DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Petrographic Compositional Data For Atokan Through Virgilian Sandstones in Oklahoma

by

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Open-File Report 87-137

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards (and stratigraphic nomenclature).

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1987

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ILLUSTRATIONS

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INTRODUCTION

Atokan through Virgilian sandstones from the northeast Oklahoma platform and from the Anadarko and Arkoma basins exhibit much compositional variation. Although many stratigraphic and sedimentologic studies are available, published petrologic data for these sandstones in the region are rare (McLaughlin, 1984). Furthermore, stratigraphic nomenclature in Oklahoma is confusing and different names are used for subsurface and surface studies (fig. 1). A better understanding of compositional trends in mid-Pennsylvanian sandstones may aid stratigraphic correlation procedures as well as efforts to establish a link between source area uplift, basin subsidence, and sediment recycling. These studies are valuable because of the significant oil and gas potential in Oklahoma. In order to begin establishing a link between sandstone composition and mid-Pennsylvanian tectonism, a large data base of compositional data must be created. The purpose of this report is to present these compositional data. Statistical analyses and petrofacies analysis of these data will be published elsewhere.

Sandstone samples described here were collected from Atokan through Virgilian strata from both cores and outcrops in Oklahoma (fig. 2). Thin sections were prepared from 96 sandstone samples; all were impregnated with blue-dyed epoxy resin and stained for potassium feldspar. Sandstone composition was estimated by counting 300 points per thin section. Data in Appendix 2 of this report summarize the results of thin-section examination of the sandstones studied.

Appendix 1 contains outcrop and well locality descriptions and stratigraphic information for samples in this study. Core samples were obtained form the Oklahoma Geological Survey (OGS) Core and Sample Library and carry their file numbers (Summers and Cox, 1984). Stratigraphic information presented for core samples is taken directly from summaries by well-site geologists and drilling companies. Stratigraphic names for outcrop samples are taken from published reports. The references section of this report contains a list of sources used to locate appropriate outcrops.

Sample numbers contain a three-part description including a chronologic sequence number (e.g., 1 -86 -P), year collected (e.g., 1 -86 - P), and sample type where P = outcrop and W = well (e.g., 1 - 86 - P).

Appendix 2 contains (1) the data matrix of framework-grain percents, (2) presence-absence data for important accessory minerals, and (3) an explanation of data codes. Framework grain summaries were computed according to Dickinson and Suczek (1979). Independent point-counts were made to determine errors introduced during the point-count procedure. A maximum error of 10 percent was identified.

This report has been prepared for the U.S. Geological Survey's Evolution of Sedimentary Basins Program.

