to uniform light brownish red), fine-grained, subrounded, soft, friable and vitreous; (weathers soft, friable and earthy; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, lenticular bed; internal appearance; medium bedded, parallel uneven. Lower contact sharp. 24.5

APPENDIX A (continued)

Reference no. 6 (continued)

	<u>Feet</u>
7. <u>Shale</u> , silty, banded light red (weathers to uniform medium brownish red), fine-grained, soft, compact and waxy; (weathers soft, brittle and earthy; weathered surface is rough). External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp.	6.5
6. <u>Sandstone</u> , clayey, banded light green and gray (weathers to uniform medium reddish brown), fine-grained, subrounded, soft, friable and vitreous; (weathers soft, friable and earthy; weathered surface is rough), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; thin bedded, parallel uneven. Lower contact sharp.	9.0
5. <u>Shale</u> , sandy, mottled medium yellow and red (weathers to mottled light yellow and red), fine-grained, containing organic material or remains; medium hard, compact and waxy; (weathers medium hard, brittle and earthy; weathered surface is rough, knobby). External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact gradational.	4.5
4. <u>Sandstone</u> , silty, streaked light gray and green (weathers to mottled medium gray and red), medium-grained, medium hard, compact and vitreous; (weathers medium hard, loose and earthy; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven.	6.5
3. <u>Sandstone</u> , silty, banded light yellow and purple (weathers to mottled dark red and purple), fine-grained, subangular, medium hard, compact and waxy; (weathers medium hard, compact and earthy; weathered surface is rough), clay cement. External appearance; thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven. Lower contact gradational.	8.5
2. <u>Siltstone</u> , shaly, banded light purple and white (weathers to mottled medium purple and gray), fine-grained, subrounded, soft, compact and vitreous; (weathers soft, brittle and earthy; weathered surface is rough), clay cement. External appearance; very thick bedded, irregular shape; internal appearance; very thin bedded, parallel uneven. Lower contact erosional with more than one foot of relief.	13.0
Dockum Group Thickness.....	206.0
Permian Quartermaster Formation (incomplete):	
1. <u>Sandstone</u> , conglomeratic, banded medium brown and red (weathers to streaked light orange and red), fine-grained, subrounded, medium hard, compact and vitreous; (weathers soft, friable and earthy; weathered surface is rough, pitted), clay cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven.	4.0
Total Section Thickness.....	222.0

Reference no. 7

Dripping Springs: 0.6 miles NW of intersection of Farm Road 1065 (599) and Texas State Highway 97, Floyd Co., Texas

Dockum Group (incomplete):

17. Covered.....	>0.0
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Tertiary Ogallala Formation(?):

16. <u>Sandstone</u> , uniform light yellow (weathers to uniform light yellow), fine-grained, poorly sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular even; internal appearance; thick bedded, massive, open fractures.	5.0
15. Covered.....	33.0

APPENDIX A (continued)

Reference no. 7 (continued)

Dockum Group:	Feet
14. <u>Sandstone</u> , uniform light yellow (weathers to uniform light yellowish gray), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, irregular shape; internal appearance; very thin bedded, parallel even, open fractures.	5.5
13. Covered.....	6.0
12. <u>Sandstone</u> , uniform light yellow (weathers to uniform light grayish yellow), fine-grained, well sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, irregular shape; internal appearance; very thin bedded, with planar cross-bedding, open fractures.	21.0
11. Covered.....	8.5
10. <u>Sandstone</u> , silty, uniform light yellow (weathers to uniform light yellowish gray), fine-grained, subrounded, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven, open fractures.	3.5
9. Covered.....	2.0
8. <u>Sandstone</u> , conglomeratic, uniform light yellow (weathers to uniform light gray), coarse-grained, subrounded, poorly sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; thin bedded, with disturbed, irregular bedding, open fractures. Lower contact gradational.	9.0
7. <u>Sandstone</u> , conglomeratic, uniform light yellow (weathers to mottled light yellow and gray), fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby). External appearance; very thick bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, with graded bedding; open fractures. Lower contact gradational.	11.5
6. <u>Conglomerate</u> , spotted medium gray (weathers to spotted medium gray), medium-grained, subrounded, poorly sorted, medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures. Lower contact sharp.	4.0
5. <u>Sandstone</u> , conglomeratic, uniform light grayish yellow (weathers to uniform light yellowish gray), very fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, lenticular channel; internal appearance; very thin bedded, with trough-shaped cross-bedding, with graded bedding; open fractures. Lower contact gradational.	16.5
4. <u>Sandstone</u> , conglomeratic, uniform light yellow (weathers to uniform light yellowish gray), coarse-grained, subrounded, poorly sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, lenticular channel; internal appearance; very thin bedded, with trough-shaped cross-bedding, with graded bedding, open fractures. Lower contact gradational.	22.0
3. <u>Sandstone</u> , conglomeratic, mottled light yellow and gray (weathers to mottled light yellow and gray), medium-grained, subrounded, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, lenticular channel; internal appearance; very thin bedded, with trough-shaped cross-bedding, with graded bedding, open fractures. Lower contact gradational.	15.0
2. <u>Sandstone</u> , conglomeratic, uniform light yellow (weathers to uniform light gray), medium-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough, knobby). External appearance; very thick bedded, lenticular channel; internal appearance; very thin bedded, with trough-shaped cross-bedding, with graded bedding, open fractures. Lower contact sharp and irregular.	15.0

APPENDIX A (continued)

Reference no. 7 (continued)

	Feet
Dockum Group Thickness (incomplete).....	139.5
Permian Quartermaster Formation:	
1. <u>Sandstone</u> , uniform light red (weathers to uniform light red), fine-grained, sub-rounded, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, irregular shape; internal appearance; very thick bedded, massive.	13.5
Total Section Thickness.....	191.0

Reference no. 8

Dickens: 0.5 miles east of Texas State Highway 70 and 2 miles north of intersection of Highway 70 and U. S. Highway 82, Dickens Co., Texas

Tertiary Ogallala Formation(?) (incomplete):

11. Conglomerate, spotted medium brown and yellow (weathers to spotted medium white and gray), very coarse-grained, subrounded, poorly sorted, medium hard, frangible and dull; (weathers medium hard, frangible and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; thin bedded, parallel even, with graded bedding, open fractures. Lower contact gradational. 18.0

Dockum Group:

10. Sandstone, conglomeratic, uniform light yellow (weathers to uniform medium gray), coarse-grained, subrounded, poorly sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, lenticular channel; internal appearance; very thin bedded, with planar cross-bedding, with graded bedding, open fractures. Lower contact gradational. 10.5
9. Sandstone, conglomeratic, uniform light yellow (weathers to uniform medium gray), medium-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular channel; internal appearance; very thin bedded, with planar cross-bedding, with graded bedding, open fractures. Lower contact gradational. 18.0
8. Sandstone (75%), conglomeratic, uniform light yellow (weathers to uniform medium gray), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull), calcareous cement. External appearance; thick bedded, tabular even; internal appearance; very thin bedded, with planar cross-bedding, with graded bedding, open fractures. Lower contact gradational. 16.5
8. Conglomerate (25%), speckled medium yellow and gray (weathers to speckled medium yellow and gray), very coarse-grained, subrounded, poorly sorted, medium hard, frangible and dull; (weathers medium hard, frangible and dull), calcareous cement. External appearance; thick bedded, tabular even; internal appearance; thick bedded, massive, with graded bedding, open fractures. Lower contact sharp. 16.5
7. Sandstone, conglomeratic, uniform medium yellow (weathers to uniform medium yellowish gray), medium-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby). External appearance; thick bedded, tabular even; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact gradational. 15.0
6. Covered..... 4.0
5. Sandstone, conglomeratic, uniform medium yellow (weathers to banded medium yellow and gray), medium-grained, subrounded, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; thin bedded, with planar cross-bedding, with graded bedding, open fractures. Lower contact gradational. 6.0

APPENDIX A (continued)

Reference no. 8 (continued)

Feet

4. Sandstone (85%), conglomeratic, speckled light yellow (weathers to speckled medium yellow and gray), coarse-grained, subrounded, poorly sorted, medium hard, friable and vitreous; (weathers medium hard, friable and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; medium bedded, parallel uneven, with graded bedding, open fractures. Lower contact gradational. 19.0
4. Conglomerate (15%), sandy, speckled light yellow (weathers to speckled light yellow and gray), very coarse-grained, poorly sorted, medium hard, friable and dull; (weathers medium hard, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; medium bedded, parallel uneven, with graded bedding, open fractures. Lower contact gradational. 19.0
3. Conglomerate, speckled light yellow and gray (weathers to speckled light yellow and gray), very coarse-grained, subrounded, poorly sorted, medium hard, frangible and dull; (weathers medium hard, frangible and dull; weathered surface is rough, knobby). External appearance; thick bedded, lenticular channel; internal appearance; thin bedded, parallel uneven, with graded bedding, open fractures. Lower contact sharp. 8.3
2. Shale, silty, uniform dark red (weathers to uniform dark red), fine-grained, soft, (weathers soft, weathered surface is smooth). External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact sharp. 10.5
- Dockum Group Thickness..... 107.8
- Permian Quartermaster Formation(?) (incomplete):
1. Sandstone, uniform medium red (weathers to uniform medium red), fine-grained, soft, friable and dull; (weathers soft, friable and dull; weathered surface is smooth). External appearance; thick bedded, tabular even; internal appearance; thick bedded, massive, open fractures. 9.0
- Total Section Thickness..... 134.8

Reference no. 9

Kalgary: 4.5 miles NNW of Kalgary, Crosby Co., Texas; south of Farm Road 2794 and 1.95 miles east of Farm Road 651

Quaternary(?) (incomplete):

14. Conglomerate, sandy, spotted light yellow and gray (weathers to spotted light yellow and gray), coarse-grained, subrounded, poorly sorted, medium hard, frangible and vitreous; (weathers medium hard, frangible and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures. Lower contact sharp. 1.0
- Dockum Group (incomplete):
13. Sandstone, uniform light gray (weathers to uniform light gray), fine-grained, subrounded, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; very thin bedded, tabular uneven; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp. 7.0
12. Sandstone (weathers to mottled medium yellow and gray), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact gradational. 19.1
11. Sandstone, silty, uniform medium yellow (weathers to mottled medium yellow and gray), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact gradational. 18.0

APPENDIX A (continued)

Reference no. 9 (continued)

	Feet
10. <u>Conglomerate</u> , sandy, spotted yellow and gray (weathers to spotted yellow and gray), medium-grained, subrounded, poorly sorted, medium hard, frangible and dull; (weathers medium hard, frangible and dull; weathered surface is rough, knobby), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; thin bedded, parallel uneven, open fractures.	2.0
9. Covered.....	21.0
8. <u>Sandstone</u> , uniform whitish gray (weathers to uniform light gray), medium-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp.	20.6
7. <u>Sandstone</u> , banded yellow and gray (weathers to uniform light gray), fine-grained, subrounded, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures.	7.0
6. <u>Conglomerate</u> , sandy, spotted medium gray and yellow (weathers to spotted medium gray and yellow), medium-grained, subangular, poorly sorted, medium hard, frangible and vitreous; (weathers medium hard, frangible and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; medium bedded, with disturbed, irregular bedding, with graded bedding, open fractures. Lower contact sharp and irregular.	6.8
5. <u>Shale</u> , mottled dark gray and red (weathers to uniform dark red), soft, plastic and dull; (weathers soft, plastic and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thick bedded, massive, open fractures. Lower contact gradational.	18.5
4. <u>Shale</u> , mottled dark gray and red (weathers to uniform dark red), soft, plastic and dull; (weathers soft, plastic and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thick bedded, massive, open fractures. Lower contact gradational.	20.0
3. <u>Shale</u> , uniform medium yellow (weathers to uniform medium yellow), soft, plastic and dull; (weathers soft, plastic and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thick bedded, massive, open fractures. Lower contact gradational.	11.5
2. <u>Shale</u> , mottled dark red and gray (weathers to uniform dark red), soft, plastic and dull; (weathers soft, plastic and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; very thick bedded, massive, open fractures. Lower contact gradational.	14.0
1. <u>Shale</u> , uniform dark red (weathers to uniform dark red), soft, plastic and dull; (weathers soft, plastic and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; very thick bedded, massive, open fractures. Lower contact gradational.	16.5
Dockum Group Thickness (incomplete).....	182.0
Total Section Thickness.....	183.0
Base of section and base of exposure in stream bed south of Highway 2794 and northeast of origin.	

