AREA
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Wellog

INTRODUCTION

CATALOG OF ALL WELLS IN WELDATA FILE,OCTOBER 1979 UPDATE

THIS INDEX REPRESENTS A CURRENT LISTING OF ALL SAMPLES STORED AT THE WELL SAMPLE LIBRARY WITH THE EXCEPTION OF DRILL CUTTINGS. THE CUTTINGS WILL BE CATALOGED NEXT AND WILL BE AVAILABLE TO THE PUBLIC SOON.

ALTHOUGH THIS INDEX INCLUDES ALL CORES, CORE CHIPS, AND OUTCROP SAMPLES, INFORMATION ON INDIVIDUAL WELLS IS OFTEN INCOMPLETE OR ERRONEOUS. USERS OF THIS INDEX CAN RENDER A SERVICE BY REPORTING ANY ERRORS OR OMISSIONS THEY DISCOVER. PLEASE SEND SUCH INFORMATION TO E. DOW DAVIDSON, CARE OF THE BUREAU OF ECONOMIC GEOLOGY, SO THAT IT CAN BE ADDED TO OUR DATA BANK.

LEGEND

WELL NO.---PREFIX C = CORE
PREFIX B = CORE CHIPS
PREFIX P = OUTCROP SAMPLES
PREFIX R = CUTTINGS
PREFIX S = SUPERIOR OIL CO. DONATIONS
PREFIX T = NEWLY ACQUIRED CORE, IN TRANSITION TO PERMANENT STORAGE.
THE NUMBERS FOLLOWING THE PREFIX ARE CATALOG NUMBERS ASSIGNED BY THE WELL SAMPLE LIBRARY

COUNTY-----INDICATES COUNTY WHERE THE WELL IS LOCATED

LOC--------NUMBER IN THIS COLUMN REFERS TO TOPO MAP NUMBER. SPOTTED BY F.E. LOZO, APRIL, 1977.

OPERATOR---NAME OF OPERATOR WHEN THE WELL WAS DRILLED. NO ALLOWANCES HAVE BEEN MADE FOR OPERATOR NAME CHANGES

LEASE------NAME OF LEASE HOLDER

NO.--------WELL NUMBER DESIGNATED ON THE SPECIFIC LEASE

DEPTH------THE TWO NUMBERS REPRESENT THE INTERVAL ON HAND AT THE LIBRARY

FORMATION--REPRESENTS THE FORMATION PENETRATED AT THE TOTAL DEPTH OF THE INTERVAL HELD BY THE LIBRARY

TS---------INDICATES THE AVAILABILITY OF THIN SECTIONS

DS---------INDICATES THE AVAILABILITY OF A DRILLERS LOG

EL---------INDICATES THE AVAILABILITY OF AN ELECTRIC LOG

AGE--------REPRESENTS THE AGE PENETRATED AT THE TOTAL DEPTH OF THE INTERVAL HELD BY THE LIBRARY

BOXES------REPRESENTS THE NUMBER OF BOXES IN WHICH THE CORE IS CONTAINED

					1-E	12456	12924	GORMAN	NO	NO	NO	ORDOVICIAN	32
			[illegible] CORPORATION	TEXAS-000	1	12438	12731	GORMAN	NO	NO	NO	ORDOVICIAN	25
[illegible]	ANDREWS	000	HUMBLE OIL AND REFINING	COWDEN	18-D	10026	10120	ELLENBURG	NO	NO	NO	ORDOVICIAN	3
C-00087F	ANDREWS	000	HUMBLE OIL AND REFINING	LINEBERRY, EVELYN	2	10340	10488	GORMAN	NO	YES	NO	ORDOVICIAN	12
C-00056	ANDREWS	000	HUMBLE OIL AND REFINING	PARKER	37	8740	8928	ELLENBURG	NO	YES	NO	ORDOVICIAN	5
C-00128	ANDREWS	000	MAGNOLIA PETROLEUM COMPANY	UNIVERSITY-36995	2	13851	13876	ELLENBURG	NO	YES	NO	ORDOVICIAN	4
C-00129	ANDREWS	000	SHELL OIL COMPANY	LOCKHART	12	8667	8847	GORMAN	NO	NO	NO	ORDOVICIAN	15
C-00088C	ANDREWS	000	SHELL OIL COMPANY	PINSON	1	10642	10773	GORMAN	NO	YES	NO	ORDOVICIAN	2
C-00075	ANDREWS	000	SHELL OIL COMPANY	RATCLIFF	7	11064	11155	GORMAN	NO	YES	NO	ORDOVICIAN	9
C-01050	ANDREWS	000	SINCLAIR OIL AND GAS	COWDEN	31	10500	11390	MONTOYA	NO	YES	NO	ORDOVICIAN	11
C-01063	ANDREWS	000	SINCLAIR OIL AND GAS	UNIVERSITY	143-4	4607	6865	FULLERTON	NO	NO	NO	PERMIAN	6
C-00159I	ANDREWS	000	SOUTHLAND ROYALTY	LOWE	1	12166	12294	ELLENBURG	NO	NO	NO	ORDOVICIAN	15
C-00566	ANDREWS	000	STANDARD OF TEXAS	FASKEN	5-1	12590	12741	MONTOYA	NO	NO	NO	ORDOVICIAN	22
C-00574	ANDREWS	000	STANDARD OF TEXAS	HOWELL	1	12115	12183	ELLENBURG	NO	NO	NO	ORDOVICIAN	28
C-00572	ANDREWS	000	STANDARD OF TEXAS	SOCONY-MOBIL	1	10974	11343	ELLENBURG	NO	NO	NO	ORDOVICIAN	15
C-00568	ANDREWS	000	STANDARD OF TEXAS	SOUTHLAND-ROYALTY	16-2	12122	12216	ELLENBURG	NO	YES	NO	ORDOVICIAN	30
C-00499	ANDREWS	000	STANOLIND	COWDEN	36	10625	10830		NO	NO	NO		18
C-00505	ANDREWS	000	STANOLIND	CREWS, ELIZABETH	1	4150	4198		NO	NO	NO		3
C-01311	ANDREWS	000	SUN OIL COMPANY	THORNBERRY, M.A.	1	4245	4326	SAN ANDRES	NO	YES	NO	PERMIAN	27
C-01387	ANDREWS	000	SUN OIL COMPANY	UNIVERSITY BLOCK 4	3	4858	4868		NO	NO	NO		1
C-01388	ANDREWS	000	SUN OIL COMPANY	UNIVERSITY	Q-2	10931	10946		NO	NO	NO		1
C-01391	ANDREWS	000	SUN OIL COMPANY	UNIVERSITY BLOCK 9A	1	4733	4741		NO	NO	NO		1
C-00052	ANDREWS	000	SUPERIOR OIL COMPANY	UNIVERSITY	1-36A	12230	12439	GORMAN	NO	NO	NO	ORDOVICIAN	9
C-00453	ANGELINA	000	ROXANA	LONGBELL	4	0	200		NO	NO	NO		13
C-01349	ARANSAS	000	SUN OIL COMPANY	COPANO STATE	104-7	6885	7180	FRIO	NO	YES	NO	OLIGOCENE	17
B-00085E	ARCHER	000	MAGNOLIA PETROLEUM COMPANY	HAYTOR (SKIPS)	1	1398	5406		NO	NO	NO		1
B-00085B	ARCHER	000	MAGNOLIA PETROLEUM COMPANY	THOM	3	3853	3869		NO	NO	NO		1
B-00085C	ARCHER	000	MAGNOLIA PETROLEUM COMPANY	THOM	4	3856	3890		NO	NO	NO		1
C-00085F	ARCHER	000	MCCARTY AND COLEMAN	TAYLOR, W.H.	2-A	4972	4991		NO	NO	NO		1
C-01104	ARCHER	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	8	23	100	GRAHAM	NO	NO	NO	PERMIAN	2
C-01105	ARCHER	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	9	23	85	GRAHAM	NO	NO	NO	PERMIAN	1
B-00081F	ARCHER	000	SNODD, C.W.	JONES	1	4064	4097		NO	NO	NO		1
C-00438	ATASCOSA	000	BALLARD-UNDERWOOD	EASTWOOD	1	1650	5311		NO	NO	NO		2
C-01560	ATASCOSA	000	HOPE, ALVIN C.	KORUS, FRANCIS	1	5223	5284	GLEN ROSE	NO	NO	NO	L.CRETAC.	21
C-00542	ATASCOSA	000	HUMBLE OIL AND REFINING	PRUITT, E.J.	46	9660	10736	SLIGO	NO	NO	NO	L.CRETAC.	163
C-00057I	ATASCOSA	000	JOC EXPLORATION	UNKNOWN	1	2006	2185	OLMOS	NO	NO	NO	U. CRETAC.	6
C-00168	ATASCOSA	000	MAGNOLIA PETROLEUM COMPANY	DORNAK	1	7260	7328		NO	NO	YES	CRETAC.	9
C-00397	ATASCOSA	000	RIO BRAVO OIL COMPANY	BROWN	1	1154	3329		NO	NO	NO		2
C-00387	ATASCOSA	000	RIO BRAVO OIL COMPANY	CORTINAS	1	2190	4000		NO	NO	NO		4
C-00434	ATASCOSA	000	RIO BRAVO OIL COMPANY	CORTINAS	2	3041	4700		NO	NO	NO		1
C-00172	ATASCOSA	000	SUN OIL COMPANY	TOM	1-A	10541	10982	EDWARDS	NO	NO	NO	L. CRETAC.	4
C-01371	ATASCOSA	000	SUN OIL COMPANY	URBANCZKY	1	10791	10917	EDWARDS	NO	NO	NO	L. CRETAC.	2
C-01548	ATASCOSA	000	TENNECO	CLIMER, GLEN	1	6162	6705	SLIGO	NO	NO	NO	L. CRETAC.	118
C-01551	ATASCOSA	000	TENNECO	ROGERS, CLEO	1	5271	5785	SLIGO	NO	NO	NO	L. CRETAC.	127
C-01537	ATASCOSA	000	TENNECO	SMITH, P.R.	1	3984	4539	SLIGO	NO	NO	NO	L. CRETAC.	124
C-01528	ATASCOSA	000	TENNECO AND PENNZOIL UNITED	FINCH, O.C.	1	5341	6326	SLIGO	NO	NO	NO	L. CRETAC.	98
C-01536	ATASCOSA	000	TENNECO AND PENNZOIL UNITED	SMITH, JULIA J.	1	4415	5356	SLIGO	NO	NO	NO	L. CRETAC.	118
C-01568	ATASCOSA	000	TENNECO AND PENNZOIL UNITED	SMITH, JULIA J.	2	2583	2653	ANACACHO	NO	NO	NO	U. CRETAC.	22
C-01529	ATASCOSA	000	TENNECO AND PENNZOIL UNITED	SUGGS, J.N.	1	6227	7267	SLIGO	NO	NO	NO	L. CRETAC.	109
C-00707	AUSTIN	000	MAGNOLIA PETROLEUM COMPANY	LASIKAR ESTATE	1	8968	9456		NO	YES	NO		7
C-01194	AUSTIN	000	SUN OIL COMPANY	BEAMAN	1	9734	9896		NO	YES	NO		22
C-01195	AUSTIN	000	SUN OIL COMPANY	JANOBSKY	1	5710	5758		NO	YES	NO		8
C-00200	BANDERA	000	MCBRIDE, W.C. INC.	MCBRIDE	1	870	1179		NO	NO	NO		1
C-00497A	BANDERA	000	ROWSEY OIL COMPANY	ROWSEY	2	6266	6882	RILEY	NO	NO	NO	CAMBRIAN	26
C-06064	BANDERA	015	SHELL DEV. CO.(B.F. PERKINS)	GARRISON LAKE	1	0	170	GLEN ROSE	NO	NO	NO	[illegible]	[illegible]
C-06062	BANDERA	006	SHELL DEV. CO.(B.F. PERKINS)	HOSKINSON RANCH	1	[illegible]	[illegible]						