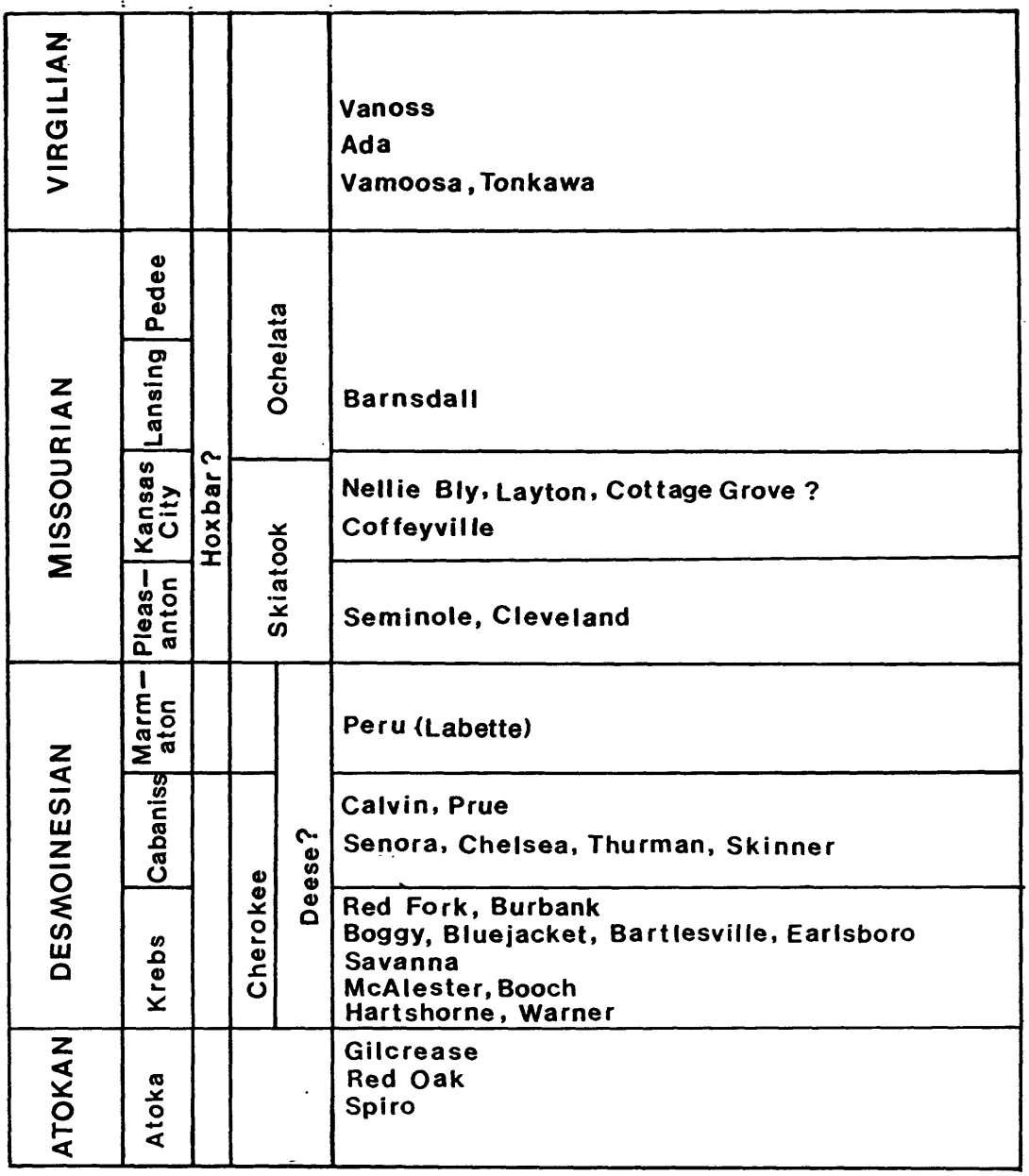

Figure 1.--Partial composite stratigraphic section of Atokan through Virgilian rocks with surface and subsurface nomenclature used in this report. Only stratigraphic units described in this report are identified. Compiled from Miser (1954), Jordon (1957), Branson (1962), Frezon and Dixon (1975), Krumme (1981), and Sutherland (1982).