Reference no. 10

Eubanks Prospect: 14 miles north of Post, Crosby Co., Texas, 5.5 miles east of State Highway 207 and south of Farm Road 261.

Dockum Group (incomplete) (succeeding interval covered)

3. Conglomerate, sandy, spotted light gray and yellow (weathers to spotted medium gray and yellow), fine-grained, subangular, moderately sorted, medium hard, frangible and vitreous; (weathers medium hard, frangible and dull), calcareous cement. Internal appearance; very thin bedded, open fractures. Yellow uranium mineralization, disseminated, sparse to some. (Not in place).....

APPENDIX A (continued)

Reference no. 10 (continued)

Feet

2. <u>Conglomerate</u> , sandy, spotted light gray (weathers to spotted medium gray), fine-grained, subangular, poorly sorted, medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp.	11.5
1. <u>Shale</u> , banded dark green and red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and earthy; weathered surface is rough, knobby), calcareous cement. External appearance; medium bedded, tabular even; internal appearance; laminated, parallel even, open fractures.	15.5
Total Section Thickness.....	27.0 ⁺
Base of section; not base of exposure.	

Reference no. 11

North Fork: Along Texas State Highway 207 at North Fork of Double Mountain Fork of Brazos River, and 9.4 miles north of Post, Garza Co., Texas

Dockum Group (incomplete):

6. <u>Sandstone</u> , mottled light yellow and gray (weathers to uniform light yellow), fine-grained, subangular, poorly sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; laminated, with planar cross-bedding, open fractures. Lower contact sharp and irregular.	11.5
5. <u>Conglomerate</u> , spotted medium yellow and red (weathers to spotted medium yellow and red), fine-grained, subangular, poorly sorted, medium hard, frangible and dull; (weathers medium hard, frangible and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding. Lower contact sharp.	3.0
4. <u>Conglomerate</u> , spotted medium green (weathers to spotted medium green and red), medium-grained, subangular, poorly sorted, medium hard, frangible and dull; (weathers medium hard, frangible and dull; weathered surface is rough, knobby). External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact sharp and irregular.	5.0
3. <u>Sandstone</u> , conglomeratic, uniform light gray (weathers to uniform medium gray), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures.	16.5
2. Covered.....	7.0
1. <u>Shale</u> , banded dark gray and red (weathers to banded dark gray and red), soft, plastic and waxy; (weathers soft, plastic and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, irregular shape; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures.	10.0
Dockum Group Thickness (incomplete).....	53.0
Total Section Thickness.....	53.0
Base of section in ravine on east side of Highway 207.	

APPENDIX A (continued)

Reference no. 12

<u>Crown Prospect Number 2:</u> About 100 feet south of Crown Prospect No. 1.	<u>Feet</u>
Dockum Group (incomplete):	
4. <u>Sandstone</u> , silty, banded medium yellow and gray (weathers to banded medium gray), very fine-grained, subangular, poorly sorted, containing organic material or remains; soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough, knobby). External appearance; thin bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp. Yellow uranium mineralization, disseminated, sparse.	3.0
3. <u>Sandstone</u> , uniform light yellow (weathers to uniform light yellow), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, pitted), calcareous cement. External appearance; thin bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact gradational.	12.7
2. <u>Sandstone</u> , uniform light yellow (weathers to uniform light yellow), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp.	4.8
1. <u>Sandstone</u> , banded medium red and gray (weathers to uniform light gray), fine-grained, subangular, poorly sorted, containing organic material or remains; medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, lenticular channel; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Yellow uranium mineralization disseminated, abundant.	2.0
Dockum Group Thickness (incomplete).....	32.5
Total Section Thickness.....	32.5
Base of the section is the base of the bulldozed cut.	

Reference no. 13

Post Number 1: About 10 miles SSE of Post, Garza Co., Texas

Tertiary Ogallala Formation:	<u>Feet</u>
6. <u>Conglomerate</u> , sandy, spotted light brown (weathers to spotted light brown), medium-grained, subrounded, poorly sorted, containing organic material or remains; medium hard, compact (weathers medium hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, lenticular channel; internal appearance; medium bedded, with disturbed, irregular bedding, open fractures. Lower contact sharp and irregular.	5.0
Dockum Group (incomplete):	
5. <u>Siltstone</u> , mottled (weathers to mottled yellow and green), containing organic material or remains; soft, compact and dull; (weathers soft, compact and dull; weathered surface is rough). External appearance; medium bedded, lenticular bed; internal appearance; laminated, with disturbed, irregular bedding, open fractures. Lower contact gradational.	2.0
4. <u>Shale</u> , uniform dark red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational.	17.5

APPENDIX A (continued)

Reference no. 13 (continued)

	<u>Feet</u>
3. <u>Shale</u> , uniform dark red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational.	17.0
2. <u>Shale</u> , silty, mottled dark green and red (weathers to mottled dark green and red), containing organic material or remains; soft, loose and dull; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational.	23.0
1. <u>Shale</u> (70%), silty, uniform dark red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational.	22.0
1. <u>Shale</u> (30%), silty, uniform light grayish green (weathers to uniform light grayish green), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational.	22.0
Dockum Group Thickness (incomplete).....	76.5
Total Section Thickness.....	81.5
Base of section is in gully below spur; not base of exposure.	

Reference no. 14

Post Number 2: About 1.4 miles SE of Post No. 1

Dockum Group (incomplete): Top of section is top of hill

9. Conglomerate, sandy, uniform light gray (weathers to uniform light grayish yellow), medium-grained, subangular, poorly sorted, medium hard, compact and vitreous; (weathers medium hard, compact and dull), calcareous cement. External appearance; thin bedded, lenticular channel; internal appearance; laminated, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular. 12.0
8. Sandstone, conglomeratic, spotted light gray (weathers to uniform light grayish yellow), fine-grained, moderately sorted, medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; thin bedded, lenticular channel; internal appearance; laminated, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular. 13.0
7. Shale, uniform dark red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact gradational. 14.2
6. Shale, uniform dark red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact gradational. 22.0
5. Shale, sandy, banded dark green and red (weathers to banded dark red), medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational. 11.3

APPENDIX A (continued)

Reference no. 14 (continued)

	Feet
4. <u>Shale</u> , silty, banded dark green and red (weathers to banded dark green and red), medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.	18.8
3. <u>Sandstone</u> , silty, speckled gray and red (weathers to uniform dark red), fine-grained, medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; laminated, lenticular bed; internal appearance; laminated, with trough-shaped cross-bedding, open fractures. Lower contact sharp.	4.3
2. <u>Shale</u> (85%), silty, uniform dark red (weathers to uniform dark red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is rough). External appearance; medium bedded, lenticular bed; internal appearance; laminated, with disturbed, irregular bedding. Lower contact gradational.	3.0
2. <u>Sandstone</u> (15%), silty, banded medium green (weathers to uniform dark red), very fine-grained, subangular, moderately sorted, medium hard, brittle and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational.	3.0
1. <u>Shale</u> , silty, uniform dark red (weathers to uniform dark red), medium hard, loose and vitreous; (weathers medium hard, loose and dull; weathered surface is rough), calcareous cement. Open fractures.	10.4
Dockum Group Thickness (incomplete).....	109.0
Total Section Thickness.....	109.0
Base of section and base of exposure.	

Reference no. 15

Double Mountain: Middle hill of Double Mountain peaks, Stonewall Co., Texas

Dockum Group (overlain by Cretaceous Trinity Sands (?)):

6. <u>Siltstone</u> , shaly, mottled dark purple (weathers to mottled dark purple), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), tabular uneven; open fractures.	5.5
5. <u>Sandstone</u> , uniform light gray (weathers to mottled light yellow and gray), medium-grained, subrounded, moderately sorted, medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact gradational.	5.5
4. <u>Conglomerate</u> , sandy, speckled white and red (weathers to speckled white and red), coarse-grained, poorly sorted, medium hard, compact and vitreous; (weathers medium hard, compact and vitreous; weathered surface is rough, knobby), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; thin bedded, massive, open fractures. Lower contact sharp.	7.8

APPENDIX A (continued)

Reference no. 15 (continued)

	Feet
3. Covered.....	7.5
2. <u>Shale</u> , silty, mottled dark red and purple (weathers to mottled dark red and purple), soft, loose and dull; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact gradational. ...	5.5
Dockum Group Thickness.....	31.8
Permian Beds:	
1. <u>Siltstone</u> , sandy, banded medium gray and red (weathers to banded medium gray and red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, tabular even; internal appearance; laminated, parallel even, open fractures.	5.0
Total Section Thickness.....	36.8
Base of section is not base of exposure.	

Reference no. 16

Camp Springs: 0.9 miles south of Camp Springs, Scurry Co., Texas, just east of Farm Road 1614

Dockum Group:

6. <u>Conglomerate</u> , sandy, spotted white and gray (weathers to spotted white and gray), subrounded, very hard, brittle and vitreous; (weathers very hard, brittle and vitreous; weathered surface is rough, knobby), siliceous cement. External appearance; thin bedded, tabular uneven; internal appearance; thin bedded, with disturbed, irregular bedding.	8.4
5. <u>Sandstone</u> , silty, banded light gray and yellow (weathers to banded light gray and yellow), very fine-grained, subangular, moderately sorted, medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; very thin bedded, tabular uneven; internal appearance; laminated, parallel uneven, calcite-filled fractures. Lower contact gradational.	8.7
4. <u>Conglomerate</u> , speckled medium green and gray (weathers to speckled medium green and gray), fine-grained, subangular, poorly sorted, hard, compact and dull; (weathers hard, compact and dull), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp.	6.2
3. <u>Siltstone</u> , sandy, banded light green and gray (weathers to banded light green and gray), coarse silt sized, moderately sorted, soft, loose (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact gradational.	14.7
2. <u>Shale</u> , banded dark gray and red (weathers to banded dark gray and red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, massive, open fractures. Lower contact sharp. ...	23.0
1. <u>Sandstone</u> , uniform light reddish gray (weathers to uniform medium red), medium-grained, subrounded, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby). External appearance; thin bedded, tabular uneven; internal appearance; thin bedded, parallel uneven, open fractures.	8.0
Dockum Group Thickness.....	69.0
Total Section Thickness.....	69.0

Base of section is near base of hill and near the Permian-Triassic contact (contact is obscured by soil).

APPENDIX A (continued)

Reference no. 17Muchakooago Peak: 4 miles SE of Gail, Borden Co., Texas

Cretaceous Trinity Sands(?) (not measured):		Feet
17. <u>Sandstone</u> , mottled light gray and yellow (weathers to mottled light gray and yellow), medium-grained, subrounded, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; very thin bedded, parallel uneven. Lower contact gradational.		>0.0
Dockum Group (incomplete):		
16. <u>Sandstone</u> , silty, uniform light gray (weathers to uniform light gray), very fine-grained, subangular, poorly sorted, soft, brittle and vitreous; (weathers soft, brittle and dull; weathered surface is rough), calcareous cement. External appearance; laminated, tabular even; internal appearance; laminated, parallel even, open fractures.		6.6
15. Covered.....		4.0
14. <u>Siltstone</u> , shaly, uniform dark brownish-red (weathers to uniform dark brownish red), soft, brittle and earthy; (weathers soft, brittle and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular even; internal appearance; laminated, parallel even, open fractures. Lower contact gradational.		33.5
13. <u>Sandstone</u> , silty, spotted light gray (weathers to uniform light gray), very fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; laminated, tabular even; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.		23.6
12. <u>Shale</u> , spotted dark blue and red (weathers to spotted dark blue and red), soft, (weathers soft, weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thick bedded, massive, open fractures. Lower contact sharp and irregular.		23.5
11. <u>Sandstone</u> , uniform light gray (weathers to mottled light red and gray), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; medium bedded, massive, calcite-filled fractures. Lower contact sharp and irregular.		22.5
10. <u>Shale</u> , silty, spotted dark green and red (weathers to spotted dark green and red), soft, loose (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures.		19.5
9. Covered.....		8.0
8. <u>Sandstone</u> , uniform light yellow (weathers to uniform light yellow), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; laminated, tabular even; internal appearance; laminated, parallel even, open fractures.		20.0
7. <u>Sandstone</u> (90%), silty, uniform light yellow (weathers to uniform light yellow), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; laminated, tabular even; internal appearance; laminated, parallel even, open fractures.		22.0
7. <u>Shale</u> (10%), sandy, mottled medium gray and yellow (weathers to mottled medium gray and yellow), containing organic material or remains; soft, compact and vitreous; (weathers soft, compact and dull; weathered surface is rough). External appearance; medium bedded, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.		22.0
6. <u>Sandstone</u> , conglomeratic, uniform light yellow (weathers to uniform light yellow), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous), calcareous cement. External appearance; lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact gradational.		16.5

APPENDIX A (continued)

Reference no. 17 (continued)

	Feet
5. <u>Conglomerate</u> , sandy, spotted medium gray and brown (weathers to spotted medium gray and brown), coarse-grained, poorly sorted, medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular channel; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular.	3.2
4. <u>Sandstone</u> , clayey, banded gray and red (weathers to banded gray and red), fine-grained, subangular, poorly sorted, medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough, knobby), clay cement. External appearance; medium bedded, lenticular channel; internal appearance; laminated, parallel even. Lower contact sharp and irregular.	6.8
3. <u>Sandstone</u> , silty, uniform light gray (weathers to uniform light gray), very fine-grained, subangular, poorly sorted, soft, loose and waxy; (weathers soft, loose and waxy; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; medium bedded, massive. Lower contact gradational.	1.6
2. <u>Shale</u> , sandy, spotted dark red (weathers to spotted dark red), soft, loose and vitreous; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, massive, open fractures.	21.8
1. <u>Shale</u> , sandy, spotted dark red (weathers to spotted dark red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thick bedded, massive, open fractures.	22.0
Dockum Group Thickness.....	255.1
Total Section Thickness.....	255.1 ⁺
Base of section is near and below base of hill; not base of exposure.	