		...RKINS)	RIPPEY R.-D.R.RIPPEY	7	8	65	GLEN ROSE	NO	NO	NO	L. CRETAC.	6
		006 SHELL DEV. CO.(B.F. PERKINS)	RIPPEY R.-D.R.RIPPEY	8	0	81	GLEN ROSE	NO	NO	NO	L. CRETAC.	7
C-06042	BANDERA	006 SHELL DEV. CO.(B.F. PERKINS)	ROTGE, ALBERT H.	1	0	46	GLEN ROSE	NO	NO	NO	L. CRETAC.	5
C-06043	BANDERA	006 SHELL DEV. CO.(B.F. PERKINS)	ROTGE, ALBERT H.	2	0	35	GLEN ROSE	NO	NO	NO	L. CRETAC.	3
C-06044	BANDERA	006 SHELL DEV. CO.(B.F. PERKINS)	ROTGE, ALBERT H.	3	0	30	GLEN ROSE	NO	NO	NO	L. CRETAC.	2
C-06045	BANDERA	006 SHELL DEV. CO.(B.F. PERKINS)	ROTGE, ALBERT H.	4	0	78	GLEN ROSE	NO	NO	NO	L. CRETAC.	6
C-06046	BANDERA	006 SHELL DEV. CO.(B.F. PERKINS)	ROTGE, ALBERT H.	5	10	71	GLEN ROSE	NO	NO	NO	L. CRETAC.	5
C-06047	BANDERA	006 SHELL DEV. CO.(B.F. PERKINS)	ROTGE, ALBERT H.	6	0	62	GLEN ROSE	NO	NO	NO	L. CRETAC.	6
C-06048	BANDERA	006 SHELL DEV. CO.(B.F. PERKINS)	ROTGE, ALBERT H.	7	0	129	GLEN ROSE	NO	NO	NO	L. CRETAC.	12
C-06049	BANDERA	006 SHELL DEV. CO.(B.F. PERKINS)	ROTGE, ALBERT H.	8	0	79	GLEN ROSE	NO	NO	NO	L. CRETAC.	5
C-06098	BANDERA	006 SHELL DEV. CO.(STRICKLIN)	PIPE CREEK-RIPPEY R	1	4	130	GLEN ROSE	NO	NO	NO	L. CRETAC.	10
C-00479	BASTROP	000 AMBASSADOR OIL COMPANY	ANDERSON	1	1734	2731		NO	NO	NO		5
C-00487	BASTROP	000 AMBASSADOR OIL COMPANY	ANDERSON	2	1235	1790		NO	NO	NO		5
C-00324	BASTROP	000 ANDERSON-PRICHARD	STANDIFER	1	1773	2329	AUSTIN	NO	NO	NO	U. CRETAC.	40
C-00457	BASTROP	000 CAMP, ET AL	BAILEY, H.L.	1	1697	2203	DALE LIME	NO	NO	NO	U. CRETAC.	63
C-00409	BASTROP	000 DENVER PROD. AND REFINING	HICKS, MILLIE	1	2509	2634	GEORGETOWN	NO	NO	NO	L. CRETAC.	1
C-00477	BASTROP	000 LOPEZ, M.M.	MALEY W.A.	1	1450	2095		NO	NO	NO		16
C-00485	BASTROP	000 LOPEZ, M.M.	WAMEL	1	1411	2226		NO	NO	NO		110
C-00372	BASTROP	000 MCGAHAN, D.B., ET AL	HOLCOMB, C.	1	1690	2236		NO	YES	NO		1
C-00388	BASTROP	000 MCGAHAN, D.B. ET AL	HOLCOMB, C.	1	1687	1784		NO	YES	NO		1
C-00443	BASTROP	000 MIDWEST TEXAS OIL COMPANY	GARZA, L.	1	2580	2692	GEORGETOWN	NO	YES	NO	L. CRETAC.	1
C-00407	BASTROP	000 MIDWEST TEXAS OIL COMPANY	GARZA, L.	1	2003	2570	GEORGETOWN	NO	YES	YES	L. CRETAC.	1
C-01398	BASTROP	000 SUN OIL COMPANY	HAYES	1	6660	6666	SLIGO	NO	NO	NO	L. CRETAC.	2
C-01534	BASTROP	000 TENNECO	KAUFFMAN,D.F.	1	5430	6058	SLIGO	NO	NO	NO	L. CRETAC.	95
C-01531	BASTROP	000 TENNECO	SAWICKI, F.J.	1	7138	7823	SLIGO	NO	NO	NO	L. CRETAC.	63
C-06124	BASTROP	000 TEXACO	BROWDER	1	8295	9044		NO	NO	NO		9
C-06120	BASTROP	000 TEXAS WATER RESOURCES	CARRIZO-WILCOX	1	177	387		NO	NO	NO		10
C-06119	BASTROP	000 TEXAS DEPT OF WATER RESOURCES	CARIZO-WILCOX	2	43	854		NO	NO	NO		34
C-00780	BASTROP	000 TEXAS BASIN-BUR. OF RECLAM.	SALEM DAM SITE	1	0	46		NO	NO	NO		1
C-00195	BASTROP	000 TRAVIS DRILLINGS	NASH-INGRAM	1	2255	2315		NO	NO	NO		21
C-00325	BASTROP	000 WILLIAMSON AND PRI	SCHWENK	2	1020	1130		NO	NO	NO		30
C-01106	BAYLOR	000 NORTH TEXAS CANAL ROUTE	TEST HOLE	10	0	70	WICHITA	NO	NO	NO	PERMIAN	1
C-00157B	BEE	000 CARL, WILLIAM E.	GILLETTE, MAE	1	9915	10230	WILCOX	NO	NO	YES	EOCENE	10
C-05000	BEE	000 M-G-F OIL CORPORATION	BOONE	1	13451	13581	EDWARDS	NO	NO	YES	L. CRETAC.	22
C-00665C	BEE	000 M-G-F OIL CORPORATION	SCHULZ	1	13431	13531	EDWARDS	NO	NO	YES	L. CRETAC.	12
C-00666F	BEE	000 SHELL OIL COMPANY	CURRER	1	13596	14078	EDWARDS	NO	NO	YES	L. CRETAC.	30
C-05001	BEE	000 SHELL OIL COMPANY	CURRER	1	13721	13925	EDWARDS	NO	NO	YES	L. CRETAC.	32
C-00666H	BEE	000 SHELL OIL COMPANY	LEPPARD	1	13531	13936	EDWARDS	NO	NO	YES	L. CRETAC.	46
C-01292	BEE	000 SHELL OIL COMPANY	RUHMAN	1	13455	13700	EDWARDS	NO	NO	NO	L. CRETAC.	8
C-00531	BEE	000 SHELL OIL COMPANY	RUHMAN	1	13453	13765	EDWARDS	NO	NO	NO	L. CRETAC.	5
C-01354	BEE	000 SUN OIL COMPANY	PAGE	A-6	5535	5543		NO	NO	NO		3
C-01361	BEE	000 SUN OIL COMPANY	PAGE	A-8	5516	5549		NO	NO	NO		5
C-06027	BELL	031 SHELL DEV. CO.(D.L.AMSBURY)	CEDAR CREEK	1	2	139	EDWARDS	NO	NO	NO	L. CRETAC.	8
C-00786	BELL	000 SHELL DEV. CO.(D.L.AMSBURY)	LAWSON RANCH	1	0	315	EDWARDS	NO	NO	NO	L. CRETAC.	2
C-06019	BELL	031 SHELL DEV. CO.(D.L.AMSBURY)	MESSER,NEIL	1	0	191	EDWARDS	NO	NO	NO	L. CRETAC.	20
C-06022	BELL	019 SHELL DEV. CO.(D.L.AMSBURY)	NORWOOD, FRED	1	0	134	EDWARDS	NO	NO	NO	L. CRETAC.	8
C-06021	BELL	030 SHELL DEV. CO.(D.L.AMSBURY)	OCONNER, ALFRED	1	0	170	EDWARDS	NO	NO	NO	L. CRETAC.	18
C-00717	BEXAR	000 CITY WATER BOARD	RANDOLPH	1	834	834	EDWARDS	NO	NO	NO	L. CRETAC.	5
C-01436A	BEXAR	000 CORPS OF ENGINEERS	SELMA	1	241	770	GLEN ROSE	NO	YES	YES	L. CRETAC.	28
C-00198	BEXAR	000 GENERAL CRUDE OIL COMPANY	ROGERS RANCH	1	2658	2669		NO	NO	NO	PENNSYLVAN	2
C-00199	BEXAR	000 GENERAL CRUDE OIL COMPANY	TALLEY	1	2615	2622		NO	NO	NO	PENNSYLVAN	1
C-00161I	BEXAR	000 JACK MEYERS OIL COMPANY	VOGEL	1	1213	1231		NO	NO	NO		3
C-00193	BEXAR	000 RENLEE OIL COMPANY	THEIS, ADOLPH	1	828	2105	OUACHITA	NO	NO	YES	PALEOCENE	3
C-01339	BEXAR	000 SUN OIL COMPANY	AUSTIN	1	1265	2375		NO	NO	NO		
C-01549	BEXAR	000 TENNECO	HERRERA, VIRGILIA	1	3909	[illegible]	[illegible]					
C-00401	BEXAR	000 TEXAS SOUTHERN OIL AND DEV.	AUANT									