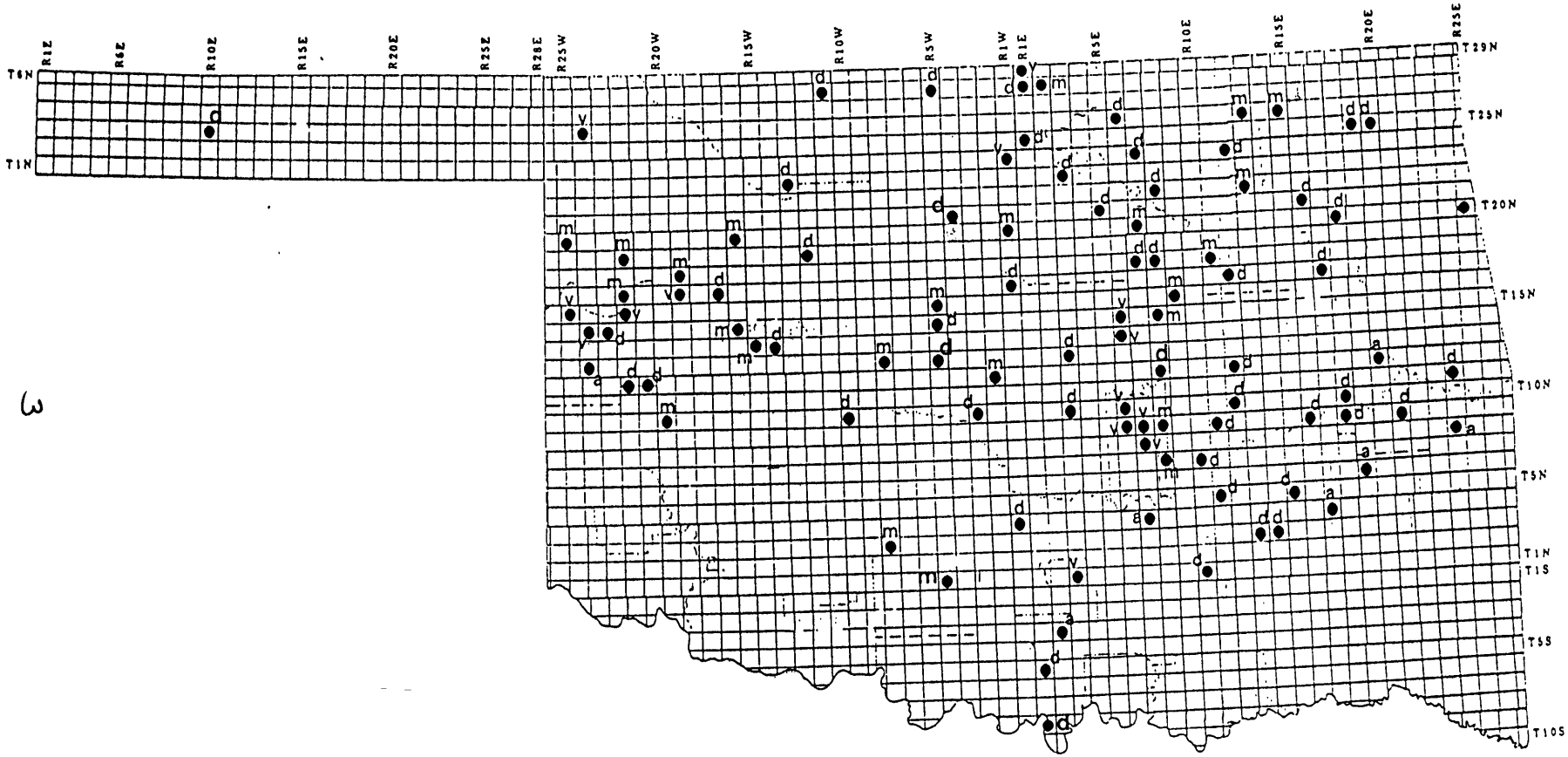

Figure 2.--Locations of Atokan through Virgilian sandstone samples presented in this report. See Appendix 1 for detailed sample location and identification. A = Atokan sample; D = Desmoinesian sample; M = Missourian sample; and V = Virgilian sample.

Appendix 1.

Sample number	Formation, age	Location	Wells only: Depth (ft)	Wells only: OGS File no.
1-86-P	Vamoosa, Virgilian	NW 1/4 sec. 8, T. 8 N., R. 7 E., Roadcut N. side highway 270.		
3-86-P	Seminole, Missourian	SE 1/4 sec. 10, T. 7 N., R. 8 E., Roadcut N. side highway 270.		
4-86-P	Calvin, Desmoinesian	NE 1/4 sec. 16, T. 7 N., R. 10 E., Roadcut S. side highway 270.		
5-86-P	Senora, Desmoinesian	SW 1/4 sec. 9, T. 5 N., R. 11 E., Roadcut N. side highway 270.		
7-86-P	Boggy, Desmoinesian	SW 1/4 sec. 3, T. 3 N., R. 13 E., Roadcut N. side county road.		
8-86-P	Atoka, Atokan	SE 1/4 sec. 8, T. 4 N., R. 17 E., Roadcut S. side highway 63.		
9-86-P	Savanna, Desmoinesian	SE 1/4 sec. 5, T. 5 N., R. 15 E., Roadcut N. side highway 270.		
10-86-P	Boggy, Desmoinesian	SW 1/4 sec. 26, T. 3 N., R. 13 E., Roadcut E. side highway 69.		
12-86-P	Savanna, Desmoinesian	SE 1/4 sec. 9, T. 1 N., R. 10 E., Roadcut N. side highway 77.		
14-86-P	Deese, Desmoinesian	SE 1/4 sec. 12, t. 5 S., R. 1 E., Roadcut W. side highway 77.		
15-86-P	Atoka, Atokan	SW 1/4 sec. 9, T. 3 S., R. 2 E., Roadcut S. side highway 53.		
16-86-P	Vanoss, Virgilian	NE 1/4 sec. 27, T. 1 N., R. 3 E., Roadcut E. side highway 170.		
17-86-P	Ada, Virgilian	NE 1/4 sec. 21, T. 9 N., R. 6 E., Roadcut S. side highway 9.		
18-86-P	Vamoosa, Virgilian	SW 1/4 sec. 16, T. 9 N., R. 7 E., Roadcut N. side highway 9.		
19-86-P	Nellie Bly, Missourian	SE 1/4 sec. 19, T. 9 N., R. 8 E., Roadcut N. side highway 9.		
20-86-P	Calvin, Desmoinesian	SW 1/4 sec. 24, T. 9 N., R. 11 E., Roadcut N. side highway 9		