Reference no. 18

West Amarillo Creek: 9.2 miles north and 4.7 miles west of intersection of U. S. Highways 87/287 and U. S. Interstate 40 in Amarillo, Potter Co., Texas

Tertiary Ogallala Formation:

8. Sandstone, silty, banded light gray and yellow (weathers to banded light gray and yellow), very fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough). External appearance; very thin bedded, lenticular channel internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.

6.0

Tertiary Ogallala Formation(?):

7. Sandstone, conglomeratic, banded light yellow and gray (weathers to banded light yellow and gray), very fine-grained, subangular, poorly sorted, soft, friable and dull; (weathers soft, friable and dull; weathered surface is rough), clay cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular.

6.2

Dockum Group (incomplete):

6. Shale, uniform dark red (weathers to uniform dark red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth). External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact gradational.
5. Shale, mottled medium red and yellow (weathers to mottled medium red and yellow), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, massive, calcite-filled fractures. Lower contact gradational.

8.0

4.0

APPENDIX A (continued)

Reference no. 18 (continued)

	Feet
4. Sandstone, clayey, banded light red and gray (weathers to banded light red and gray), fine-grained, soft, friable and dull; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; laminated, lenticular bed; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.	2.0
3. Shale, uniform dark red (weathers to uniform dark red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures.	14.3
2. Shale, sandy, mottled medium red and yellow (weathers to mottled medium red and yellow), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact gradational.	22.0
1. Shale, spotted dark red (weathers to spotted medium purple), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures.	11.0
Dockum Group Thickness.....	61.3
Total Section Thickness.....	73.5

Reference no. 19

Sierra de la Cruz Creek: NW bluff of Sierra de la Cruz Creek, $\pm$ 2 miles SW of State Farm Road 1061, Potter Co., Texas

14. Covered.....	>0.0
Dockum Group (incomplete):	
13. Sandstone, silty, uniform light gray (weathers to uniform light gray), very fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp.	5.0
12. Shale, uniform dark red (weathers to uniform dark red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact sharp.	10.7
11. Sandstone, silty, uniform light gray (weathers to uniform light gray), very fine-grained, subangular, poorly sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact gradational.	10.5
10. Conglomerate, sandy, speckled light red and black (weathers to speckled light red and gray), very fine-grained, subangular, poorly sorted, hard, brittle and dull; (weathers hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; very thin bedded, tabular uneven; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	4.8
9. Sandstone, silty, uniform light gray (weathers to uniform medium gray), very fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.	9.7
8. Conglomerate, speckled light gray (weathers to uniform light red), very fine-grained, subrounded, poorly sorted, hard, brittle and dull; (weathers hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; thin bedded, lenticular bed; internal appearance; thin bedded, massive, open fractures. Lower contact sharp and irregular.	3.5

APPENDIX A (continued)

Reference no. 19 (continued)

	Feet
7. <u>Claystone</u> , uniform light greenish gray (weathers to uniform light greenish gray), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth). External appearance; medium bedded, tabular uneven; internal appearance; very thin bedded, with disturbed, irregular bedding. Lower contact gradational.	1.0
6. <u>Shale</u> , uniform dark red (weathers to uniform dark red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures.	8.5
5. <u>Shale</u> , silty, banded dark red (weathers to banded dark red), soft, compact and dull; (weathers soft, compact and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures. Lower contact gradational.	20.0
4. <u>Siltstone</u> , uniform light greenish gray (weathers to uniform light greenish gray), subangular, medium hard, compact and dull; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; laminated, lenticular bed; internal appearance; laminated, parallel uneven, open fractures. Lower contact sharp.	1.5
3. <u>Shale</u> , silty, mottled dark gray and red (weathers to mottled dark gray and red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact gradational.	20.5
2. <u>Shale</u> , silty, spotted medium yellow (weathers to spotted medium yellow), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth). External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, massive. Lower contact gradational.	11.0
1. <u>Shale</u> , silty, streaked medium red (weathers to streaked medium red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth). External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive.	23.0
Dockum Group Thickness (incomplete).....	129.7
Total Section Thickness.....	129.7
Base of section near base of bluff; not base of exposure.	

Reference no. 20

Harte-Mansfield Prospect: ± 10 miles NW of Mansfield Ranch House, north of Vega, Oldham Co., Texas

Dockum Group (incomplete):

5. <u>Sandstone</u> , shaly, banded medium gray and red (weathers to banded medium gray and red), fine-grained, medium hard, brittle and dull; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; laminated, lenticular bed; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational.	6.0
4. <u>Sandstone</u> (80%), silty, banded dark red (weathers to banded dark red), fine-grained, soft, brittle and dull; (weathers soft, brittle and dull; weathered surface is rough), calcareous cement. External appearance; laminated, lenticular channel; internal appearance; laminated, parallel even, open fractures. Lower contact gradational.	5.5
4. <u>Conglomerate</u> (20%), sandy, spotted light gray (weathers to spotted light gray), coarse-grained, subangular, poorly sorted, medium hard, brittle and dull; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; very thin bedded, lenticular channel; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp.	5.5

APPENDIX A (continued)

Reference no. 20 (continued)

	<u>Feet</u>
3. <u>Sandstone</u> , silty, banded medium green and gray (weathers to banded medium green and gray), fine-grained, soft, brittle, (weathers soft, brittle), calcareous cement. External appearance; laminated, lenticular channel; internal appearance; laminated, parallel even, open fractures. Lower contact sharp.	5.3
2. <u>Siltstone</u> , shaly, banded dark red (weathers to banded dark red), soft, brittle and dull; (weathers soft, brittle and dull; weathered surface is rough). External appearance; medium bedded, tabular uneven; internal appearance; medium bedded, parallel uneven, open fractures.	12.7
1. <u>Siltstone</u> (90%), sandy, banded dark red (weathers to banded dark red), soft, brittle and dull; (weathers soft, brittle and dull; weathered surface is rough). External appearance; laminated, lenticular bed; internal appearance; laminated, with planar cross-bedding, open fractures.	11.5
1. <u>Sandstone</u> (10%), silty, banded light gray and green (weathers to banded light gray and green), fine-grained, soft, brittle and dull; (weathers soft, brittle and dull). External appearance; laminated, lenticular bed; internal appearance; laminated, with planar cross-bedding, open fractures.	11.5
Dockum Group Thickness (incomplete).....	41.0
Total Section Thickness.....	41.0
Base of section; not base of exposure.	

Reference no. 21

Trujillo Creek:

Dockum Group:

14. <u>Sandstone</u> , banded light red and gray (weathers to uniform medium red), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, lenticular bed; internal appearance; very thick bedded, massive, open fractures. Lower contact gradational.	7.5
13. <u>Shale</u> , dark red (weathers to uniform dark red), soft, loose and dull; (weathers soft, loose and dull; weathered surface is smooth). External appearance; thick bedded, lenticular bed; internal appearance; thick bedded, massive, open fractures. Lower contact gradational.	4.0
12. <u>Sandstone</u> , silty, uniform light yellow (weathers to uniform light yellow), very fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby). External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	9.0
11. <u>Sandstone</u> , uniform light grayish yellow (weathers to uniform light grayish yellow), fine-grained, well sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby). External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	20.0
10. Covered.....	3.0
9. <u>Sandstone</u> , speckled dark yellow and brown (weathers to banded dark gray and brown), medium-grained, medium hard, frangible and vitreous; (weathers medium hard, frangible and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact sharp.	5.8
8. <u>Claystone</u> , uniform medium gray (weathers to uniform medium gray), soft, plastic and waxy; (weathers soft, plastic and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact sharp.	8.0

APPENDIX A (continued)

Reference no. 21 (continued)

	<u>Feet</u>
7. Sandstone, uniform medium yellow (weathers to uniform medium yellow), very fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough, knobby), ferruginous cement. External appearance; laminated, lenticular bed; internal appearance; laminated, with planar cross-bedding, open fractures. Lower contact gradational.	8.7
6. Sandstone, uniform medium yellow (weathers to uniform medium grayish yellow), fine-grained, subangular, moderately sorted, medium hard, frangible and vitreous; (weathers medium hard, frangible and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact gradational.	22.0
5. Sandstone, uniform medium yellow (weathers to uniform medium grayish yellow), fine-grained, moderately sorted, medium hard, frangible and vitreous; (weathers medium hard, frangible and dull; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact gradational.	22.0
4. Sandstone, conglomeratic, banded light white and yellow (weathers to banded light white and yellow), medium-grained, subangular, moderately sorted, containing organic material or remains; medium hard, frangible and vitreous; (weathers medium hard, frangible and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; thin bedded, massive, open fractures. Lower contact sharp and irregular.	11.0
3. Sandstone, clayey, mottled light yellow (weathers to mottled light yellow), very fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth), ferruginous cement. External appearance; thick bedded, tabular uneven; internal appearance; thick bedded, massive, open fractures. Lower contact sharp and irregular.	9.7
Dcokum Group Thickness.....	133.0
Permian(?):	
2. Shale, mottled dark brown and red (weathers to uniform dark brownish red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is smooth). External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures. Lower contact sharp.	5.5
Permian (incomplete):	
1. Sandstone, uniform medium red (weathers to uniform medium red), fine-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough, knobby), ferruginous cement. External appearance; very thin bedded, tabular even; internal appearance; very thin bedded, parallel even, open fractures.	6.5
Total Section Thickness.....	145.0
Base of section; not base of exposure.	