					1	2279	2290	WILBERNS	NO	NO	NO	CAMBRIAN	1
			[illegible]	SULTMEYER		2	64		NO	NO	NO		22
C-00726	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	1	0.	65	GRANITE	NO	NO	NO	PRECAMBRN	7
C-00727	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	2	0.	225	GRANITE	NO	NO	NO	PRECAMBRN	23
C-00728	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	3	0.	249	GRANITE	NO	NO	NO	PRECAMBRN	26
C-00729	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	4	0.	172	GRANITE	NO	NO	NO	PRECAMBRN	17
C-00730	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	5	0.	275	GRANITE	NO	NO	NO	PRECAMBRN	29
C-00731	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	6	10.	314	GRANITE	NO	NO	NO	PRECAMBRN	33
C-00732	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	7	0.	365	GRANITE	NO	NO	NO	PRECAMBRN	38
C-00733	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	8	0.	380.	GRANITE	NO	NO	NO	PRECAMBRN	37
C-00734	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	9	0.	368	GRANITE	NO	NO	NO	PRECAMBRN	38
C-00735	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	10.	0.	221	GRANITE	NO	NO	NO	PRECAMBRN	23
C-00736	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	11	0.	186	GRANITE	NO	NO	NO	PRECAMBRN	20.
C-00737	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	12	0.	366	GRANITE	NO	NO	NO	PRECAMBRN	38
C-00738	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	13	4	257	GRANITE	NO	NO	NO	PRECAMBRN	27
C-00739	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	14	0.	364	CAP MTN.	NO	NO	NO	CAMBRIAN	38
C-00740	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	15	2	476	GRANITE	NO	NO	NO	PRECAMBRN	44
C-00741	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	16	17	421	GRANITE	NO	NO	NO	PRECAMBRN	44
C-00742	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	17	0.	420	GRANITE	NO	NO	NO	PRECAMBRN	44
C-00743	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	18	0.	605	CAP MTN.	NO	NO	NO	CAMBRIAN	62
C-00744	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	19	25	283	GRANITE	NO	NO	NO	PRECAMBRN	30.
C-00745	BLANCO	000	LINDGREN AND LEHMAN, INC.	HOG THIEF BEND	20.	0.	255	GRANITE	NO	NO	NO	PRECAMBRN	27
C-00746	BLANCO	000	LINDGREN AND LEHMAN, INC.	IRON ROCK CREEK	1	0.	513	GRANITE	NO	NO	NO	PRECAMBRN	51
C-00747	BLANCO	000	LINDGREN AND LEHMAN, INC.	IRON ROCK CREEK	2	0.	633	GRANITE	NO	NO	NO	PRECAMBRN	65
C-00748	BLANCO	000	LINDGREN AND LEHMAN, INC.	IRON ROCK CREEK	3	0.	185	GRANITE	NO	NO	NO	PRECAMBRN	18
C-00749	BLANCO	000	LINDGREN AND LEHMAN, INC.	IRON ROCK CREEK	4	0.	244	GRANITE	NO	NO	NO	PRECAMBRN	26
C-00750	BLANCO	000	LINDGREN AND LEHMAN, INC.	IRON ROCK CREEK	5	0.	725	GRANITE	NO	NO	NO	PRECAMBRN	72
C-06051	BLANCO	022	SHELL DEV CO (B F PERKINS)	BECKMANN	1	0.	62	GLEN ROSE	NO	NO	NO	L. CRETAC.	7
C-06052	BLANCO	022	SHELL DEV CO (B F PERKINS)	BECKMANN	2	0.	51	GLEN ROSE	NO	NO	NO	L. CRETAC.	6
C-06053	BLANCO	022	SHELL DEV CO (B F PERKINS)	BECKMANN	3	0.	62	GLEN ROSE	NO	NO	NO	L. CRETAC.	7
C-06054	BLANCO	022	SHELL DEV CO (B F PERKINS)	DAVIS	1	0.	79	GLEN ROSE	NO	NO	NO	L. CRETAC.	7
C-06055	BLANCO	022	SHELL DEV CO (B F PERKINS)	DAVIS	2	0.	91	GLEN ROSE	NO	NO	NO	L. CRETAC.	9
C-00001	BORDEN	000	AMERADA PETROLEUM CORP.	WEATHERS	6	6802	6841	CANYON	NO	YES	NO	PENNSYLVAN	6
C-00007	BORDEN	000	MAGNOLIA PETROLEUM COMPANY	CONRAD	C-3	6755	6767	CANYON	NO	NO	NO	PENNSYLVAN	1
C-00008	BORDEN	000	MAGNOLIA PETROLEUM COMPANY	CONRAD	C-5	6911	6944	CANYON	NO	YES	NO	PENNSYLVAN	1
C-00006	BORDEN	000	SEABOARD	CANNON	1	8357	8404	CANNON	NO	YES	NO	PENNSYLVAN	2
C-00009	BORDEN	000	SEABOARD	CLAYTON, J. B.	A-1	8390.	8405	CANYON	NO	YES	NO	PENNSYLVAN	3
C-00535	BORDEN	000	SEABOARD	GOOD	1	7947	8009	CANYON	NO	YES	NO	PENNSYLVAN	3
C-00005	BORDEN	000	SEABOARD	GOOD	12	0.	0.	CANYON	NO	NO	NO	PENNSYLVAN	1
C-00003	BORDEN	000	SEABOARD	GOOD	24	8088	8186	CANYON	NO	YES	NO	PENNSYLVAN	10.
C-00534	BORDEN	000	SEABOARD	GOOD	27	8251	8303	CANYON	NO	YES	NO	PENNSYLVAN	3
C-00533	BORDEN	000	SEABOARD	GOOD	28	8264	8319	CANYON	NO	YES	NO	PENNSYLVAN	2
C-00004	BORDEN	000	SEABOARD	HANKS, PORTER	1	6230.	6246	SPRAYBERRY	NO	YES	NO	PERMIAN	1
C-00536	BORDEN	000	SEABOARD	ZANT	1	7822	7855		NO	NO	NO		1
C-00002	BORDEN	000	SLICK-MOORMAN	VAN ROEDER	1	6695	6805	CANYON	NO	NO	NO	PENNSYLVAN	12
C-00570	BORDEN	000	STANDARD OF TEXAS	GOOD, CLARA	1	9759	9802	FUSSELMAN	NO	NO	NO	SILURIAN	15
C-01290	BORDEN	000	SUN OIL COMPANY	MCDOWELL	1	6657	6677	WOLFCAMP	NO	NO	NO	PERMIAN	8
C-01046	BOWIE	000	PAN AMERICAN CORPORATION	BRADHAM	1	6328	6340	SMACKOVER	NO	NO	NO	JURASSIC	3
C-00795	BOWIE	000	TEXAS WATER PROJECT	TEST HOLE -XCN-	1	1	71		NO	NO	NO		1
C-00828	BOWIE	000	TEXAS WATER PROJECT	TEST HOLE -ND-	1	1	61		NO	NO	NO		2
C-05010	BRAZORIA	000	BRITISH-AMERICAN	FAY A.B.	1	12773	13597	SLIGO	NO	NO	NO	L. CRETAC.	3
C-00300D	BRAZORIA	000	BRITISH AMERICAN	FAY	1	11867	13954	SKIPS	NO	NO	NO		1
T-00043	BRAZORIA	000	PAN AMERICAN CORPORATION	SHEPARDS MATT	1	0.	0.	FRIO	NO	NO	NO	L. CRETAC.	9
C-00605	BRAZORIA	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY	1	16	48		NO	NO	NO		3
C-00604	BRAZORIA	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY	2	16	51		NO	NO	NO		2
C-00602	BRAZORIA	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY	3	16	75		NO	NO	NO		
C-00634	BRAZORIA	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY									