Appendix 1.--continued

Sample number	Formation, age	Location	Wells only: Depth (ft)	Wells only: OGS File no.
24-86-P	Boggy, Desmoinesian	SE 1/4 sec. 11, T. 9 N., R. 16 E., Roadcut E. side highway 69.		
25-86-P	Bluejacket, Desmoinesian	NE 1/4 sec. 24, T. 9 N., R. 18 E., Roadcut N. side highway 9.		
26-86-P	Warner, Desmoinesian	NE 1/4 sec. 13, T. 9 N., R. 21 E., Roadcut N. side highway 9.		
28-86-P	Warner, Desmoinesian	NE 1/4 sec. 12, T. 11 N., R. 24 E., Roadcut N. side highway 64.		
29-86-P	Atoka, Atokan	SE 1/4 sec. 6, T. 12 N., R. 20 E., Roadcut N. side turnpike.		
30-86-P	Warner, Desmoinesian	NE 1/4 sec. 23, T. 25 N., R. 20 E., Roadcut N. side highway 60.		
33-86-P	Chelsea, Desmoinesian	SW 1/4 sec. 6, T. 25 N., R. 19 E., Roadcut N. side highway 60.		
35-86-P	Coffeyville, Missourian	SW 1/4 sec. 20, T. 26 N., R. 15 E., Roadcut N. side highway 60.		
37-86-P	Nellie Bly, Missourian	SE 1/4 sec. 5, T. 25 N., R. 13 E., Roadcut W. side highway 75.		
38-86-P	Coffeyville, Missourian	NE 1/4 sec. 9, T. 22 N., R. 13 E., Roadcut W. side highway 75.		
40-86-P	Senora, Desmoinesian	NW 1/4 sec. 36, T. 21 N., R. 16 E., Roadcut S. side county road.		
41-86-P	Warner, Desmoinesian	SE 1/4 sec. 33, T. 20 N., R. 18 E., Roadcut N. side highway 33.		
43-86-P	Bluejacket, Desmoinesian	NE 1/4 sec. 19, T. 17 N., R. 17 E., Roadcut S. side highway 51.		
45-86-P	Nellie Bly, Missourian	NE 1/4 sec. 32, T. 18 N., R. 11 E., Roadcut N. side turnpike.		
48-86-P	Barnsdall, Missourian	NE 1/4 sec. 20, T. 16, N., R. 9 E., Roadcut N. side turnpike.		
49-86-P	Vanoss, Virgilian	NE 1/4 sec. 34, T. 15 N., R. 6 E., Roadcut E. side highway 99.		

Appendix 1.--continued

Sample number	Formation, age	Location	Wells only: Depth (ft)	Wells only: OGS File no.
50-86-P	Vanoss, Virgilian	NW 1/4 sec. 15, T. 14 N., R. 6 E., Roadcut E. side highway 99.		
51-86-P	Vanoss, Virgilian	SE 1/4 sec. 16, T. 10 N., R. 6 E., Roadcut W. side highway 99.		
52-86-P	Ada, Virgilian	SW 1/4 sec. 22, T. 9 N., R. 6 E., Roadcut E. side highway 99.		
1-3-85W	Red Fork Desmoinesian	sec. 13, T. 10 N., R. 3 W., Lone Star No. 2 Miller.	7,390	45F
3-5-85W	Red Fork, Desmoinesian	sec. 4, T. 10 N., R. 10 W., Eason 1-A Cook-Dodson.	12,269	1491
4-5-85W	Red Fork, Desmoinesian	sec. 30, T. 15 N., R. 5 W., Post Petrol. No. 1 Trindle.	7,068	2020
5-2-85W	Red Fork, Desmoinesian	sec. 26, T. 18 N., R. 8 E., Kerr-McKee No. 15 Escoe.	2,616	1754
6-3-85W	Red Fork, Desmoinesian	sec. 9, T. 19 N., R. 12 W., Ferguson No. 1 Grabon.	7,609	1592
8-3-85W	Red Fork, Desmoinesian	sec. 2, T. 21 N., R. 5 E., Thompson-Tye No. 3 Shields.	2,963	916
9-3-85W	Red Fork, Desmoinesian	sec. 20, T. 21 N., R. 5 E., Perkins Prod. No. 1 Buchanan.	3,303	964
10-5-85W	Red Fork, Desmoinesian	sec. 8, T. 22 N., R. 8 E., Andover Oil No. 8-5 McCain.	2,552	1961
11-2-85W	Red Fork, Desmoinesian	sec. 16, T. 23 N., R. 3 E., Publishers No. 1 R. L. Rosier.	3,545	1135
13-2-85W	Red Fork, Desmoinesian	sec. 24, T. 28 N., R. 5 W., Indian Wells No. 4-24 Hajek.	4,681	2030
16-3-85W	Red Fork, Desmoinesian	sec. 4, T. 17 N., R. 17 W., W. C. Pickens No. 1 Leslie.	9,480	808
17-1-85W	Red Fork, Desmoinesian	sec. 17, T. 14 N., R. 14 W., Davis Oil No. 1 Herbing.	10,916	1345F
18-2-85W	Red Fork, Desmoinesian	sec. 13, T. 17 N., R. 17 W., Wessely A-1 Clark.	9,608	881