Reference no. 22

Good Luck Group Prospect: ± 8.5 miles NE of Ragland, Quay Co., New Mexico

Consolidated Debris:

13. Carbonate, uniform light white (weathers to uniform light grayish white), hard, compact and waxy; (weathers hard, compact and dull; weathered surface is rough). External appearance; thick bedded, tabular uneven; internal appearance; thick bedded, massive. Lower contact sharp and irregular.	4.0
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APPENDIX A (continued)

Reference no. 22 (continued)

	Feet
Dockum Group (incomplete):	
12. <u>Shale</u> , uniform dark red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, with disturbed, irregular bedding, open fractures. Lower contact sharp and irregular.	23.0
11. <u>Shale</u> , uniform dark red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, with disturbed, irregular bedding, open fractures. Lower contact sharp and irregular.	22.0
10. <u>Sandstone</u> , uniform light yellowish gray (weathers to uniform light yellowish gray), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough). External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	14.0
9. <u>Sandstone</u> (80%), uniform light yellow (weathers to uniform light grayish yellow), fine-grained, subangular, moderately sorted, containing organic material or remains; soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough, knobby). External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, with planar cross-bedding, open fractures. Lower contact sharp and irregular.	22.0
9. <u>Shale</u> (20%), banded dark red (weathers to banded dark red), subangular, soft, loose and earthy; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; laminated, parallel even, open fractures. Lower contact sharp and irregular.	22.0
8. <u>Sandstone</u> , uniform light yellowish gray (weathers to uniform light yellow), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp.	22.0
7. <u>Conglomerate</u> , spotted medium gray (weathers to spotted medium gray), containing organic material or remains; soft, brittle and dull; (weathers soft, brittle and dull; weathered surface is rough), clay cement. External appearance; medium bedded, lenticular bed; internal appearance; medium bedded, massive, open fractures. Lower contact sharp.	2.7
6. <u>Sandstone</u> , uniform light yellowish gray (weathers to banded light gray and red), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is smooth). External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact sharp.	2.0
5. <u>Shale</u> , banded medium gray (weathers to banded medium gray), medium hard, compact and waxy; (weathers medium hard, compact and dull; weathered surface is rough). External appearance; medium bedded, lenticular bed; internal appearance; laminated, parallel even, sulfate-filled fractures. Lower contact sharp and irregular.	2.8
4. <u>Sandstone</u> , silty, uniform light yellow (weathers to uniform light yellowish gray), fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; thick bedded, lenticular bed; internal appearance; medium bedded, parallel uneven, open fractures. Lower contact gradational.	17.5
3. <u>Sandstone</u> , uniform light gray (weathers to uniform light gray), fine-grained, subangular, well sorted, containing organic material or remains; soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough). External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular.	12.0

APPENDIX A (continued)

Reference no. 22 (continued)

	Feet
2. <u>Conglomerate</u> , sandy, spotted medium gray (weathers to spotted medium gray), fine-grained, subangular, moderately sorted, medium hard, brittle and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular channel; internal appearance; medium bedded, massive, open fractures. Lower contact erosional with more than one foot of relief.	3.0
1. <u>Sandstone</u> , banded dark red (weathers to banded dark red), fine-grained, moderately sorted, soft, compact and vitreous; (weathers soft, compact and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures.	2.0
Dockum Group Thickness (incomplete).....	145.0
Total Section Thickness.....	149.0
Base of section; base of exposure.	

Reference no. 23

Redonda Mesa Number 1: North end of Redonda Mesa, Quay Co., New Mexico, overlain by the Redonda Formation (not measured)

Chinle Formation (incomplete):

14. <u>Siltstone</u> (60%), clayey, mottled medium gray and red (weathers to mottled light gray and pink), medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact gradational.	37.5
14. <u>Sandstone</u> (40%), uniform medium orange (weathers to uniform medium brownish orange), fine-grained, medium hard, compact and vitreous; (weathers medium hard, compact and vitreous; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, iron oxide filled fractures. Lower contact gradational.	37.5
13. <u>Shale</u> , uniform dark red (weathers to uniform medium red), medium hard, compact and waxy; (weathers medium hard, compact and earthy; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel uneven. Lower contact sharp and irregular.	8.5
12. <u>Shale</u> , sandy, mottled dark brown and red (weathers to mottled medium gray and red), medium hard, compact and waxy; (weathers medium hard, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel uneven. Lower contact gradational.	40.0
11. <u>Shale</u> , sandy, mottled dark gray and red (weathers to banded medium gray and red), medium hard, compact and waxy; (weathers medium hard, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, with concentric layering or bedding. Lower contact gradational.	40.0
10. <u>Shale</u> , sandy, mottled dark gray and red (weathers to banded medium gray and red), medium hard, compact and waxy; (weathers medium hard, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, with concentric layering or bedding. Lower contact gradational.	40.0

APPENDIX A (continued)

Reference no. 23 (continued)

	<u>Feet</u>
9. <u>Shale</u> , sandy, mottled dark red (weathers to mottled medium red), medium hard, compact and waxy; (weathers medium hard, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel uneven. Lower contact gradational.	40.0
8. <u>Shale</u> , mottled medium gray and red (weathers to banded medium gray and red), medium hard, compact and waxy; (weathers medium hard, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel uneven. Lower contact gradational.	40.0
7. <u>Shale</u> , conglomeratic, mottled dark gray and red (weathers to streaked medium gray and red), medium hard, compact and waxy; (weathers medium hard, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive. Lower contact gradational.	14.3
6. <u>Shale</u> , silty, uniform dark red (weathers to uniform dark red); medium hard, compact and waxy; (weathers medium hard, loose and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded; tabular uneven; internal appearance; thin bedded, massive. Lower contact gradational.	15.0
5. <u>Siltstone</u> , shaly, spotted dark gray and red (weathers to spotted medium red); medium hard; compact and vitreous; (weathers medium hard, loose and earthy), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel even. Lower contact sharp and irregular.	40.0
4. <u>Sandstone</u> , streaked medium red and gray (weathers to streaked medium red and gray), fine-grained, subangular, medium hard, brittle and vitreous; (weathers medium hard, brittle and vitreous; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; laminated; parallel uneven. Lower contact sharp and irregular.	1.7
3. <u>Shale</u> , silty, banded dark gray and red (weathers to mottled medium red); sub-angular, medium hard, compact and waxy; (weathers medium hard, loose and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, massive; open fractures. Lower contact sharp and irregular.	14.0
2. <u>Siltstone</u> (80%), shaly, mottled dark red (weathers to banded medium red), soft; compact and waxy; (weathers soft, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp and irregular.	20.0
2. <u>Sandstone</u> (20%), uniform medium grayish red (weathers to uniform medium brownish red), fine-grained, subangular, medium hard, brittle and vitreous; (weathers medium hard, brittle and vitreous; weathered surface is smooth), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; laminated; parallel uneven. Lower contact sharp and irregular.	20.0
1. <u>Sandstone</u> , uniform dark brownish red (weathers to spotted medium black and red), fine-grained, subangular, medium hard, compact and waxy; (weathers medium hard; brittle and vitreous; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven.	5.0
Chinle Formation Thickness (incomplete)	356.0
Total Section Thickness	356.0
Base of section at base of hill; near base of exposure.	

APPENDIX A (continued)

Reference no. 24Redonda Mesa Number 2: ± 1.5 miles southeast of Redonda Mesa No. 1.

Cretaceous Beds (not measured):		<u>Feet</u>
25. <u>Conglomerate</u> , sandy, speckled light green and gray (weathers to speckled medium orange and gray), very coarse-grained, subangular, poorly sorted, medium hard, brittle and earthy; (weathers medium hard, brittle and vitreous; weathered surface is rough, knobby), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; medium bedded, parallel uneven. Lower contact sharp and irregular.		>0.0
Jurassic Entrada Formation(?):		
24. <u>Shale</u> , silty, mottled medium green and red (weathers to mottled medium gray and red), soft, plastic and waxy; (weathers soft, brittle and earthy; weathered surface is rough), clay cement. External appearance; very thick bedded, tabular uneven; internal appearance; laminated, parallel uneven. Lower contact gradational.		22.7
23. <u>Sandstone</u> , uniform light grayish yellow (weathers to uniform light yellow), fine-grained, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel uneven, calcite-filled fractures. Lower contact gradational.		5.7
22. <u>Siltstone</u> , uniform medium red (weathers to uniform medium red), soft, compact and vitreous; (weathers soft, brittle and earthy; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel uneven. Lower contact gradational.		4.0
21. <u>Sandstone</u> , silty, uniform dark yellow (weathers to streaked medium gray and yellow), very fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thick bedded, massive. Lower contact sharp and irregular.		31.5
20. <u>Sandstone</u> , uniform light gray (weathers to mottled light red and gray), fine-grained, moderately sorted, medium hard, compact and vitreous; (weathers medium hard, brittle and dull; weathered surface is smooth), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; thin bedded, parallel uneven. Lower contact gradational.		2.5
19. <u>Siltstone</u> , sandy, mottled medium gray and red (weathers to mottled medium gray and red), fine-grained, medium hard, compact and vitreous; (weathers medium hard, compact and dull; weathered surface is smooth), clay cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel uneven. Lower contact gradational.		8.0
18. <u>Sandstone</u> , uniform light yellowish gray (weathers to streaked light yellow and gray), fine-grained, soft, friable and vitreous; (weathers soft, compact and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven.		20.0
17. <u>Sandstone</u> , uniform light grayish yellow (weathers to streaked light gray and yellow), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, compact and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven.		25.2
16. <u>Siltstone</u> , sandy, uniform light grayish yellow (weathers to streaked light gray and yellow), coarse silt sized, moderately sorted, soft, friable and vitreous; (weathers soft, compact and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; medium bedded, parallel uneven.		26.0
15. Covered.....		8.0
14. <u>Siltstone</u> , sandy, uniform light yellowish gray (weathers to streaked light yellow and gray), coarse silt sized, poorly sorted, soft, friable and vitreous; (weathers soft, compact and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; medium bedded, parallel uneven.		7.0
13. Covered.....		3.3
Entrada Formation(?) Thickness.....		163.9

APPENDIX A (continued)

Reference no. 24 (continued)

Triassic Redonda Formation:	Feet
12. <u>Siltstone</u> , sandy, uniform light gray (weathers to streaked light yellow and gray), coarse silt sized, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, compact and dull; weathered surface is smooth), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; medium bedded, massive.	2.5
11. <u>Sandstone</u> , silty, uniform light gray (weathers to streaked light yellow and gray), very fine-grained, subangular, poorly sorted, soft, friable and vitreous; (weathers soft, compact and dull; weathered surface is smooth), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thick bedded, massive. Lower contact erosional with more than one foot of relief.	17.0
10. <u>Shale</u> , sandy, speckled medium red (weathers to streaked medium red), soft, compact and waxy; (weathers soft, loose and earthy; weathered surface is rough). External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel uneven, sulfate-filled fractures. Lower contact sharp and irregular.	7.5
9. <u>Sandstone</u> , mottled medium red and gray (weathers to mottled medium red and gray), fine-grained, medium hard, brittle and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; thin bedded, parallel uneven. Lower contact gradational.	11.5
8. <u>Sandstone</u> , shaly, mottled medium gray and red (weathers to mottled medium gray and red), fine-grained, medium hard, compact and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact gradational.	9.5
7. <u>Sandstone</u> , calcareous, speckled light white and gray (weathers to mottled medium black and gray), very fine-grained, subangular, poorly sorted, hard, brittle and vitreous; (weathers hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; thick bedded, massive, calcite-filled fractures. Lower contact sharp and irregular.	10.0
6. <u>Sandstone</u> , streaked dark gray and red (weathers to mottled medium gray and red), fine-grained, moderately sorted, medium hard, brittle and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp and irregular.	13.0
5. <u>Sandstone</u> , uniform light gray (weathers to mottled light black and gray), fine-grained, medium hard, brittle and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, tabular uneven; internal appearance; medium bedded, massive.	2.2
4. Covered.....	5.0
3. <u>Sandstone</u> , uniform light greenish gray (weathers to uniform light gray), fine-grained, medium hard, brittle and vitreous; (weathers medium hard, brittle and dull; weathered surface is smooth), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp and irregular.	4.7
2. <u>Sandstone</u> (70%), calcareous, streaked light green and gray (weathers to mottled medium green and gray), fine-grained, subangular, medium hard, brittle and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, with ripple marks; calcite-filled fractures. Lower contact sharp and irregular.	6.6
2. <u>Shale</u> (30%), calcareous, uniform medium green (weathers to uniform medium green), soft, compact and waxy; (weathers soft, compact and dull; weathered surface is smooth), calcareous cement. External appearance; thin bedded, tabular uneven; internal appearance; laminated, parallel uneven. Lower contact sharp and irregular.	6.6
1. <u>Carbonate</u> , sandy, uniform light grayish white (weathers to mottled light brown and gray), hard, brittle and vitreous; (weathers hard, brittle and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, tabular even; internal appearance; very thin bedded, parallel uneven. Lower contact sharp.	0.0

APPENDIX A (continued)

Reference no. 24 (continued)

	Feet
Redonda Formation Thickness.....	96.5
Total Section Thickness.....	260.4 ⁺
Base of section; not base of exposure. Underlain by Chinle Formation. Section offset from S001759.	