			... VALLEY		2	16	75		NO	NO	NO		4
			... GNDWT. AND WAT COMM.	TEST HOLE	RF-4	0	1425	GLEN ROSE	NO	NO	NO	L. CRETAC.	153
C-00167	BROOKS	000	ARKANSAS FUEL OIL	DAWSON, J. F.	1	7119	7549	FRIO	YES	YES	YES	OLIGOCENE	2
C-06112	BROOKS	000	BUR OF ECO GEO-US GYPSUM	GH-39 GYP HILL		12	916						95
C-01256	BROOKS	000	SUN OIL COMPANY	HORNSBY	1-A	7366	8996		NO	YES	NO		17
C-06104	BROWN	000	HOUSTON OIL AND MINERAL	STRATIGRAPHIC TEST		1658	2446	CHAPELL	NO	NO	NO	MISSIPPI	1
C-01076	BROWN	000	MOBIL OIL COMPANY	DAWSCH	1	0	0		NO	NO	NO		1
C-01249	BROWN	000	SUN OIL COMPANY	BLAIR	1	2861	3005		NO	NO	NO		1
C-01255	BROWN	000	SUN OIL COMPANY	HANKS, B.	1	5987	6058		NO	NO	NO		2
C-06097	BROWN	000	WATER DEVELOPMENT BOARD	MEDLEY 31-57-85859-60		0	103		NO	NO	NO		1
T-00002	BURLESON	000	CADDO OIL COMPANY	COFFIELD B-7-A	3	3326	3375	NAVARRO	NO	YES	NO	U. CRETAC.	18
C-00667B	BURLESON	000	LAMBERT HOLLUB DRLG. CO.	KEY	1	6024	6124	BUDA	NO	NO	NO	L. CRETAC.	8
C-00433	BURLESON	000	RED BANK OIL COMPANY	GRAMM	1	6080	6341	EDWARDS	NO	YES	YES	L. CRETAC.	4
C-01235	BURLESON	000	SUN OIL COMPANY	DUGGER-HERRING-WELL	1	10138	10138		NO	NO	NO		4
C-00347	BURNET	000	CHILDRESS QUARRY	TEST HOLE	2	0	332	MARBLE FLS	NO	NO	NO	PENNSYLVAN	2
C-00346	BURNET	000	CHILDRESS QUARRY	TEST HOLE	3	0	38	MARBLE FLS	NO	NO	NO	PENNSYLVAN	3
C-00751	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	1	10	434	GRANITE	NO	NO	NO	PRECAMBRN	44
C-00752	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	2	7	235	CAP MTN.	NO	NO	NO	CAMBRIAN	24
C-00753	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	3	0	326	GRANITE	NO	NO	NO	PRECAMBRN	33
C-00754	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	4	0	369	CAP MTN.	NO	NO	NO	CAMBRIAN	37
C-00755	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	5	5	355	CAP MTN.	NO	NO	NO	CAMBRIAN	37
C-00756	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	6	0	250	GRANITE	NO	NO	NO	PRECAMBRN	26
C-00757	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	7	48	135	CAP MTN.	NO	NO	NO	CAMBRIAN	14
C-00758	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	8	0	86	CAP MTN.	NO	NO	NO	CAMBRIAN	9
C-00759	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	9	0	232	GRANITE	NO	NO	NO	PRECAMBRN	25
C-00760	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	10	4	65	CAP MTN.	NO	NO	NO	CAMBRIAN	7
C-00761	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	11	0	65	GRANITE	NO	NO	NO	PRECAMBRN	7
C-00762	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	12	0	63	CAP MTN.	NO	NO	NO	CAMBRIAN	6
C-00763	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	13	0	47	GRANITE	NO	NO	NO	PRECAMBRN	5
C-00764	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	14	0	115	GRANITE	NO	NO	NO	PRECAMBRN	13
C-00765	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	15	0	215	GRANITE	NO	NO	NO	PRECAMBRN	23
C-00766	BURNET	000	LINDGREN AND LEHMAN, INC.	SLAUGHTER GAP	16	0	185	GRANITE	NO	NO	NO	PRECAMBRN	19
C-06017	BURNET	028	SHELL DEV CO (C H MOORE)	N.BERTRAM-C. ALLEN	1	9	158	PALUXY	NO	NO	NO	L. CRETAC.	15
C-06016	BURNET	027	SHELL DEV CO (C H MOORE)	OATMEAL-SHAW PROP.	1	4	142	PALUXY	NO	NO	NO	L. CRETAC.	15
C-06018	BURNET	027	SHELL DEV CO (C H MOORE)	WATSON RANCH-HARDIN	1	9	72	PALUXY	NO	NO	NO	L. CRETAC.	7
T-00014B	BURNET	000	U.S. AIR FORCE	BG-CR	10	12	200	GRANITE	NO	YES	NO	PRECAMBRN	14
C-00312	CALDWELL	000	MAGNOLIA PETROLEUM COMPANY	MERCER, ALF	40	2067	4720	SLIGO	NO	NO	NO		14
C-00305	CALDWELL	000	ADAMS-RIDDLE	DINGES	1	2504	2552		NO	NO	NO		16
C-00190	CALDWELL	000	ADAMS-RIDDLE	DINGES	2	2086	2468		NO	NO	NO		41
C-00303	CALDWELL	000	BEARD-SCHEFTS	BROWNE	3-A	1927	2230		NO	NO	NO		102
C-00302	CALDWELL	000	BEARD-SCHEFTS	BROWNE	7-A	1880	2217		NO	NO	NO		107
C-00212	CALDWELL	000	BEARD-SCHEFTS	BROWNE	8	1915	2243		NO	NO	NO		114
C-00386	CALDWELL	000	CALLIHAN-ELLISON, ET. AL.	DILLARD-COOPER	1	2246	2753		NO	NO	NO		1
C-00403	CALDWELL	000	CALLIHAN-ELLISON, ET. AL.	DILLARD-SCURRY	1	2675	2675		NO	NO	NO		1
C-00384	CALDWELL	000	DANCIGER-DEVELOPMENT SYND.	JOLLEY	1	440	1425		NO	YES	NO		1
C-00089F	CALDWELL	000	DELRAY OIL COMPANY	BRANDY	19	1970	2229	BUDA LIME	NO	NO	NO	L. CRETAC.	15
C-00089H	CALDWELL	000	DELRAY OIL COMPANY	BRANDY	18	1910	2167	BUDA LIME	NO	NO	NO	L. CRETAC.	13
C-06108	CALDWELL	000	DOW CHEMICAL	WHITE (SKIPS	1	1164	2217		NO	NO	NO		6
C-00385	CALDWELL	000	EDWARDS, JOHN ET. AL.	CALDWELL	1	1346	1480		NO	YES	NO		1
C-00439	CALDWELL	000	GIVENS, ET. AL.	BEDNOR	1	1906	1909		NO	NO	NO		1
C-00400	CALDWELL	000	GREYBERG	BLACKBURN	1	1581	2452		NO	NO	NO		1
C-00564	CALDWELL	000	GULF OIL CORPORATION	BEATTY	36	1244	1996	GEORGETOWN	NO	YES	NO	L. CRETAC.	193
C-00304	CALDWELL	000	HAYNES-JOHNS	RODENBURG	1	1902	2192		NO	YES	NO		97
C-00210	CALDWELL	000	IRVING-SCHEFTS	BRANYON	1-A	1974	2445		NO	NO	NO		106
C-00211	CALDWELL	000	LULING OIL AND GAS	TILLER	1	2315	2610	TAYLOR	NO	YES	NO	U. CRETAC.	[illegible]
C-00478	CALDWELL	000	MAGNOLIA PETROLEUM COMPANY	GRAYBURG-TABOR	15	1884	[illegible]						
C-00486	CALDWELL	000	MAGNOLIA PETROLEUM COMPANY	HARRISON ...									