Appendix 1.--continued

Sample number	Formation, age	Location	Wells only	
			Depth (ft)	OGS File no.
20-2-85W	Red Fork, Desmoinesian	sec. 14, T. 23 N., R. 13 W., Anadarko Prod. 1 Sackett.	6,480	1323
21-1-85W	Red Fork, Desmoinesian	sec. 5, T. 10 N., R. 12 E., Vab No. 1 Amey.	1,975	1611
22-2-85W	Red Fork, Desmoinesian	sec. 29, T. 12 N., R. 21 W., GHK No. 29-1 Nesser.	15,213	2031
23-1-85W	Red Fork, Desmoinesian	sec. 27, T. 12 N., R. 22 W., Tenneco Merrick No. 1-27.	12,700	2161
24-1-85W	Red Fork, Desmoinesian	sec. 25, T. 28 N., R. 1 E., Gulf Oil No. 1 Sheik.	3,605	93
25-1-85W	Skinner, Desmoinesian	sec. 7, T. 25 N., R. 1 E., Gulf Oil No. 1 Rence.	4,075	158
26-1-85W	Red Fork, Desmoinesian	sec. 11, T. 20 N., R. 4 W., C. Gungoll No. 1 Inez.	5,498	2116
27-2-85W	Burbank, Desmoinesian	sec. 27, T. 24 N., R. 7 E., Oliphant No. 1 Henry.	2,630	708
28-1-85W	Cottage Grove, Missourian	sec. 2, T. 19 N., R. 22 W., Odessa No. 1 Chief.	8,084	1370
34-1-86W	Layton Missourian	sec. 36, T. 21 N., R. 4 W., E. S. Adams No. 1 Schooland	4,635	999
35-2-86W	Cleveland, Missourian	sec. 4, T. 20 N., R. 25 W., Jordon Oil Stuart 1-4.	8,030	2194
36-1-85W	Prue, Desmoinesian	sec. 21, T. 13 N., R. 5 W., Seneca Oil Simpson 2-21.	7,052	2125
41-2-85W	Prue, Desmoinesian	sec. 34, T. 18 N., R. 7 E., Sinclair No. 11 Barney A.E.	2,268	419
42-2-86W	Bartlesville, Desmoinesian	sec. 32, T. 26 N., R. 15 E., Reliance No. 4 Wilkerson.	1,075	1505
43-1-86W	Bartlesville, Desmoinesian	sec. 15, T. 17 N., R. 12 E., Sinclair-Prarie No. 12 Durant.	1,504	404
46-1-85W	Bartlesville, Desmoinesian	sec. 34, T. 24 N., R. 12 E., Shell No. 651 Mackey.	1,538	1199