Reference no. 25

Hoot Owl Draw: ± 13.5 miles west and 1.25 miles north of Elida, Chaves Co., New Mexico

Tertiary Ogallala Formation:

20. Carbonate, uniform light white (weathers to spotted light gray and white), sub-angular, medium hard, brittle and dull; (weathers medium hard, brittle and dull; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; thick bedded, massive. 17.1

19. Covered..... 33.0

Triassic:

18. Sandstone, uniform medium yellow (weathers to uniform medium yellow), fine-grained, subangular, moderately sorted, containing organic material or remains; soft, friable; (weathers soft, friable; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular. 30.0
17. Conglomerate, sandy, spotted medium red and gray (weathers to spotted medium red and gray), medium-grained, poorly sorted, hard, compact and vitreous; (weathers hard, compact and dull; weathered surface is rough). External appearance; thick bedded, tabular uneven; internal appearance; medium bedded, parallel uneven, open fractures. Lower contact sharp and irregular. 31.0
16. Sandstone, banded light gray and red (weathers to banded light gray and red), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; very thin bedded, tabular uneven; internal appearance; very thin bedded, parallel even, open fractures. Lower contact gradational. 8.0
15. Sandstone, uniform light grayish red (weathers to uniform light grayish red), fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough). External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact sharp and irregular. 33.7
14. Sandstone, banded dark red (weathers to banded dark red), fine-grained, moderately sorted, soft, friable (weathers soft, friable; weathered surface is rough). External appearance; very thin bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact gradational. 29.4
13. Sandstone, uniform medium grayish red (weathers to uniform medium grayish red), fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth). External appearance; thin bedded, lenticular bed; internal appearance; thin bedded, parallel even, open fractures. Lower contact gradational. 23.0
12. Shale, uniform dark purplish brown (weathers to uniform medium purple), soft, loose and earthy; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures. Lower contact gradational. 9.8
11. Siltstone, sandy, banded dark brown and red (weathers to uniform dark brownish red), soft, loose and earthy; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact gradational. 11.0

APPENDIX A (continued)

Reference no. 25 (continued)

	Feet
10. <u>Shale</u> , banded dark red (weathers to banded dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough). External appearance; very thick bedded, irregular shape; internal appearance; very thin bedded with disturbed, irregular bedding, open fractures. Lower contact gradational.	19.5
9. <u>Shale</u> , uniform dark red (weathers to uniform dark red), soft, loose and waxy; (weathers soft, loose and dull; weathered surface is rough). External appearance; very thick bedded, irregular shape; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures.	22.0
8. Covered.....	2.5
7. <u>Sandstone</u> , uniform medium red (weathers to uniform medium red), fine-grained, well sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough). External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, calcite-filled fractures. Lower contact gradational.	8.5
6. <u>Sandstone</u> (80%), banded medium red (weathers to banded medium red), fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact gradational.	16.5
6. <u>Conglomerate</u> (20%), spotted dark gray and red (weathers to spotted dark gray and red), soft, frangible and dull; (weathers soft, frangible and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; medium bedded, massive, open fractures. Lower contact sharp and irregular.	16.5
5. <u>Shale</u> (70%), banded dark gray and red (weathers to banded dark gray and red), soft, compact and earthy; (weathers soft, compact and dull; weathered surface is rough), calcareous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, with disturbed, irregular bedding, open fractures. Lower contact sharp and irregular.	24.0
5. <u>Sandstone</u> (30%), banded medium red (weathers to banded medium red), fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular.	24.0
4. <u>Sandstone</u> , silty, uniform medium red (weathers to uniform medium red), very fine-grained, subangular, poorly sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; very thin bedded, tabular uneven; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular.	13.5
3. <u>Siltstone</u> , shaly, uniform dark red (weathers to uniform dark red), soft, loose (weathers soft, loose and dull; weathered surface is smooth), calcareous cement. External appearance; laminated, tabular uneven; internal appearance; laminated, parallel even, open fractures. Lower contact gradational.	10.0
2. Covered.....	2.0
1. <u>Sandstone</u> , banded dark gray and red (weathers to banded dark gray and red), very fine-grained, moderately sorted, soft, loose and earthy; (weathers soft, loose and dull; weathered surface is rough), calcareous cement. External appearance; laminated, tabular uneven; internal appearance; laminated, parallel uneven, open fractures.	5.5
Dockum Group Thickness (incomplete).....	299.9
Total Section Thickness.....	350.0
Base of section; base of exposure.	

APPENDIX A (continued)

Reference no. 26

Haystack Mountain: ± 30 miles NE of Roswell, Chaves Co., New Mexico, 5 miles north of U. S. Highway 70 and 0.5 miles east of Haystack Mountain

	<u>Feet</u>
10. Ogallala Formation (not sampled).....	8.5
Dockum Group (incomplete):	
9. <u>Sandstone</u> , uniform light yellow (weathers to uniform light yellowish gray), fine-grained, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact gradational.	15.0
8. <u>Sandstone</u> , uniform medium yellow (weathers to uniform medium yellowish green), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is smooth), ferruginous cement. External appearance; medium bedded, lenticular bed; internal appearance; very thin bedded, parallel even, open fractures. Lower contact gradational.	15.5
7. <u>Sandstone</u> , silty, uniform medium grayish yellow (weathers to uniform medium yellowish brown), very fine-grained, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	22.0
6. <u>Conglomerate</u> , sandy, spotted medium gray (weathers to spotted medium gray), fine-grained, subangular, moderately sorted, soft, frangible and vitreous; (weathers soft, frangible and dull; weathered surface is rough), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular.	10.0
5. <u>Sandstone</u> , silty, uniform medium yellow (weathers to uniform medium yellow), very fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact gradational.	16.0
4. <u>Sandstone</u> , uniform medium red (weathers to uniform medium red), fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, friable and vitreous; weathered surface is rough), calcareous cement. External appearance; very thin bedded, lenticular bed; internal appearance; very thin bedded, with trough-shaped cross-bedding, open fractures. Lower contact sharp and irregular.	13.0
3. <u>Shale</u> (50%), silty, banded dark gray and red (weathers to banded dark gray and red), soft, (weathers soft; weathered surface is rough). External appearance; very thin bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp.	11.0
3. <u>Sandstone</u> (40%), spotted dark red (weathers to spotted dark red), fine-grained, subangular, well sorted, medium hard, brittle and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), ferruginous cement. External appearance; thick bedded, lenticular bed; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact gradational.	11.0
2. <u>Siltstone</u> , uniform medium red (weathers to uniform medium red), medium hard, brittle and vitreous; (weathers medium hard, brittle and dull), calcareous cement. External appearance; very thin bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp.	3.0
1. <u>Shale</u> , silty, banded dark gray and red (weathers to banded dark gray and red), soft, frangible and dull; (weathers soft, frangible and dull; weathered surface is rough), calcareous cement. External appearance; very thin bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures.	10.0
Dockum Group Thickness.....	115.5
Total Section Thickness.....	124.0
Base of section; not base of exposure.	

APPENDIX A (continued)

Reference no. 27

Maroon Cliffs: $\pm$ 22.5 miles NE of Carlsbad, Eddy Co., New Mexico, south of U. S.
Highway 62/180.

	Feet
12. Covered (not measured).....	0.0
Dockum Group (incomplete):	
11. <u>Sandstone</u> , speckled medium gray and red (weathers to mottled medium gray and red), fine-grained, subangular, moderately sorted, medium hard, friable and vitreous; (weathers medium hard, compact and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, with planar cross-bedding.	10.0
10. Covered.....	10.0
9. <u>Sandstone</u> , speckled medium brown and red (weathers to mottled medium black and red), fine-grained, subangular, moderately sorted, medium hard, friable and vitreous; (weathers medium hard, compact and earthy; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp and irregular.	11.8
8. <u>Sandstone</u> , silty, mottled medium green and red (weathers to mottled light gray and red), very fine-grained, subangular, poorly sorted, medium hard, friable and vitreous; (weathers medium hard, compact and earthy; weathered surface is rough, knobby), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven. Lower contact sharp and irregular.	3.5
7. <u>Siltstone</u> , shaly, uniform medium brownish red (weathers to speckled medium brown and red), subangular, medium hard, compact and waxy; (weathers medium hard, compact and earthy; weathered surface is rough, knobby), clay cement. External appearance; medium bedded, tabular uneven; internal appearance; medium bedded, massive.	1.7
6. Covered.....	8.8
5. <u>Sandstone</u> , silty, uniform light gray (weathers to streaked light brown and gray), very fine-grained, subangular, moderately sorted, soft, friable and vitreous; (weathers soft, brittle and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; very thin bedded, parallel uneven, open fractures. Lower contact sharp and irregular.	4.6
4. <u>Siltstone</u> , sandy, banded medium gray and red (weathers to banded medium gray and red), medium hard, compact and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), clay cement. External appearance; tabular uneven; internal appearance; laminated, parallel uneven.	8.7
3. <u>Sandstone</u> , speckled medium red (weathers to streaked medium black and red), fine-grained, subangular, well sorted, soft, friable and vitreous; (weathers soft, friable and dull; weathered surface is rough), calcareous cement. External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel uneven, open fractures. Lower contact gradational.	6.2
2. <u>Sandstone</u> , speckled medium green and red (weathers to mottled light gray and red), fine-grained, subangular, moderately sorted, medium hard, friable and vitreous; (weathers medium hard, brittle and dull; weathered surface is rough), calcareous cement. External appearance; very thick bedded, tabular uneven; internal appearance; very thin bedded, massive, open fractures. Lower contact sharp and irregular.	21.2
1. <u>Siltstone</u> , shaly, streaked medium gray and red (weathers to streaked medium gray and red), medium hard, compact and waxy; (weathers medium hard, brittle and earthy; weathered surface is rough). External appearance; thick bedded, tabular uneven; internal appearance; laminated, parallel uneven.	4.0
Dockum Group Thickness (incomplete).....	90.5
Total Section Thickness.....	90.5
Base of section; not base of exposure.	

APPENDIX B

THIN-SECTION ANALYSES (PERCENT BY VOLUME)

(Samples analyzed are predominantly
sandstone and conglomerate)

Mineral Abbreviations

BIO	- Biotite
CCD	- Calcite-Dolomite
CRB	- Carbonate Clast
CHT	- Chert
CHL	- Chlorite
CLY	- Clay
CYC	- Clay Cast
FOS	- Fossil
KSP	- K-Spar
MUS	- Muscovite
PLG	- Plagioclase
QTZ	- Quartz
QZC	- Composite Quartz
RPLU	- Rock Fragments (plutonic)
RSED	- Rock Fragments (sedimentary)
ZEO	- Zeolite
ZIR	- Zircon
RMET	- Rock Fragments (metamorphic)
CHA	- Chalcedony
OOL	- Oolites
GPST	- Grapestone
OPQ	- Opaques
TRM	- Tourmaline
CBA	- Cement-Barite
CCA	- Cement-Carbonate
CCL	- Cement-Clay
CFE	- Cement-Ferruginous
CSI	- Cement-Silica
GRN	- Garnet

THIN-SECTION ANALYSIS

[illegible][illegible]

APPENDIX B (continued)

Reference no. 3

Strat.	Unit	% of	Sample	BIO	CCD	CRB	CHT	CHL	CLY	CYC	FOS	KSP	MUS	PLG	QTZ	QZC	RPLU	RSED	ZEO	ZIR	RMET	CHA	OOL	GPST	OPQ	TRM	CBA	CCA	CCL	CFE	CSI	GRN
	No.	Unit	Number	1	2	3	4	5	6	7	9	12	14	16	17	18	19	20	25	26	27	28	29	30	32	33	35	36	37	39	40	41
18	100	10133					4					5		1	30	10		8				tr						27				
17	100	0																														
16	100	10132																														
15	0	0																														
14	100	10131																														
13	100	10130																														
12	100	10129													50													25	17	8		
11	100	10128								2		tr		tr	63						tr							15	12	9		
10	100	10127					1					1			96	1					tr											
9	100	10126					tr				tr	1		tr	45	2					tr								47	4		
8	100	10125			20		1					1			30	2		5										35				
7	100	10124					tr				tr	1		tr	80						tr				tr				18			
6	100	10123					2					4		tr	91	2					tr											
5	100	0																														
4	100	10122																														
3	100	10121																														
2	100	10120					2			1		1	tr	tr	73	1					tr	1							20			
1	100	10119					tr					1	1	tr	72	2													15	8		

Reference no. 4

[illegible]

APPENDIX B (continued)

Reference no. 4 (continued)

Strat.	Unit	% of	Sample	BIO	CCD	CRB	CHT	CHL	CLY	CYC	FOS	KSP	MUS.	PLG	QTZ	QZC	RPLU	RSED	ZEG	ZIR	RMET	CHA	OOL	GPST	OPQ	TRM	CBA	CCA	CCL	CFE	CSI	GRN
	No.	Unit	Number	1	2	3	4	5	6	7	9	12	14	16	17	18	19	20	25	26	27	28	29	30	32	33	35	36	37	39	40	41
	4	55	10137																													
	4	45	10136																													
	3	100	0																													
	2	100	10135				tr					tr			50	tr									1			30	9			
	1	100	10134		5										10													12			72	