Moore Business Forms, Inc. S

				... S. W.	1	1984	2034	EDWARDS	NO	YES	NO	L. CRETAC.	17
			... OPERATOR AND TRUST	SCHOLWINSKI	1	1125	2735		NO	NO	NO		108
C-00360	CALDWELL	000	ORMSBY	MERIWEATHER	6	2282	2632		NO	NO	NO		27
C-00402	CALDWELL	000	PAYNE AND BOND	SCHAWE	2	780	1514		NO	YES	NO		2
C-00432	CALDWELL	000	RAYOR, M. O.	AUGUST	1	2020	2360		NO	NO	NO		18
C-00373	CALDWELL	000	RAYOR, M. O.	WALKER	2	2950	3698		NO	YES	NO		1
C-00160G	CALDWELL	000	ROUSELL, LOUIS J.	NAME WITHELD	C	1905	2514	BUDA	NO	NO	NO	L. CRETAC.	24
C-06135	CALDWELL	000	SERBAN	HINDS	1	2300	2737		NO	NO	NO		74
C-00213	CALDWELL	000	SCHEFTS, MARTIN	CLARK, S.	1	1872	2210	AUSTIN	NO	YES	NO	U. CRETAC.	112
C-00315	CALDWELL	000	SMITH-STARR	CROWELL	1	2425	6490	HOSSTON	NO	YES	NO	L. CRETAC.	14
C-00428	CALDWELL	000	SOUTHERN PRODUCING COMPANY	HOLCOMB-BRANNING	1	1243	1359		NO	NO	YES	CRETACEOUS	30
C-00163	CALDWELL	000	STARR-MCNEIL	CROWELL	1	4135	5340	SLIGO	NO	YES	YES	L. CRETAC.	326
C-00422	CALDWELL	000	SWEARINGEN BROS.-ARMSTRONG	WRIGHT	1	2217	2352		NO	NO	NO		20
C-01542	CALDWELL	000	TENNECO	DICKSON, R.P.	1	5468	6179	SLIGO	NO	NO	NO	L. CRETAC.	62
C-00352	CALDWELL	000	UNITED NORTH AND SOUTH	BYRD	2	2015	4149	EDWARDS	NO	NO	NO	L. CRETAC.	2
C-00354	CALDWELL	000	UNITED NORTH AND SOUTH	GIDEON	1	2071	2166	EDWARDS	NO	YES	NO	L. CRETAC.	1
C-00355	CALDWELL	000	UNITED NORTH AND SOUTH	HARDIMAN	7	2116	4136	EDWARDS	NO	NO	NO	L. CRETAC.	1
C-00353	CALDWELL	000	UNITED NORTH AND SOUTH	KELLY	1	3935	4660	EDWARDS	NO	NO	NO	L. CRETAC.	2
C-00356	CALDWELL	000	UNITED NORTH AND SOUTH	SHANKLIN	1	2012	4584	EDWARDS	NO	NO	NO	L. CRETAC.	13
C-00351	CALDWELL	000	UNITED NORTH AND SOUTH	TABOR	8	3371	4744	EDWARDS	NO	NO	NO	L. CRETAC.	1
C-00350	CALDWELL	000	UNITED NORTH AND SOUTH	TILLER	2	3320	4645	EDWARDS	NO	YES	NO	L. CRETAC.	2
C-00165	CALDWELL	000	VOYLES AND BYRD	TAYLOR	1	1699	1748	EDWARDS	NO	NO	NO	L. CRETAC.	17
C-00158D	CALDWELL	000	VOYLES AND SOTHRN. PROD.	JOLLY	6	1261	1964	EDWARDS	NO	NO	NO	L. CRETAC.	88
C-00427	CALDWELL	000	VOYLES AND SOTHRN. PROD.	SCHAEFFER	1	1260	1364	EDWARDS	NO	NO	NO	L. CRETAC.	28
C-01360	CALHOUN	000	SUN OIL COMPANY	LAVACA BAY	34	8679	8804	FRIO	YES	NO	YES	OLIGOCENE	3
C-01218	CALLAHAN	000	SUN OIL COMPANY	FREELAND	1	2899	3832	BARNETT	NO	YES	NO	MISSISSIPPI	27
C-01221	CALLAHAN	000	SUN OIL COMPANY	GUYTON	1	3218	4100	ELLENBURG	NO	YES	NO	ORDOVICIAN	27
C-01253	CALLAHAN	000	SUN OIL COMPANY	WILLIAMS	1	2403	2513	MORAN	NO	YES	NO	PERMIAN	12
C-06099	CALLAHAN	000	WATER DEVELOPMENT BOARD	PAGE 30-55-620	611	0	83		NO	NO	NO		1
C-01327	CAMERON	000	SUN OIL COMPANY	CAMERON COUNTY DIST.	1	9778	9841	FRIO	NO	NO	YES	OLIGOCENE	18
C-01280	CAMERON	000	SUN OIL COMPANY	CAMERON COUNTY DIST.	1-A	9750	9861	FRIO	NO	YES	YES	OLIGOCENE	34
C-00791	CAMP	000	TEXAS WATER PROJECT	BORING -TD-	1	1	140		NO	NO	NO	EOCENE	5
C-00792	CAMP	000	TEXAS WATER PROJECT	BORING -TD-	2	1	51		NO	NO	NO	EOCENE	1
C-00822	CAMP	000	TEXAS WATER PROJECT	BORING -FCT-	3	1	111		NO	NO	NO	EOCENE	4
C-00823	CAMP	000	TEXAS WATER PROJECT	BORING -FCT-	4	1	98		NO	NO	NO	EOCENE	4
C-00824	CAMP	000	TEXAS WATER PROJECT	BORING -FCT-	5	1	101		NO	NO	NO	EOCENE	3
C-00825	CAMP	000	TEXAS WATER PROJECT	BORING -FCT-	6	1	58		NO	NO	NO	EOCENE	3
C-00826	CAMP	000	TEXAS WATER PROJECT	BORING -FCT-	7	1	71		NO	NO	NO	EOCENE	2
C-01072	CARSON	000	AIKMAN	SANFORD	1	3093	3093		NO	NO	NO		3
C-01073	CARSON	000	CABOT CORPORATION	RAPSTINE	2	0	0		NO	NO	NO		1
C-01182	CHAMBERS	000	SUN OIL COMPANY	HOFFMAN	2	8432	8548		NO	YES	NO		6
C-00437	CHEROKEE	000	GENERAL CRUDE OIL COMPANY	STOCKTON, ET AL	1	4380	4504		NO	YES	NO	L. CRETAC.	3
C-01234	CHEROKEE	000	SUN OIL COMPANY	TEMPLE INDUSTRIES	1	5104	5180		NO	NO	NO		24
C-00632	CHEROKEES	000	AMERICAN PETROFINA COMPANY	CHILDRESS	1	3737	3939	WOODBINE	NO	YES	NO	U. CRETAC.	17
B-00084G	CHILDRESS	000	HUMBLE OIL AND REFINING	FURR	1	2573	5594		NO	NO	NO		1
C-01081	CHILDRESS	000	WEST TEXAS DRILLING COMPANY	OWENS, STEVE	1	5778	6235		NO	NO	NO		21
C-00344	CLAY	000	HUMBLE OIL AND REFINING	DEEP ROCK MOORE	1	6636	6894	ELLENBURG	NO	NO	NO	ORDOVICIAN	14
B-00080E	CLAY	000	MAGNOLIA PETROLEUM CONPANY	FISHER	1	6524	6529	ELLENBURG	NO	NO	NO	ORDOVICIAN	1
B-00084F	CLAY	000	MAGNOLIA PETROLEUM COMPANY	FORD	1	3992	4343	STRAWN	NO	NO	NO	PENNSYLVAN	1
B-00084E	CLAY	000	MAGNOLIA PETROLEUM COMPANY	FORD -SKIPS-	2	3891	4494	BRYSON	NO	NO	NO	PENNSYLVAN	1
B-00085	CLAY	000	MAGNOLIA PETROLEUM COMPANY	OLIVER	1	3193	3280	STRAWN	NO	NO	NO	PENNSYLVAN	1
B-00085A	CLAY	000	MAGNOLIA PETROLEUM COMPANY	OLIVER	2	3179	3185	STRAWN	NO	NO	NO	PENNSYLVAN	1
C-00085G	CLAY	000	MAGNOLIA PETROLEUM COMPANY	WYNN	4	1	10		NO	NO	NO		1
B-00084C	CLAY	000	MAGNOLIA PETROLEUM COMPANY	WYNN	5	4484	4492		NO	NO	NO		1
B-00084D	CLAY	000	MAGNOLIA PETROLEUM COMPANY	WYNN	7	4529	4539		NO	NO	NO		
C-00668G	CLAY	000	PHILLIPS PETROLEUM COMPANY	HAPGOOD	1								