Appendix 1.--continued

Sample number	Formation, age	Location	Wells only	
			Depth (ft)	OGS File no.
51-2-85W	Skinner Desmoinesian	sec. 16, T. 17 N., R. 1 W., Jet No. 1 State L.	4,869	1584
53-1-85W	Red Fork Desmoinesian	sec. 33, T. 3 N., R. 10 E., Texaco No. 1 Hartley.	4,550	870
54-1-85W	Skinner Desmoinesian	sec. 23, T. 15 N., R. 23 W., Harper Oil No. 1 Merrick.	11,230	1942
58-1-86W	Cottage Grove, Missourian	sec. 26, T. 20 N., R. 16 W., Woods No. 1 Bensch.	6,965	813
60-1-86W	Cottage Grove, Missourian	sec. 3, T. 17 N., R. 22 W., Sarkeys No. 1-3 Gillispie.	8,578	1841
61-1-86W	Cottage Grove, Missourian	sec. 22, T. 18 N., R. 19 W., Graham No. 2 Barnes.	8,038	2049
62-1-86W	Cleveland, Missourian	sec. 13, T. 20 N., R. 1 W., Tenneco No. 62 Slecsu	4,363	1702
63-1-86W	Cleveland, Missourian	sec. 17, T. 12 N., R. 2 W., Tenneco A-1 Cullen.	5,761	258A
64-2-86W	Cottage Grove, Missourian	sec. 7, T. 13 N., R. 8 W., Towner Petrol. Leighton 7-1.	8,075	2163
66-1-86W	Cottage Grove, Missourian	sec. 25, T. 15 N., R. 16 W., Parker No. 1 Cornelius.	8,551	68C
67-1-86W	Cottage Grove, Missourian	sec. 36, T. 14 N., R. 15 W ., Tidewater No. 1 Ashby.	8,461	798
70-1-86W	Layton, Missourian	sec. 31, T. 16 N., R. 5 W., Mackeller No. 1 Kordis.	5,892	1552
73-1-86W	Cleveland(?) Missourian	sec. 27, T. 15 N., R. 8 E., Morton Bros. No. 1 Hashagen.	1,456	1667
74-2-86W	Cleveland, Missourian	sec. 3, T. 20 N., R. 7 E., Fain-Porter No. 1 Fipley.	2,188	1345L
75-1-86W	Cleveland, Missourian	sec. 18, T. 28 N., R. 2 E., Gulf Oil No. 1 Brosh.	3,205	123

Appendix 1.--continued

Sample number	Formation, age	Location	Wells only	
			Depth (ft)	OGS File no.
77-2-86W	Bartlesville, Desmoinesian	sec. 24, T. 13 N., R. 3 E., Bass Ent. Moore No. 1.	4,647	2170
80-1-86W	Red Fork, Desmoinesian	sec. 26, T. 28 N., R. 11 W., Clinton No. 2 Tullis	unmarked core.	1727
81-1-86W	Red Fork, Desmoinesian	sec. 33, T. 3 N., R. 10 E., Texaco No. 1 Hartley.	4,535	870 (same as 53-1-86W)
84-1-86W	Gilcrease, Atokan	sec. 1, T. 4 N., R. 7 E., Sunray-Dx No. 5 Busby.	2,246	1025
85-1-86W	Gilcrease, Atokan	sec. 20, T. 4 N., R. 7 E., Belgram No. 3 Britt.	1,480	1064
86-1-86W	Red Oak, Atokan	sec. 32, T. 6 N., R. 19 E., Pan American 1-B Quaid.	6,958	691
87-1-86W	Spiro, Atokan	sec. 1, T. 8 N., R. 24 E., Pan American B-1 Tackett.	10,952	744
88-1-86W	Tonkawa, Virgilian	sec. 17, T. 29 N., R. 1 E., Sun No. 7 Dickason.	2,368	966
89-1-86W	Hoxbar, Missourian	sec. 2, T. 1 N., R. 5 W., Tenneco N. Doyle Unit 6-6.	5,522	497B
90-1-86W	Cottage Grove, Missourian	sec. 19, T. 3 N., R. 8 W., Towner Petrol. 19-1 Melvin.	8,214	2046
91-1-86W	Deese, Desmoinesian	sec. 8, T. 4 N., R. 1 W., Buck-Leben No. 1 Harmon.	5,467	1030
92-1-86W	Tonkawa, Virgilian	sec. 29, T. 16 N., R. 25 W., Lone Star Prod. No. 4 Powell.	8,524	1026
93-1-86W	Hoxbar, Missourian	sec. 27, T. 10 N., R. 20 W., GHK No. 1-27 Niece.	10,995	668
94-1-86W	Tonkawa, Virgilian	sec. 16, T. 15 N., R. 24 W., GHK No. 1-16 Aderhold.	7,863	583
95-1-86W	Tonkawa, Virgilian	sec. 14, T. 26 N. R. 24 W., Gulf Oil No. 1 Woodburn.	5,560	248