Reference no. 5

[illegible]

Reference no. 6

[illegible]

APPENDIX B (continued)

Reference no. 6 (continued)

47

Reference no. 7

18	100	10854			1				4	tr	tr	36	3			tr	tr		tr		55	
17	100	0																				
16	100	10223																				
15	100	0																				
14	100	10222	1		1				10	1	7	55	9		2			tr		tr	12	1
13	100	0																				
12	100	10221																				
11	100	0																				
10	100	10220		tr	1	3	tr	1	4	1	2	64	4		4			tr			15	
9	100	0																				
8	100	10219			7	2		1	3	1	tr	30	1		5						45	3
7	100	10218																				
6	100	10217			6	1			4	2		38	7		1			tr			40	
5	100	10216	1			3		1	7	2	3	55	8				1	1		1	15	1
4	100	10215	tr		3	2		1	5	2	3	55	4		3			1			20	
3	100	10214				3		1	12	1	2	54	22			tr		4				
2	100	10213	tr			4			4		1	74	6				tr				10	tr
1	100	10212	1		5	tr			20	1	10	50	4		6			2				

APPENDIX B (continued)

Reference no. 8

[illegible]

Reference no. 9

[illegible]

APPENDIX B (continued)

Reference no. 10

Strat.	Unit	% of	Sample	BIO	CCD	CRB	CHT	CHL	CLY	CYC	FOS	KSP	MUS	PLG	QTZ	QZC	RPLU	RSED	ZED	ZIR	RMET	CHA	OOL	GPST	OPQ	TRM	CBA	CCA	CCL	CFE	CSI	GRN
No.	Unit	Unit	Number	1	2	3	4	5	6	7	9	12	14	16	17	18	19	20	25	26	27	28	29	30	32	33	35	36	37	39	40	41
3	100	10251										4	2	2	55	2		4			1											
2	100	10250				20	tr					6	tr		28	28	1	5										16	7			
1	100	10249																										17	4			

Reference no. 11

[illegible]

Reference no. 12

[illegible]

Reference no. 13

6	100	10271	15	5	1	1	1	19	7	50
5	100	10270								

APPENDIX B (continued)

Reference no. 13 (continued)

Strat.	Unit	% of	Sample	BIO	CCD	CRB	CHT	CHL	CLY	CYC	FOS	KSP	MUS	PLG	QTZ	QZC	RPLU	RSED	ZEO	ZIR	RMET	CHA	OOL	GPST	OPQ	TRM	CBA	CCA	CCL	CFE	CSI	GRN
No.	Unit	Unit	Number	1	2	3	4	5	6	7	9	12	14	16	17	18	19	20	25	26	27	28	29	30	32	33	35	36	37	39	40	41
4	100		10269																													
3	100		10268																													
2	100		10267																													
1	70		10266																													
1	30		10265																													

Reference no. 14

9	100		10281			25	4					4	tr	2	34	5					tr	tr				tr					25
8	100		10280																												
7	100		10279																												
6	100		10278																												
5	100		10277																												
4	100		10276																												
3	100		10275																												
2	85		10274																												
2	15		10273	tr			1	tr				3	1	1	38	1		2			tr							30	22		
1	100		10272																												

Reference no. 15

6	100		10286																												
5	100		10285				15					tr			53	15					1						tr		15		
4	100		10284																												
3	100		0																												
2	100		10283																												
1	100		10282																												

Reference no. 16

6	100		10292				10								50	12					2				tr		10		15		
5	100		10291	2				2		3		4	4	2	60	5					1							16			

APPENDIX B (continued)

Reference no. 16 (continued).

[illegible]

Reference no. 17

[illegible]

Reference no. 18

8	100	10596
7	100	10595
6	100	10594
5	100	10593

APPENDIX B (continued)

Reference no. 18 (continued)

Strat.	Unit	% of	Sample	BIO	CCD	CRB	CHT	CHL	CLY	CYC	FOS	KSP	MUS	PLG	QTZ	QZC	RPLU	RSED	ZEO	ZIR	RMET	CHA	OOL	GPST	OPQ	TRM	CBA	CCA	CCL	CFE	CSI	GRN
No.	Unit	Unit	Number	1	2	3	4	5	6	7	9	12	14	16	17	18	19	20	25	26	27	28	29	30	32	33	35	36	37	39	40	41
4	100	10592																														
3	100	10591																														
2	100	10590																														
1	100	10589																														

Reference no. 19

14	0	0																														
13	100	10609				1	2					8	1	1	61	5										tr	18	2				
12	100	10608																														
11	100	10607	tr			2	1					7	1	1	62	3										tr	20	2				
10	100	10606				75						tr		tr	8				1	tr							12			3		
9	100	10605				6	2					8	tr	1	62	5											15					
8	100	10604				68				2		1		tr	10			3									15					
7	100	10603																														
6	100	10602																														
5	100	10601																														
4	100	10600					1					4	1	1	38					1					3		50					
3	100	10599																														
2	100	10598																														
1	100	10597																														

Reference no 20

5	100	10616																														
4	20	10615										2	tr	tr	15	tr												12			3	
4	80	10614																														
3	100	10613																														
2	100	10612																														
1	10	10611																														
1	90	10610																														

APPENDIX B (continued)

Reference no. 21

53

Reference no. 22

[illegible]

APPENDIX B (continued)

Reference no. 23

Strat.	Unit	% of	Sample	BIO	CCD	CRB	CHT	CHL	CLY	CYC	FOS	KSP	MUS	PLG	QTZ	QZC	RPLU	RSED	ZEO	ZIR	RMET	CHA	OOL	GPST	OPQ	TRM	CBA	CCA	CCL	CFE	CSI	GRN
No.	Unit	Unit	Number	1	2	3	4	5	6	7	9	12	14	16	17	18	19	20	25	26	27	28	29	30	32	33	35	36	37	39	40	41
14	40	10732																														
14	60	10731																														
13	100	10730																														
12	100	10729																														
11	100	10728																														
10	100	10727																														
9	100	10726																														
8	100	10725																														
7	100	10724																														
6	100	10723																														
5	100	10722																														
4	100	10721	1				tr					2	2	2	20	tr								1				36	35			
3	100	10720	tr				1	tr				3	1	1	53	1												15	5	15		
2	20	10719	tr				2	tr		3		5	2	3	53	2					1							18		10		
2	80	10718																														
1	100	10717	tr				2	tr				4	tr	1	48	1								3				15	10	15		

Reference no. 24

25	0	10755					7	tr				9		1	72	8															1	1
24	100	10754																														
23	100	10753																														
22	100	10752																														
21	100	10751																														
20	100	10750																														
19	0	10749																														
18	100	10748																														
17	100	10747					1			1		4		1	64													27		1		
16	100	10746																														
15	0	0																														
14	0	10745																														
13	0	0																														
12	100	10744										1		tr	41																55	2
11	100	10743										1		tr	25																73	tr
10	100	10742																														

APPENDIX B (continued)

Reference no. 24 (continued)

[illegible]

Reference no. 25

[illegible]

Reference no. 26

[illegible]

APPENDIX B (continued)

Reference no. 27

Strat. Unit No.	% of Unit	Sample Number	BIO 1	CCD 2	CRB 3	CHT 4	CHL 5	CLY 6	CYC 7	FOS 9	KSP 12	MUS 14	PLG 16	QTZ 17	QZC 18	RPLU 19	RSED 20	ZEO 25	ZIR 26	RMET 27	CHA 28	OOL 29	GPST 30	OPQ 32	TRM 33	CBA 35	CCA 36	CCL 37	CFE 39	CSI 40	GRN 41
12	0	0																													
11	100	10793				9			1		7	tr	1	57	6		1			3							10		4		
10	100	0																													
9	100	10792				12					6	1	1	56	6												8		4	5	
8	100	10791				8			2		7		1	48	6		2			1							17	7			
7	100	10790				8					4	tr	1	35	2												48	1	tr		
6	0	0																													
5	100	10789				5			1		5		3	54	5		1			2							8	15			
4	100	10788																													
3	100	10787	tr			7					8	tr	1	49	8		5			3	tr						8	2	8		
2	100	10786				7					6		2	49	6		1			1							18	tr	9		
1	100	10785																													

APPENDIX C

GAMMA-RAY SPECTROMETRIC ANALYSIS

(Samples analyzed for uranium, thorium, and potassium)

APPENDIX C

GAMMA-RAY SPECTROMETRIC ANALYSIS

Reference no. 1

<u>Strat. Unit No.</u>	<u>Percent of Unit</u>	<u>Sample Number</u>	<u>U PPM</u>	<u>TH PPM</u>	<u>U/TH</u>	<u>K Percent</u>	<u>U/K X10000</u>	<u>TH/K X10000</u>
16	100	10108	2.5	7.2	0.35	1.35	1.86	5.36
15	100	10107	2.5	8.4	0.29	1.64	1.51	5.15
14	100	10106	4.1	4.1	1.00	0.63	6.46	6.43
13	15	10105	4.5	3.6	1.25	0.48	9.31	7.48
13	85	10104	6.1	11.1	0.55	1.94	3.15	5.70
12	100	10103	2.9	9.9	0.29	1.75	1.65	5.63
11	100	10102	1.8	6.4	0.28	1.23	1.46	5.24
10	100	10101	2.7	4.2	0.64	1.10	2.41	3.77
9	100	10100	1.3	4.7	0.27	0.73	1.75	6.41
8	100	10099	2.5	11.9	0.21	1.65	1.54	7.19
7	100	10098	2.0	12.9	0.15	2.05	0.97	6.30
6	100	10097	1.3	4.7	0.29	0.72	1.85	6.46
5	100	10096	1.0	3.9	0.26	0.45	2.22	8.58
4	100	10095	1.9	11.0	0.17	0.37	5.08	29.81
3	100	10094	2.6	14.1	0.19	0.18	14.67	78.44
2	100	10093	3.0	6.8	0.43	0.61	4.85	11.21
1	20	10092	3.0	5.6	0.54	1.68	1.80	3.30
1	80	10091	0.9	8.1	0.12	1.60	0.59	5.06

Reference no. 2

11	100	10118	8.1	2.1	3.90	.47	17.19	4.40
10	0	0						
9	100	10117	6.0	5.9	1.02	.72	8.39	8.19
8	100	10116	6.2	9.5	0.65	1.80	3.46	5.29
7	100	10115	12.0	7.4	1.63	1.12	10.73	6.58
6	100	10114	2.7	10.6	0.26	1.96	1.38	5.41
5	100	10113	1.5	8.4	0.18	1.50	1.00	5.59
4	100	10112	2.7	11.9	0.22	2.35	1.13	5.08
3	100	10111	2.7	11.8	0.23	2.41	1.13	4.88
2	100	10110	2.3	8.0	0.29	1.57	1.50	5.10
1	100	10109	2.5	9.0	0.27	1.44	1.70	6.24

Reference no. 3

18	100	10133	0.4	1.3	0.31	0.55	0.73	2.36
17	100	0						
16	100	10132	0.1	1.9	0.04	0.65	0.11	2.88
15	0	0						

APPENDIX C (continued)

Reference no. 3 (continued)

<u>Strat.</u> <u>Unit No.</u>	<u>Percent</u> <u>of Unit</u>	<u>Sample</u> <u>Number</u>	<u>U</u> <u>PPM</u>	<u>TH</u> <u>PPM</u>	<u>U/TH</u>	<u>K</u> <u>Percent</u>	<u>U/K</u> <u>X10000</u>	<u>TH/K</u> <u>X10000</u>
14	100	10131	2.8	3.3	0.83	.72	3.83	4.64
13	100	10130	2.6	8.7	0.30	1.55	1.66	5.59
12	100	10129	2.3	10.1	0.22	1.69	1.33	5.97
11	100	10128	2.3	8.3	0.28	1.32	1.77	6.26
10	100	10127	1.9	3.6	0.53	1.01	1.91	3.58
9	100	10126	2.0	6.5	0.30	1.04	1.88	6.26
8	100	10125	1.0	1.4	0.73	0.39	2.59	3.54
7	100	10124	2.1	6.4	0.34	0.63	3.40	10.10
6	100	10123	1.4	2.8	0.51	0.52	2.71	5.31
5	100	0						
4	100	10122	13.9	13.4	1.03	1.71	8.10	7.85
3	100	10121	1.1	2.0	0.57	0.21	5.38	9.38
2	100	10120	3.4	5.4	0.63	0.61	5.62	8.89
1	100	10119	3.7	4.7	0.79	1.80	2.05	2.58