				[illegible]WORTH, C.W.	2	6090	6127	STRAWN	NO	YES	NO	PENNSYLVAN	1
				BLOODWORTH,	2	5766	6271	STRAWN	NO	YES	NO	PENNSYLVAN	149
		000	SUN OIL COMPANY	BLOODWORTH, H.L.	2	5599	6456	STRAWN	NO	YES	NO	PENNSYLVAN	1
C-00184	COKE	000	SUN OIL COMPANY	BRANNON	10	6049	6314	ELLENBURG	NO	YES	NO	ORDOVICIAN	95
C-01363	COKE	000	SUN OIL COMPANY	CUMMINGS	2	5770	5872	CANYON	NO	YES	NO	PENNSYLVAN	3
C-01364	COKE	000	SUN OIL COMPANY	CUMMINGS	4	5885	6019	CANYON	NO	YES	NO	PENNSYLVAN	5
C-00147	COKE	000	SUN OIL COMPANY	CUMMINGS	5	5905	6038	ELLENBURG	NO	YES	NO	ORDOVICIAN	45
C-00148	COKE	000	SUN OIL COMPANY	CUMMINGS	6	5911	6031	STRAWN	NO	YES	NO	PENNSYLVAN	34
C-01270	COKE	000	SUN OIL COMPANY	CUMMINGS	7	1090	1120		NO	NO	NO		8
C-00144	COKE	000	SUN OIL COMPANY	CUMMINGS	9	6062	6182	CANYON	NO	NO	NO	PENNSYLVAN	43
C-01362	COKE	000	SUN OIL COMPANY	CUMMINGS	13	6174	6246	STRAWN	NO	YES	NO	PENNSYLVAN	4
C-01413	COKE	000	SUN OIL COMPANY	CUMMINGS	16	6032	6063	STRAWN	NO	NO	NO	PENNSYLVAN	4
C-00146	COKE	000	SUN OIL COMPANY	CUMMINGS	16	6032	6064	STRAWN	NO	NO	NO	PENNSYLVAN	11
C-01414	COKE	000	SUN OIL COMPANY	CUMMINGS	17	5928	6013	STRAWN	NO	NO	NO	PENNSYLVAN	5
C-00145	COKE	000	SUN OIL COMPANY	CUMMINGS	18	5990	6739	STRAWN	NO	NO	NO	PENNSYLVAN	6
C-01404	COKE	000	SUN OIL COMPANY	CUMMINGS	18	5990	6239	STRAWN	NO	NO	NO	PENNSYLVAN	2
C-01250	COKE	000	SUN OIL COMPANY	CUMMINGS	19	950	1071		NO	NO	NO		2
C-01366	COKE	000	SUN OIL COMPANY	DAVIDSON	3	5940	6038	STRAWN	NO	YES	NO	PENNSYLVAN	5
C-00298B	COKE	000	SUN OIL COMPANY	DAVIDSON	9	5642	5866	STRAWN	NO	YES	NO	PENNSYLVAN	24
C-01365	COKE	000	SUN OIL COMPANY	DAVIDSON	11	5958	6046	STRAWN	NO	YES	NO	PENNSYLVAN	5
C-00341	COKE	000	SUN OIL COMPANY	JAMISON	7	6331	6494	CANYON	NO	YES	NO	PENNSYLVAN	52
C-00162	COKE	000	SUN OIL COMPANY	JAMISON	7	5967	6359	CANYON	NO	YES	NO	PENNSYLVAN	104
C-00337	COKE	000	SUN OIL COMPANY	BRANNON	14	5855	6326	CANYON	NO	YES	NO	PENNSYLVAN	79
C-00339	COKE	000	SUN OIL COMPANY	JAMISON, H.H.	26	5896	6562	CANYON	NO	NO	NO	PENNSYLVAN	103
C-01331	COKE	000	SUN OIL COMPANY	MALONE	1	5586	5598	CANYON	NO	YES	NO	PENNSYLVAN	4
C-01293	COKE	000	SUN OIL COMPANY	MALONE, CYNTHIA	A-1	5688	5764	CANYON	NO	YES	NO	PENNSYLVAN	26
C-00185	COKE	000	SUN OIL COMPANY	MATHERS	6	5999	6502	CANYON	NO	NO	NO	PENNSYLVAN	134
C-01348	COKE	000	SUN OIL COMPANY	PRICE, F.	1	5714	5744	CANYON	NO	NO	NO	PENNSYLVAN	3
C-01241	COKE	000	SUN OIL COMPANY	PRICE	1	1165	1313	CANYON	NO	NO	NO	PENNSYLVAN	20
C-00153	COKE	000	SUN OIL COMPANY	PRICE	3	5900	6013	CANYON	NO	YES	NO	PENNSYLVAN	40
C-01343	COKE	000	SUN OIL COMPANY	SCHOOLER	1	6313	6422	CANYON	NO	YES	NO	PENNSYLVAN	19
C-00338	COKE	000	SUN OIL COMPANY	WALKER	A-1	6111	6318	CANYON	NO	YES	NO	PENNSYLVAN	72
C-00183	COKE	000	SUN OIL COMPANY	WALKER	3	6273	6920	CANYON	NO	YES	NO	PENNSYLVAN	93
C-00340	COKE	000	SUN OIL COMPANY	WALKER	7	5976	6264	CANYON	NO	YES	NO	PENNSYLVAN	95
C-00156G	COLEMAN	000	DEL-RAY OIL COMPANY	ALLCORN	1	2998	3007	PALO PINTO	NO	NO	NO	PENNSYLVAN	1
C-00157E	COLEMAN	000	DEL-RAY OIL COMPANY	LOUDER	1	2960	2970	PALO PINTO	NO	NO	NO	PENNSYLVAN	2
C-00299G	COLEMAN	000	DEL-RAY OIL COMPANY	UNKNOWN		2521	2974	PALO PINTO	NO	NO	NO	PENNSYLVAN	2
C-00156B	COLEMAN	000	SIGMORE OIL CORPORATION	DAY	1	2343	2393	MARBLE FLS	NO	NO	NO	PENNSYLVAN	5
C-00156I	COLEMAN	000	SIGMORE OIL CORPORATION	TUCKER	2	2330	2356	MARBLE FLS	NO	NO	NO	PENNSYLVAN	5
C-01198	COLEMAN	000	SUN OIL COMPANY	JOHNSON	1	4192	4374	ELLENBURG	NO	YES	NO	ORDOVICIAN	62
C-00089D	COLLIN	000	HUMBLE OIL AND REFINING	MILLER	1	9298	11388	ELLENBURG	NO	NO	NO	ORDOVICIAN	94
C-01023	COLGWORTH	000	LA CIMA	BELL	A-7	2170	2174		NO	NO	NO		19
C-00616	COLGWORTH	000	SALT FORK BASIN-BUR. RECL.	SAMNORWOOD DAM	1-2-3-4	0	0		NO	NO	NO		3
C-00708	COLORADO	000	MAGNOLIA PERTOLEUM COMPANY	CHESTERVILLE UNIT	6	9470	9735		NO	YES	NO		7
C-00664F	COLORADO	000	MAGNOLIA PETROLEUM COMPANY	GRACEY WEGENHOFT	1	9804	14280	WILCOX	YES	YES	YES	EOCENE	5
C-00161E	COLORADO	000	PURE OIL	VOGELSANG, FREIDA	1	8266	10504	WILCOX	YES	YES	YES	EOCENE	316
C-00778	COLORADO	000	TEXAS BASIN-BUR. OF RECLAM.	SKULL CREEK DAM	1	0	49		NO	NO	NO		1
C-00246	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	1	26	294		NO	NO	NO	CRETACEOUS	18
C-00258	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	1	3	175		NO	NO	NO	L. CRETAC.	6
C-00247	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	2	32	193		NO	NO	NO	L. CRETAC.	11
C-00260	COMAL	000	CORPS OF ENGINEERS	CANYON DAM -WC-	2	10	100		NO	NO	NO	L. CRETAC.	5
C-00259	COMAL	000	CORPS OF ENGINEERS	CANYON DAM 8-	2	6	159		NO	NO	NO	L. CRETAC.	7
C-00248	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	3	0	159		NO	NO	NO	L. CRETAC.	[illegible]
C-00261	COMAL	000	CORPS OF ENGINEERS	CANYON DAM -WC-	3	4	129		NO	NO	[illegible]		
C-00262	COMAL	000	CORPS OF ENGINEERS	CANYON DAM 8-	3	81	[illegible]						
C-00249	COMAL	000	CORPS OF ENGINEERS	CANYON DAM									