Appendix 1.--continued

Sample number	Formation, age	Location	Wells only	
			Depth (ft)	OGS File no.
96-1-86W	Deese, Desmoinesian	sec. 24, T. 8 S., R. 1 E., J. M. Huber No. 1 Johnson.	8,025	820
97-1-86W	Atoka, Atokan	sec. 9, T. 13 N., R. 24 W., Tenneco 2-9 Griffin.	13,844	1806
98-1-86W	Tonkawa, Virgilian	sec. 16, T. 16 N., R. 22 W., Sun No. 1 Mclean Jr.	8,448	1630
99-1-86W	Tonkawa, Virgilian	sec. 15, T. 24 N., R. 1 W., D-X Division No. 9.	2,656	1629
101-1-86W	Tonkawa, Virgilian	sec. 24, T. 17 N., R. 19 W., Texas Oil-Gas No. 1 Saylor.	7,920	1595
104-1-86W	Booch, Desmoinesian	sec. 21, T. 12 N., R. 12 E., Dal-Tex Oil Witt No. 2.	1,875	2,089
105-1-86W	Booch, Desmoinesian	sec. 31, T. 10 N., R. 18 E., CSO Mason A-1.	1,450	2156
106-1-86W	Red Fork, Desmoinesian	sec. 9, T. 26 N., R. 6 E., Conklin No. 9-7.	3,122	2312
107-1-86W	Red Fork, Desmoinesian	sec. 29, T. 10 N., R. 3 E., Sabine Prod. Sabine 3-29.	5,035	2302
108-1-86W	Booch, Desmoinesian	sec. 14, T. 12 N., R. 8 E., Gulf Oil No. 1 Hapke.	3,395	26A

APPENDIX 2

DISTRIBUTION OF FRAMEWORK GRAINS AND ACCESSORY MINERALS

EXPLANATION OF CODES FOR APPENDIX 2:

Framework grains

(volume percent, T = trace)

Qm: monocrystalline quartz

Qp: foliated and nonfoliated polycrystalline quartz

CHT: chert

P: plagioclase feldspar

K: potassium feldspar

LS: limestone

MD: mudstone

SS: sandstone

VC: undifferentiated volcanic

MT: undifferentiated metamorphic

Accessory minerals present

(X = present)

M: total mica

G: glauconite

Z: zircon

H: hornblende

O: undifferentiated opaque minerals

Appendix 2

Sample Number	Framework Grains										Accessory minerals				
	Qm	Qp	CHT	P	K	LS	MD	SS	VC	MT	M	G	Z	H	O
1-86-P	86	8	3	T			1			2			X	X	X
3-86-P	92	3	3	1	T			T		1	X		X		X
5-86-P	90	2	5	1	1					1	X		X		X
7-86-P	78	13	5				3				X				X
8-86-P	82	12	3	T	T			2			X		X		X
9-86-P	76	5	10	1	3		1			4	X		X		X
10-86-P	94	1	1	1	2		T			T	X		X		
12-86-P	84	5	5	T	2		T			4	X		X	X	X
14-86-P	80	13	5	T	2			T		T	X		X		X
15-86-P	77	6	7	2	3		2	2		1	X		X		
16-86-P	45	1	3	3	T	47					X	X	X		
17-86-P	79	7	11	3	T	T				T	X		X		X
18-86-P	79	5	13	T	1			1		1			X		X
19-86-P	82	10	3	1	1					3	X				X
20-86-P	84	5	4							7	X		X		X
24-86-P	79	8	4	2			1	1		5	X		X		X
25-86-P	67	15	3	2			3			10	X		X		
26-86-P	82	15	1				1			1					
28-86-P	81	6	2	T						11	X		X	X	X
29-86-P	95	2	3					T			X		X		
30-86-P	86	9	4	T						1	X		X		
33-86-P	74	10	5	T		T	3			7	X		X		
35-86-P	76	10	4	T			T			10	X				
37-86-P	80	1	2	3	1					13	X	X	X		X
38-86-P	89	4	2	1	T		2			2	X	X	X		X
40-86-P	61	17	3	2	2					15	X				X
41-86-P	75	8	8	1	T					8	X		X		X
43-86-P	60	22	6	3	3					5	X		X		X
45-86-P	87	10	2	1	T										
48-86-P	92	4	2	T	T					1			X		
49-86-P	90	4	4	2	T								X		X
51-86-P	83	12	4	T	T		1			T		X	X		
52-86-P	79	9	7	T			1	1		3	X		X		X
58-86-P	86	9	5	T	T					T	X		X		X
1-3-85W	66	11	5	5		1	2	2	T	8				X	X