Reference no. 4

17	100	10148	1.2	3.3	0.36	.66	1.85	5.08
16	100	10147	2.4	11.4	0.21	2.28	1.04	5.00
15	100	10146	8.8	10.4	0.85	1.73	5.09	5.99
14	100	0						
13	100	10145	4.9	4.1	1.21	1.14	4.32	3.58
12	100	10144	2.0	3.2	0.63	0.93	2.19	3.47
11	100	10143	2.1	4.7	0.44	0.44	4.75	10.68
10	100	10142	84.4	9.0	9.40	0.77	109.61	11.66
9	100	10141	7.1	2.3	3.03	0.86	8.23	2.72
8	100	0						
7	100	10140	5.9	2.2	2.74	0.61	9.69	3.54
6	100	10139	1.6	1.2	1.36	0.29	5.48	4.03
5	100	10138	6.6	6.8	0.98	1.39	4.75	4.86
4	55	10137	2.1	4.9	0.42	1.42	1.45	3.43
4	45	10136	2.8	11.0	0.26	2.84	1.00	3.88
3	100	0						
2	100	10135	3.2	12.3	0.26	2.92	1.08	4.20
1	100	10134	1.8	9.8	0.18	2.81	0.63	3.47

Reference no. 5

15	100	10163	3.6	4.3	0.84	0.93	3.83	4.58
14	100	10162	3.7	11.1	0.33	2.75	1.34	4.05
13	100	0						
12	100	10161	2.2	5.7	0.39	1.29	1.74	4.45
11	100	10160	4.2	3.7	1.12	1.14	3.65	3.27
10	100	10159	2.8	7.8	0.36	1.36	2.04	5.71

APPENDIX C (continued)

Reference no. 5 (continued)

<u>Strat.</u> <u>Unit No.</u>	<u>Percent</u> <u>of Unit</u>	<u>Sample</u> <u>Number</u>	<u>U</u> <u>PPM</u>	<u>TH</u> <u>PPM</u>	<u>U/TH</u>	<u>K</u> <u>Percent</u>	<u>U/K</u> <u>X10000</u>	<u>TH/K</u> <u>X10000</u>
9	100	10158	4.7	7.2	.65	1.60	2.94	4.51
8	100	10157	2.3	11.9	.20	2.81	.83	4.25
7	100	10156	2.8	12.9	.21	2.48	1.12	5.22
6	100	10155	3.1	12.7	.24	2.36	1.31	5.38
5	40	10154	3.5	10.6	.33	1.82	1.93	5.82
5	60	10153	1.2	11.4	.11	2.11	.57	5.39
4	100	10152	2.7	8.3	.32	1.34	1.99	6.16
3	100	10151	2.7	11.3	.24	2.06	1.30	5.50
2	100	10150	1.9	5.4	.34	.89	2.08	6.09
1	100	10149	2.5	11.0	.22	2.04	1.21	5.40

Reference no. 6

18	100	10187	1.0	2.6	.40	.64	1.61	4.03
17	100	10186	3.3	10.5	.32	1.91	1.74	5.49
16	100	10185	2.7	10.0	.27	1.67	1.62	5.99
15	100	10184	2.4	10.9	.22	1.86	1.31	5.88
14	100	10183	2.2	10.7	.21	1.88	1.18	5.71
13	100	10182	1.8	10.9	.16	2.12	.83	5.14
12	100	10181	2.2	8.4	.26	1.87	1.19	4.52
11	100	10180	2.2	9.8	.23	1.43	1.55	6.86
10	100	10179	3.0	6.8	.45	1.31	2.33	5.21
9	100	10178	1.8	10.9	.17	2.16	.85	5.02
8	100	10177	1.0	4.4	.23	.70	1.41	6.24
7	100	10176	3.0	15.4	.19	2.99	.99	5.14
6	100	10175	2.7	8.5	.32	1.34	2.04	6.35
5	100	10174	2.4	12.3	.20	2.62	.92	4.70
4	100	10173	2.1	12.4	.17	2.55	.84	4.85
3	100	10172	.9	4.4	.21	.06	15.83	73.67
2	100	10171	1.3	4.5	.29	.24	5.33	18.58
1	100	10170	1.3	4.2	.32	.80	1.65	5.21

Reference no. 7

18	100	10854	2.6	3.2	.79	.72	3.57	4.50
17	100	0						
16	100	10223	1.7	2.8	.62	1.11	1.54	2.50
15	100	0						
14	100	10222	1.5	4.5	.32	.70	2.09	6.46
13	100	0						
12	100	10221	1.4	2.8	.51	.67	2.09	4.12
11	100	0						
10	100	10220	.8	4.2	.19	.66	1.18	6.38
9	100	0						
8	100	10219	1.1	2.7	.40	.54	1.98	4.94

APPENDIX C (continued)

Reference no. 7 (continued)

<u>Strat.</u> <u>Unit No.</u>	<u>Percent</u> <u>of Unit</u>	<u>Sample</u> <u>Number</u>	<u>U</u> <u>PPM</u>	<u>TH</u> <u>PPM</u>	<u>U/TH</u>	<u>K</u> <u>Percent</u>	<u>U/K</u> <u>X10000</u>	<u>TH/K</u> <u>X10000</u>
7	100	10218	1.2	3.5	.36	.53	2.34	6.57
6	100	10217	2.7	2.1	1.27	.34	7.91	6.24
5	100	10216	2.0	6.0	.34	.82	2.46	7.33
4	100	10215	1.3	3.8	.34	.61	2.10	6.15
3	100	10214	1.0	2.1	.51	.43	2.44	4.79
2	100	10213	1.0	1.6	.62	.49	2.04	3.29
1	100	10212	.7	5.6	.13	2.03	.36	2.76

Reference no. 8

11	100	10235	.9	.2	4.43	.24	3.87	.87
10	100	10234	.6	1.2	.46	.36	1.53	3.31
9	100	10233	.6	1.4	.41	.54	1.07	2.59
8	25	10232	1.2	1.9	.62	.38	3.05	4.89
8	75	10231	1.1	2.6	.43	.60	1.87	4.38
7	100	10230	.3	1.5	.17	.47	.57	3.30
6	100	0						
5	100	10229	.8	.9	.85	.36	2.11	2.47
4	15	10228	1.1	1.4	.75	.25	4.28	5.72
4	85	10227	.7	1.1	.62	.33	2.12	3.42
3	100	10226	1.5	1.9	.78	.21	7.14	9.14
2	100	10225	1.7	6.4	.27	1.77	.97	3.62
1	100	10224	.9	5.5	.17	1.49	.62	3.72

Reference no. 9

14	100	10248	1.3	2.0	.61	.42	2.98	4.88
13	100	10247	1.3	3.2	.40	.67	1.91	4.75
12	100	10246	2.6	1.6	1.55	.61	4.20	2.70
11	100	10245	1.8	2.2	.79	.79	2.22	2.81
10	100	10244	3.0	2.4	1.23	.26	11.42	9.27
9	100	0						
8	100	10243	.6	2.2	.27	.59	.98	3.69
7	100	10242	.9	3.1	.28	.93	.95	3.35
6	100	10241	1.7	2.5	.66	.41	4.07	6.17
5	100	10240	4.0	12.6	.32	2.14	1.86	5.86
4	100	10239	2.4	13.7	.17	2.17	1.10	6.33
3	100	10238	1.8	11.9	.15	2.33	.78	5.10
2	100	10237	1.8	13.8	.13	2.12	.83	6.49
1	100	10236	2.5	12.1	.21	2.14	1.17	5.64

Reference no. 10

3	100	10251	0.11% U ₃ O ₈ according to chemical assay					
2	100	10250	3.1	3.9	.78	.43	7.16	9.14
1	100	10249	2.4	14.9	.16	2.48	.97	6.00

APPENDIX C (continued)

Reference no. 11

<u>Strat.</u> <u>Unit No.</u>	<u>Percent</u> <u>of Unit</u>	<u>Sample</u> <u>Number</u>	<u>U</u> <u>PPM</u>	<u>TH</u> <u>PPM</u>	<u>U/TH</u>	<u>K</u> <u>Percent</u>	<u>U/K</u> <u>X10000</u>	<u>TH/K</u> <u>X10000</u>
6	100	10256	1.7	6.4	.26	1.44	1.17	4.47
5	100	10255	4.1	6.7	.61	1.02	4.02	6.59
4	100	10254	5.0	5.1	.98	.87	5.74	5.87
3	100	10253	3.1	7.0	.44	1.37	2.23	5.09
2	100	0						
1	100	10252	2.9	13.7	.21	2.55	1.14	5.36

Reference no. 12

4	100	10264	0.02% U ₃ O ₈ according to chemical assay					
3	100	10263	12.2	5.1	2.41	1.27	9.61	3.98
2	100	10262	362.6	14.6	24.79	1.04	348.66	14.07
1	100	10261	0.31% U ₃ O ₈ according to chemical assay					

Reference no. 13

6	100	10271	2.2	3.6	.62	.80	2.76	4.45
5	100	10270	4.3	12.7	.34	2.28	1.88	5.59
4	100	10269	3.1	12.2	.25	2.29	1.35	5.32
3	100	10268	4.2	15.1	.28	2.53	1.64	5.97
2	100	10267	3.6	13.5	.27	2.36	1.52	5.71
1	70	10266	4.8	14.5	.33	2.36	2.06	6.15
1	30	10265	4.6	11.7	.40	1.88	2.46	6.21

Reference no. 14

9	100	10281	.9	2.5	.36	.37	2.46	6.78
8	100	10280	1.7	5.4	.31	.77	2.22	7.08
7	100	10279	2.4	9.7	.25	1.30	1.86	7.45
6	100	10278	4.2	11.4	.37	1.76	2.40	6.45
5	100	10277	2.2	10.5	.21	1.62	1.33	6.46
4	100	10276	3.7	12.2	.30	2.07	1.78	5.90
3	100	10275	5.9	4.9	1.19	.82	7.15	6.02
2	85	10274	3.1	10.8	.29	1.91	1.63	5.64
2	15	10273	8.6	8.9	.97	1.19	7.21	7.46
1	100	10272	4.2	12.6	.33	1.92	2.19	6.56

APPENDIX C (continued)

Reference no. 15

<u>Strat.</u> <u>Unit No.</u>	<u>Percent</u> <u>of Unit</u>	<u>Sample</u> <u>Number</u>	<u>U</u> <u>PPM</u>	<u>TH</u> <u>PPM</u>	<u>U/TH</u>	<u>K</u> <u>Percent</u>	<u>U/K</u> <u>X10000</u>	<u>TH/K</u> <u>X10000</u>
6	100	10286	.9	5.3	.16	.28	3.11	18.86
5	100	10285	-0.0	1.2	-0.03	.06	-0.67	19.50
4	100	10284	.4	2.3	.17	.06	6.50	38.17
3	100	0						
2	100	10283	2.3	9.8	.24	2.94	.80	3.34
1	100	10282	1.9	8.6	.23	2.36	.82	3.65

Reference no. 16

6	100	10292	5.2	1.7	3.02	.20	25.85	8.55
5	100	10291	2.8	11.4	.25	1.59	1.77	7.20
4	100	10290	6.8	7.7	.89	.82	8.33	9.39
3	100	10289	7.3	12.9	.57	2.14	3.43	6.02
2	100	10288	4.1	11.4	.36	2.25	1.83	5.08
1	100	10287	1.2	4.6	.27	1.17	1.05	3.89

Reference no. 17

17	0	10491	2.5	11.6	.22	1.70	1.49	6.84
16	100	10490	1.0	7.2	.15	1.36	.77	5.26
15	100	0						
14	100	10489	-0.0	.8	-0.01	.01	-1.00	76.00
13	100	10488	.0	.0	1.00	.03	1.33	1.33
12	100	10487	2.0	13.3	.15	2.33	.85	5.69
11	100	10486	.5	4.8	.09	.82	.56	5.91
10	100	10485	2.5	14.2	.17	2.52	.98	5.63
9	100	0						
8	100	10484	1.6	6.0	.27	1.04	1.55	5.75
7	90	10483	1.6	6.0	.26	.90	1.73	6.63
7	10	10482	4.0	12.5	.32	1.85	2.18	6.75
6	100	10481	-0.0	2.8	-0.00	.61	-0.02	4.56
5	100	10480	.7	2.4	.28	.41	1.61	5.83
4	100	10479	2.3	10.0	.24	.80	2.94	12.46
3	100	10478	4.3	11.6	.37	1.86	2.31	6.24
2	100	10477	5.2	13.9	.37	2.16	2.38	6.41
1	100	10476	2.7	14.7	.18	2.12	1.25	6.93