				CANYON DAM	10	0	161		NO	NO	NO	L. CRETAC.	10
	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	12	0	160		NO	NO	NO	L. CRETAC.	10
C-00256	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	14	0	67		NO	NO	NO	CRETACEOUS	8
C-00257	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	16	0	150		NO	NO	NO	L. CRETAC.	7
C-00640	COMAL	010	CORPS OF ENGINEERS	CANYON DAM	2C-49T82	0	150		NO	NO	NO	L. CRETAC.	12
C-00639	COMAL	010	CORPS OF ENGINEERS	CANYON DAM	2C-75T00	50	174		NO	NO	NO	L. CRETAC.	14
C-00641	COMAL	010	CORPS OF ENGINEERS	CANYON DAM	F 1-213	0	373	GLEN ROSE	NO	NO	NO	L. CRETAC.	7
C-06080	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	F1 2 C-112	119	254		YES	NO	NO	CRETACEOUS	17
C-06081	COMAL	000	CORPS OF ENGINEERS	CANYON DAM	F1 2 C-140	7	351		YES	NO	NO	L. CRETAC.	21
C-00317	COMAL	000	LANDA PARK	WATER WELL	2-0	0	320	EDWARDS	NO	NO	NO	L. CRETAC.	74
C-06011	COMAL	010	SHELL DEV CO (F E LOZO)	CANYON-EGON PREUSSER	1	2	156	GLEN ROSE	NO	NO	NO	L. CRETAC.	14
C-06068	COMAL	000	SHELL DEV CO (F E LOZO)	WAGNER	1	7	72	EDWARDS	YES	NO	NO	L. CRETAC.	7
C-06069	COMAL	000	SHELL DEV CO (F E LOZO)	WEHE	1	5	82	EDWARDS	YES	NO	NO	L. CRETAC.	8
C-06015	COMAL	010	SHELL DEV CO (C H MOORE)	BRETZKE, LEE	1	0	68	GLEN ROSE	NO	NO	NO	L. CRETAC.	6
C-06057	COMAL	009	SHELL DEV CO (B F PERKINS)	BREMER, CURTIS	1	9	125	GLEN ROSE	NO	NO	NO	L. CRETAC.	12
C-06058	COMAL	005	SHELL DEV CO (B F PERKINS)	MAYER, EDWIN	1	1	118	GLEN ROSE	NO	NO	NO	L. CRETAC.	11
C-06059	COMAL	005	SHELL DEV CO (B F PERKINS)	MAYER, EDWIN	2	0	96	GLEN ROSE	NO	NO	NO	L. CRETAC.	6
C-06060	COMAL	005	SHELL DEV CO (B F PERKINS)	MAYER, EDWIN	3	0	73	GLEN ROSE	NO	NO	NO	L. CRETAC.	5
C-01165	COMAL	000	WATER DEVELOPMENT BOARD	TEST HOLE	DX-2	275	433	GLEN ROSE	NO	NO	NO	L. CRETAC.	13
C-01126	COMANCHE	000	BOX, N. L.	OBSERVATION WELL	1	0	103		NO	NO	NO		2
C-01127	COMANCHE	000	BOX, N. L.	OBSERVATION WELL	2	20	983		NO	NO	NO		2
C-01128	COMANCHE	000	BOX, N. L.	OBSERVATION WELL	3	0	101		NO	NO	NO		2
C-01129	COMANCHE	000	BOX, N. L.	OBSERVATION WELL	4	0	105		NO	NO	NO		2
C-01130	COMANCHE	000	BOX, N. L.	OBSERVATION WELL	6	0	132		NO	NO	NO		1
C-06101	COMANCHE	000	WATER DEVELOPMENT BOARD	KIMMELL 31-53-448	9-450	0	109		NO	NO	NO		1
C-06098	COMANCHE	000	WATER DEVELOPMENT BOARD	CRAIG 41-05-402	7,8,9	0	111		NO	NO	NO		1
C-06096	COMANCHE	000	WATER DEVELOPMENT BOARD	GILBREATH LAND 41-06	512	0	369	NO	NO	NO			2
C-01011	CONCHO	000	CARTER, E. L.	CARTER, E.L.	1	1540	1592		NO	NO	NO		17
C-01289	CONCHO	000	SUN OIL COMPANY	WARDLAW	1	2427	2432	CANYON	NO	YES	NO	PENNSYLVAN	2
C-01065	COOKE	000	COX, D. A.	COX, D. A.	2	3842	3963		NO	NO	NO		1
C-01064	COOKE	000	COX, D. A.	COX, D. A.	2-A	2940	4038		NO	NO	NO		1
C-00473	COOKE	000	HOLLINGSWORTH	FETTE	31	5000	5000		NO	NO	NO	PRECAMBRN	1
B-00081G	COOKE	000	MAGNOLIA PETROLEUM COMPANY	MCGEORGE -SKIPS-	1	5366	5513		NO	NO	NO		3
C-00082A	COOKE	000	MAGNOLIA PETROLEUM CO.	MCGEORGE	2	4864	5582		NO	NO	NO		9
C-00081A	COOKE	000	MAGNOLIA PETROLEUM COMPANY	MCGEORGE	3	5544	5573		NO	NO	NO		5
C-00084	COOKE	000	MAGNOLIA PETROLEUM COMPANY	MCGEORGE	4	5596	5595		NO	NO	NO		3
B-00081B	COOKE	000	MAGNOLIA PETROLEUM COMPANY	MITCHELL	1	3885	3903		NO	YES	NO		2
B-00082	COOKE	000	MAGNOLIA PETROLEUM COMPANY	MITCHELL	1	3895	3913		NO	YES	NO		2
C-00079G	COOKE	000	MAGNOLIA PETROLEUM COMPANY	MOONEY -SKIPS-	4	2676	3988		NO	NO	NO		1
C-00079A	COOKE	000	MAGNOLIA PETROLEUM COMPANY	RAMSEY	1	7822	7842		NO	NO	NO		1
C-00079B	COOKE	000	MAGNOLIA PETROLEUM COMPANY	RAMSEY -SKIPS-	2	4660	4897		NO	NO	NO		2
B-00079D	COOKE	000	MAGNOLIA PETROLEUM COMPANY	RAMSEY	4	4657	5677		NO	NO	NO		1
C-00079C	COOKE	000	MAGNOLIA PETROLEUM COMPANY	RAMSEY	6	4747	4759		NO	NO	NO		1
C-00079E	COOKE	000	MAGNOLIA PETROLEUM COMPANY	RAMSEY -SKIPS-	8	4662	4813		NO	NO	NO		1
B-00079F	COOKE	000	MAGNOLIA PETROLEUM COMPANY	RAMSEY	9	4655	4680		NO	NO	NO		1
B-00080A	COOKE	000	MAGNOLIA PETROLEUM COMPANY	RAMSEY	13	4741	5290		NO	NO	NO		1
C-00080B	COOKE	000	MAGNOLIA PETROLEUM COMPANY	RAMSEY	18	4697	4708		NO	NO	NO		1
C-01101	COOKE	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	5	20	100	DUCK CREEK	NO	NO	NO	L. CRETAC.	2
C-01102	COOKE	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	6	11	47	DUCK CREEK	NO	NO	NO	L. CRETAC.	4
C-01103	COOKE	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	7	0	60	GOODLAND	NO	NO	NO	L. CRETAC.	1
C-01117	COOKE	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	22	0	75		NO	NO	NO	L. CRETAC.	2
C-00082B	COOKE	000	SEITZ, ET AL	MCGEORGE	3	5512	5521		NO	NO	NO		1
C-00080C	COOKE	000	SEITZ, ET AL	WILLIAMS	1	5490	5521		NO	NO	NO		1
B-00076G	COOKE	000	SNODD, C. W.	WEESE	2	3427	3433		NO	NO	NO		1
C-00511	COOKE	000	STANOLIND	BEST, J. M.	13	4846	4998		NO	NO	NO		
C-00509	COOKE	000	STANOLIND	BEST, J. M.									