Appendix 2.--Continued

Sample Number	Framework Grains										Accessory minerals				
	Qm	Qp	CHT	P	K	LS	MD	SS	VC	MT	M	G	Z	H	O
3-5-85W	62	11	7	3			4	T			X		X	X	X
4-5-85W	80	6	1	1		T	2			7	X		X	X	X
6-3-85W	49	19	6	5		1	1			19	X			X	X
8-3-85W	63	8	11	4			2	1		11			X		X
9-3-85W	59	16	7	4			3	T		11	X			X	X
10-5-85W	70	13	3	4			2			8	X		X	X	X
11-2-85W	78	7	3				2			9	X		X	X	X
13-2-85W	67	14	12				5				X				X
16-3-85W	74	7	3	3		1	5			7	X		X	X	X
17-1-85W	51	15	13	8		1	4	2		5			X		X
20-2-85W	45	20	11	5	2	10				7	X			X	X
21-1-85W	76	5	8	1			10			T	X			X	X
23-1-85W	89	4	5				1			1	X		X	X	X
24-1-85W	86	5	5	1			T			3	X		X		X
26-1-85W	51	10	13			1	6	2		15	X				X
27-2-85W	66	7	8	2		T	7	T		9	X		X	X	X
28-1-85W	82	5	4	1		1	3			3	X		X		X
34-1-86W	79	4	3	2	5		1			7	X		X	X	X
35-2-86W	41	25	4	7	4		4	1		14	X		X	X	X
36-1-85W	56	18	12	3			2	4			X				
41-2-85W	98	1	1												X
42-2-86W	52	10	11	6	2		3	3		13	X		X		X
43-1-86W	74	7	5	3	4	T	1	5		1	X		X		X
46-1-85W	60	10	19	3			2	3	1		X		X		
51-2-85W	86	3	8	T			1			2	X		X		X
53-1-85W	54	3	6	5	31	1					X		X	X	X
54-1-85W	75	9	2	T			7	2		4	X		X	X	X
60-1-86W	87	2	3	2	2	T	T			4	X			X	X
61-1-86W	85	6	1	1	4	1	T			2	X				X
62-1-86W	51	13	13	2	2		2	1		17					X
63-1-86W	76	5	4	T	4	9	1			1	X		X	X	X
64-2-86W	88	2	T	2	2		3	1		2			X	X	X
66-1-86W	80	4	7	1	4	T				4	X		X	X	X
67-1-86W	77	9	10	1			3	T		T			X	X	
70-1-86W	92	4	2	T	1		T			T			X	X	X

Appendix 2.--Continued

Sample Number	Framework Grains										Accessory minerals				
	Qm	Qp	CHT	P	K	LS	MD	SS	VC	MT	M	G	Z	H	O
74-2-86W	62	14	3	5	4		1			11	X			X	X
75-1-86W	62	6	8	2	6	1	3	2		10	X		X	X	X
77-2-86W	84	9	4	1						2	X		X	X	X
81-1-86W	55	3		8	25	1	8								X
83-1-86W	94	1	3				2			T	X	X	X		X
84-1-86W	98				2	T								X	X
85-1-86W	99	1		T	T								X	X	X
86-1-86W	87	3	2	1	1	T				6	X		X	X	X
87-1-86W	83	10				7									X
88-1-86W	84	7	5	1	2		T			1	X		X		X
89-1-86W	64	16	3	T	T	12	5			T					X
90-1-86W	83	2	2	T	2		6	3		2					
91-1-86W	85	T	3	T	1	11				T	X		X		X
92-1-86W	80	7	1	3	2		T		T	7	X		X	X	X
93-1-86W	43	15	23	5	4	6	4					X			X
94-1-86W	86	3	3	T	3	1				4	X		X	X	X
95-1-86W	86	1	2	3	3	T				5	X				X
96-1-86W	81	6	3	2	T		2			6	X		X		X
98-1-86W	89	2	1	1	1		1			5	X		X	X	X
101-1-86W	86	7	1	2	T		1			3	X			X	X
104-1-86W	67	11	9	T			1	T		12	X		X		X
105-1-86W	89	3	T	T	2		1			5	X				X
106-2-86W	59	9	9	4	5		7	3		4	X		X		X
107-1-86W	84	6	7	1	T		2			T	X				X
108-1-86W	81	7	3	1			2			6	X				X

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