Reference no. 18

8	100	10596	1.0	3.2	.31	.60	1.62	5.28
7	100	10595	1.5	5.2	.28	.72	2.03	7.17
6	100	10594	2.3	11.3	.20	2.10	1.07	5.36
5	100	10593	2.5	11.5	.21	1.69	1.45	6.79
4	100	10592	1.5	5.5	.28	.97	1.58	5.65

APPENDIX C (continued)

Reference no. 18 (continued)

<u>Strat.</u> <u>Unit No.</u>	<u>Percent</u> <u>of Unit</u>	<u>Sample</u> <u>Number</u>	<u>U</u> <u>PPM</u>	<u>TH</u> <u>PPM</u>	<u>U/TH</u>	<u>K</u> <u>Percent</u>	<u>U/K</u> <u>X10000</u>	<u>TH/K</u> <u>X10000</u>
3	100	10591	2.4	13.0	.18	1.96	1.21	6.62
2	100	10590	3.1	10.0	.31	1.59	1.92	6.27
1	100	10589	2.7	13.7	.20	1.43	1.89	9.56

Reference no. 19

14	0	0						
13	100	10609	1.4	5.5	.25	.76	1.80	7.28
12	100	10608	2.6	11.2	.23	2.29	1.15	4.89
11	100	10607	2.6	7.0	.37	.80	3.27	8.74
10	100	10606	1.1	4.4	.25	.44	2.50	9.93
9	100	10605	1.3	3.5	.35	.82	1.52	4.33
8	100	10604	1.3	3.8	.35	.34	3.88	11.09
7	100	10603	1.7	9.3	.18	1.09	1.52	8.54
6	100	10602	2.1	10.2	.20	1.08	1.94	9.44
5	100	10601	2.0	9.7	.21	1.45	1.41	6.70
4	100	10600	5.6	9.9	.57	.79	7.09	12.47
3	100	10599	2.9	10.5	.28	2.31	1.26	4.53
2	100	10598	2.3	10.7	.21	1.83	1.24	5.84
1	100	10597	2.2	12.0	.18	1.39	1.57	8.65

Reference no. 20

5	100	10616	7.9	10.4	.76	1.79	4.42	5.79
4	20	10615	0.13% U ₃ O ₈ , 0.22% eU ₃ O ₈			according to chemical assay		
4	80	10614	875.2	25.4	34.44	.55	1591.18	46.20
3	100	10613	92.9	10.3	9.01	1.37	67.85	7.53
2	100	10612	4.0	9.2	.43	1.88	2.12	4.88
1	10	10611	3.2	8.7	.36	1.45	2.17	5.98
1	90	10610	3.1	9.6	.33	1.91	1.64	5.04

Reference no. 21

14	100	10629	.6	2.0	.32	.48	1.31	4.15
13	100	10628	3.3	15.3	.21	1.96	1.68	7.82
12	100	10627	1.4	3.6	.40	.48	3.00	7.56
11	100	10626	.8	1.0	.77	.42	1.83	2.38
10	100	0						
9	100	10625	2.9	1.0	2.86	.24	12.04	4.21
8	100	10624	4.1	14.9	.28	2.61	1.58	5.72
7	100	10623	3.5	6.3	.56	1.26	2.77	4.98
6	100	10622	2.1	2.7	.78	.69	3.06	3.91
5	100	10621	2.4	1.7	1.42	.63	3.87	2.73

APPENDIX C (continued)

Reference no. 21 (continued)

<u>Strat.</u> <u>Unit No.</u>	<u>Percent</u> <u>of Unit</u>	<u>Sample</u> <u>Number</u>	<u>U</u> <u>PPM</u>	<u>TH</u> <u>PPM</u>	<u>U/TH</u>	<u>K</u> <u>Percent</u>	<u>U/K</u> <u>X10000</u>	<u>TH/K</u> <u>X10000</u>
4	100	10620	3.8	3.0	1.27	.53	7.11	5.62
3	100	10619	3.5	4.8	.74	1.78	1.98	2.69
2	100	10618	3.2	10.0	.32	2.17	1.47	4.59
1	100	10617	1.8	8.9	.20	1.66	1.09	5.37

Reference no. 22

13	100	10716	.8	2.3	.34	.42	1.88	5.55
12	100	10715	2.6	12.6	.21	1.91	1.38	6.61
11	100	10714	3.2	13.0	.24	1.91	1.65	6.81
10	100	10713	1.6	2.6	.62	.16	10.06	16.25
9	80	10712	.9	4.9	.18	.56	1.59	8.84
9	20	10711	2.6	11.5	.23	1.74	1.49	6.60
8	100	10710	1.3	4.8	.26	.58	2.17	8.22
7	100	10709	7.2	8.4	.85	1.21	5.92	6.96
6	100	10708	2.1	5.1	.41	.81	2.58	6.35
5	100	10707	3.1	12.5	.25	1.67	1.85	7.48
4	100	10706	4.9	5.3	.92	.73	6.71	7.30
3	100	10705	10.1	5.5	1.84	.96	10.52	5.72
2	100	10704	0.10% U ₃ O ₈ , 0.09% eU ₃ O ₈ according to chemical assay					
1	100	10703	5.7	9.6	.60	1.86	3.08	5.17

Reference no. 23

14	40	10732	2.4	6.3	0.39	1.57	1.55	3.98
14	60	10731	4.6	9.1	0.51	2.16	2.14	4.19
13	100	10730	3.3	10.3	0.33	2.20	1.52	4.66
12	100	10729	3.8	10.5	0.36	2.06	1.83	5.10
11	100	10728	3.9	11.3	0.34	1.99	1.94	5.69
10	100	10727	3.1	10.8	0.28	1.93	1.59	5.61
9	100	10726	2.8	11.3	0.25	2.32	1.23	4.86
8	100	10725	3.3	10.1	0.32	2.00	1.64	5.07
7	100	10724	3.3	11.9	0.28	2.10	1.59	5.67
6	100	10723	3.2	12.3	0.26	2.21	1.46	5.58
5	100	10722	2.9	11.3	0.26	2.02	1.43	5.58
4	100	10721	6.5	10.4	0.63	1.16	5.63	8.92
3	100	10720	3.3	10.8	0.30	1.74	1.87	6.18
2	20	10719	2.6	8.7	0.30	1.13	2.28	7.73
2	80	10718	3.0	9.7	0.31	1.82	1.66	5.34
1	100	10717	2.3	7.3	0.31	0.94	2.46	7.82

APPENDIX C (continued)

Reference no. 24

Strat. Unit No.	Percent of unit	Sample number	U (ppm)	TH (ppm)	U/TH	K percent	U/K X10000	TH/K X10000
25	0	10755	1.0	1.3	0.77	0.69	1.42	1.84
24	100	10754	2.3	11.3	0.20	2.66	0.85	4.23
23	100	10753	1.2	5.5	0.21	1.73	0.68	3.20
22	100	10752	1.4	7.1	0.20	1.91	0.74	3.72
21	100	10751	0.6	2.9	0.19	1.85	0.30	1.55
20	100	10750	2.3	9.1	0.26	1.96	1.18	4.62
19	0	10749	2.2	8.5	0.26	2.11	1.06	4.01
18	100	10748	1.5	4.4	0.33	1.67	0.87	2.61
17	100	10747	1.9	5.0	0.38	1.70	1.12	2.94
16	100	10746	2.2	5.3	0.41	1.80	1.20	2.94
15	0	0						
14	0	10745	2.3	8.1	0.29	1.61	1.44	5.06
13	0	0						
12	100	10744	1.5	4.7	0.32	1.03	1.43	4.51
11	100	10743	1.2	6.4	0.19	1.31	0.94	4.85
10	100	10742	3.1	11.4	0.27	2.43	1.28	4.71
9	100	10741	2.4	8.4	0.29	1.64	1.48	5.10
8	100	10740	2.4	9.1	0.26	1.92	1.24	4.72
7	100	10739	1.7	5.1	0.33	1.02	1.63	4.97
6	100	10738	2.6	19.4	0.13	1.23	2.12	15.80
5	100	10737	2.5	4.6	0.55	1.32	1.91	3.45
4	0	0						
3	100	10736	1.5	4.4	0.34	1.31	1.15	3.37
2	70	10735	1.3	3.4	0.37	1.05	1.19	3.23
2	30	10734	4.5	8.1	0.55	2.68	1.66	3.03
1	100	10733	1.7	4.5	0.38	0.85	2.04	5.29

APPENDIX C (continued)

Reference no. 25

<u>Strat. Unit No.</u>	<u>Percent of Unit</u>	<u>Sample Number</u>	<u>U PPM</u>	<u>TH PPM</u>	<u>U/TH</u>	<u>K Percent</u>	<u>U/K X10000</u>	<u>TH/K X10000</u>
20	100	10774	2.6	.0	66.00	.11	24.00	.36
19	0	0						
18	100	10773	1.1	1.7	.69	.67	1.72	2.48
17	100	10772	2.8	3.2	.87	.60	4.68	5.38
16	0	10771	2.0	7.7	.27	1.24	1.64	6.17
15	100	10770	2.4	7.0	.35	1.20	2.03	5.80
14	100	10769	2.5	7.4	.33	1.42	1.73	5.23
13	0	10768	2.0	4.3	.46	.96	2.09	4.51
12	100	10767	3.1	10.2	.31	1.51	2.07	6.74
11	100	10766	2.1	8.1	.26	1.62	1.29	5.02
10	100	10765	2.9	12.1	.24	1.93	1.52	6.26
9	100	10764	3.4	12.2	.28	2.65	1.28	4.59
8	100	0						
7	100	10763	1.2	4.4	.28	1.19	1.03	3.70
6	20	10762	1.7	5.9	.29	.86	2.00	6.86
6	80	10761	1.8	4.9	.37	1.07	1.69	4.55
5	30	10760	2.2	5.3	.41	1.09	2.02	4.87
5	70	10759	4.4	9.4	.47	1.78	2.46	5.25
4	100	10758	2.3	5.8	.39	.85	2.68	6.80
3	100	10757	2.2	9.1	.24	2.02	1.09	4.50
2	100	0						
1	100	10756	2.0	8.6	.23	1.52	1.33	5.67

Reference no. 26

10	0	0						
9	100	10784	3.8	7.9	.48	1.31	2.92	6.05
8	100	10783	9.3	5.0	1.88	.69	13.52	7.20
7	100	10782	5.3	4.4	1.19	.82	6.43	5.39
6	100	10781	2.9	3.4	.85	.89	3.27	3.85
5	100	10780	4.3	7.4	.58	1.31	3.31	5.67
4	100	10779	1.2	4.9	.24	1.11	1.07	4.43
3	40	10778	1.7	7.8	.22	1.40	1.21	5.57
3	50	10777	2.3	12.5	.18	2.76	.82	4.53
2	100	10776	2.4	8.5	.29	1.56	1.55	5.44
1	100	10775	3.3	11.9	.28	2.68	1.24	4.43

Reference no. 27

12	0	0						
11	100	10793	.7	2.5	.28	1.13	.61	2.19
10	100	0						
9	100	10792	1.5	6.4	.24	1.35	1.15	4.72
8	100	10791	1.9	4.6	.42	1.60	1.19	2.84
7	100	10790	2.0	7.1	.29	2.32	.88	3.07
6	0	0						

APPENDIX C (continued)

Reference no. 27 (continued)

<u>Strat. Unit No.</u>	<u>Percent of Unit</u>	<u>Sample Number</u>	<u>U PPM</u>	<u>TH PPM</u>	<u>U/TH</u>	<u>K Percent</u>	<u>U/K x10000</u>	<u>TH/K x10000</u>
5	100	10789	1.0	3.4	.29	1.44	.68	2.38
4	100	10788	2.1	9.6	.22	2.18	.97	4.41
3	100	10787	1.7	4.9	.35	1.52	1.14	3.26
2	100	10786	.8	5.1	.15	1.41	.54	3.64
1	100	10785	2.4	9.3	.26	2.16	1.10	4.31