C-00903	CULBERSON	000	CITIES SERVICE OIL
C-00932	CULBERSON	000	CITIES SERVICE OIL
C-00864	CULBERSON	000	CITIES SERVICE OIL
C-00896	CULBERSON	000	CITIES SERVICE OIL
C-00892	CULBERSON	000	CITIES SERVICE OIL
C-00914	CULBERSON	000	CITIES SERVICE OIL
C-00855	CULBERSON	000	CITIES SERVICE OIL
C-00907	CULBERSON	000	CITIES SERVICE OIL
C-00910	CULBERSON	000	CITIES SERVICE OIL
C-00934	CULBERSON	000	CITIES SERVICE OIL
C-00936	CULBERSON	000	CITIES SERVICE OIL
C-00860	CULBERSON	000	CITIES SERVICE OIL
C-00862	CULBERSON	000	CITIES SERVICE OIL
C-00863	CULBERSON	000	CITIES SERVICE OIL
C-00918	CULBERSON	000	CITIES SERVICE OIL
C-00930	CULBERSON	000	CITIES SERVICE OIL
C-00853	CULBERSON	000	CITIES SERVICE OIL
C-00931	CULBERSON	000	CITIES SERVICE OIL
C-00868	CULBERSON	000	CITIES SERVICE OIL
C-00903	CULBERSON	000	CITIES SERVICE OIL
C-00904	CULBERSON	000	CITIES SERVICE OIL
C-00858	CULBERSON	000	CITIES SERVICE OIL
C-00902	CULBERSON	000	CITIES SERVICE OIL
C-00854	CULBERSON	000	CITIES SERVICE OIL
C-00879	CULBERSON	000	CITIES SERVICE OIL
C-00847	CULBERSON	000	CITIES SERVICE OIL
C-00914	CULBERSON	000	CITIES SERVICE OIL
C-00851	CULBERSON	000	CITIES SERVICE OIL
C-00909	CULBERSON	000	CITIES SERVICE OIL
C-00912	CULBERSON	000	CITIES SERVICE OIL
C-00916	CULBERSON	000	CITIES SERVICE OIL
C-00905	CULBERSON	000	CITIES SERVICE OIL
C-00915	CULBERSON	000	CITIES SERVICE OIL
C-00850	CULBERSON	000	CITIES SERVICE OIL
C-00875	CULBERSON	000	CITIES SERVICE OIL
C-00880	CULBERSON	000	CITIES SERVICE OIL
C-00911	CULBERSON	000	CITIES SERVICE OIL
C-00895	CULBERSON	000	CITIES SERVICE OIL
C-00929	CULBERSON	000	CITIES SERVICE OIL
C-00866	CULBERSON	000	CITIES SERVICE OIL
C-00887	CULBERSON	000	CITIES SERVICE OIL
C-00808	CULBERSON	000	CITIES SERVICE OIL
C-00848	CULBERSON	000	CITIES SERVICE OIL
C-00885	CULBERSON	000	CITIES SERVICE OIL
C-00878	CULBERSON	000	CITIES SERVICE OIL
C-00874	CULBERSON	000	CITIES SERVICE OIL
C-00897	CULBERSON	000	CITIES SERVICE OIL
C-00894	CULBERSON	000	CITIES SERVICE OIL
C-00846	CULBERSON	000	CITIES SERVICE OIL
C-00923	CULBERSON	000	CITIES SERVICE OIL
C-00867	CULBERSON	000	CITIES SERVICE OIL
C-00883	CULBERSON	000	CITIES SERVICE OIL
C-00898	CULBERSON	000	CITIES SERVICE OIL

									NO	NO	NO		4
				[illegible] -SKIPS-	1	6331	6557		NO	NO	NO		1
C-01195	COOKE	000	SUN OIL COMPANY	FREEMAN (ADAM SEITZ)	2	3044	3104		NO	NO	NO		22
C-01367	COOKE	000	SUN OIL COMPANY	PRICE	3	5900	6043		NO	NO	NO		6
C-01262	COOKE	000	SUN OIL COMPANY	SAYLORS	3	2565	2604		NO	YES	NO		10
C-00078D	COOKE	000	TEXACO	ROSUSE	1	6771	6788		NO	NO	NO		1
C-06026	CORYELL	032	SHELL DEV. CO.(AMSBURY)	EVANT (SHELDON PRO)	1	1	150	PALUXY	NO	NO	NO	L. CRETAC.	16
C-00201	COTTLE	000	GENERAL CRUDE OIL COMPANY	SWENSON DVLP. CO.	13-1	5410	5454		NO	NO	NO	PRECAMBRN	1
C-00202	COTTLE	000	GENERAL CRUDE OIL COMPANY	SWENSON	29-1	5392	5402	CANYON	NO	NO	NO	PENNSYLVAN	1
C-00203	COTTLE	000	GENERAL CRUDE OIL COMPANY	SWENSON	33-1	5392	5452		NO	YES	NO	PRECAMBRN	1
C-00204	COTTLE	000	GENERAL CRUDE OIL COMPANY	SWENSON	273-1	5315	5452		NO	YES	NO	PRECAMBRN	1
C-01082	COTTLE	000	STANDARD OF TEXAS	BARRON	1	6538	6564	MORROW	NO	NO	NO	PENNSYLVAN	1
C-01089	COTTLE	000	STAND. AND ROBINSON BROS.	TIPPEN	2	6798	6877	MORROW	NO	NO	NO	PENNSYLVAN	2
C-00123	CRANE	000	ATLANTIC REFINING COMPANY	UNIVERSITY	1-W	10391	10522	ELLENBURG	NO	NO	NO	ORDOVICIAN	9
C-00291	CRANE	000	GULF OIL CORPORATION	ESTES, W.A.	28-E	7951	8099	ELLENBURG	NO	NO	NO	ORDOVICIAN	31
C-00290	CRANE	000	GULF OIL CORPORATION	HENDERSON, D.W.	94	10074	10645		NO	NO	NO	DEVONIAN	54
C-00296	CRANE	000	GULF OIL CORPORATION	LEA, ET AL	14-T	2903	4898	SAN ANDRES	NO	NO	NO	PERMIAN	182
C-00282	CRANE	000	GULF OIL CORPORATION	WADDELL	144-E	10136	11048	ELLENBURG	NO	NO	NO	ORDOVICIAN	91
C-00099	CRANE	000	HUMBLE OIL AND REFINING	COWDEN	1-C	9024	9132	ELLENBURG	NO	YES	NO	ORDOVICIAN	7
C-00120	CRANE	000	HUMBLE OIL AND REFINING	COWDEN	3	8804	8955	HONEYCUT	NO	YES	NO	ORDOVICIAN	20
C-00382	CRANE	000	SINCLAIR-PRAIRIE ET AL	TUBBS	2	5753	6362	ELLENBURG	NO	YES	NO	ORDOVICIAN	99
C-00154	CROCKETT	000	CONTINENTAL OIL COMPANY	HARRIS	E-1	10131	10178	ELLENBURG	NO	YES	NO	ORDOVICIAN	8
C-00117	CROCKETT	000	CONTINENTAL OIL COMPANY	HARRIS	E-1	10131	10178	ELLENBURG	NO	YES	NO	ORDOVICIAN	8
C-00087I	CROCKETT	000	HUMBLE OIL AND REFINING	COX, ALMA	1	8143	8178	ELLENBURG	NO	YES	NO	ORDOVICIAN	2
C-00088B	CROCKETT	000	HUMBLE OIL AND REFINING	COX, ALMA	1-C	8207	8678	ELLENBURG	NO	YES	NO	ORDOVICIAN	20
C-00135	CROCKETT	000	HUMBLE OIL AND REFINING	COX	1-D	7417	7999	GORMAN	NO	YES	NO	ORDOVICIAN	53
C-00088	CROCKETT	000	HUMBLE OIL AND REFINING	COX, ALMA	1-E	8602	8668	ELLENBURG	NO	YES	NO	ORDOVICIAN	7
C-00067	CROCKETT	000	HUMBLE OIL AND REFINING	HARDWICK	2	8481	8505	ELLENBURG	NO	YES	NO	ORDOVICIAN	2
C-00065	CROCKETT	000	MAGNOLIA PETROLEUM COMPANY	HOSPITAL-SHANNON	1	7094	7320	ELLENBURG	NO	YES	NO	ORDOVICIAN	19
C-00089A	CROCKETT	000	SHELL OIL COMPANY	BAGGETT, W.R.	2-20	6590	6769	CANYON	NO	NO	NO	PENNSYLVAN	21
C-00070	CROCKETT	000	SHELL OIL COMPANY	CHAMBERS	5	7506	7602	ELLENBURG	NO	YES	NO	ORDOVICIAN	1
C-00071	CROCKETT	000	SHELL OIL COMPANY	CHAMBERS	9	7534	7585	ELLENBURG	NO	YES	NO	ORDOVICIAN	1
C-00072	CROCKETT	000	SHELL OIL COMPANY	CHAMBERS	10	7520	7584	ELLENBURG	NO	YES	NO	ORDOVICIAN	1
C-00073	CROCKETT	000	SHELL OIL COMPANY	CHAMBERS	12	7502	7553	ELLENBURG	NO	NO	NO	ORDOVICIAN	1
C-00716	CROCKETT	000	STANDARD-MILLSPAUGH	GARLITZ (SKIPS)	2-15	364	690		NO	NO	NO		4
C-00507	CROCKETT	000	STANOLIND	HOLT, NETTIE	3	1029	1462		NO	NO	NO		6
C-00420	CROCKETT	000	STANOLIND	TODD, J.S.	1	6146	7357	ELLENBURG	NO	YES	NO	ORDOVICIAN	27
C-01173	CROCKETT	000	SUN OIL COMPANY	UNIVERSITY	1	6897	6981		NO	YES	NO	DEVONIAN	28
C-00053	CROCKETT	000	SUPERIOR OIL COMPANY	UNIVERSITY	127	7331	7367	GORMAN	NO	YES	NO	ORDOVICIAN	17
C-01134	CROSBY	000	NORTH TEXAS CANAL ROUTE	BLANCO CANYON DAM	1	0	136		NO	NO	NO		5
C-01135	CROSBY	000	NORTH TEXAS CANAL ROUTE	BLANCO CANYON DAM	2	0	126		NO	NO	NO		4
C-00922	CULBERSON	000	CITIES SERVICE OIL COMPANY	ALICE	CT-1	0	2061		NO	NO	NO		4
C-00506	CROSBY	000	STANOLIND	ROBERTSON	2	3616	3719		NO	NO	NO		9
C-00865	CULBERSON	000	CITIES SERVICE OIL COMPANY	ALICE	CT-2	451	456		NO	NO	NO		1
C-00917	CULBERSON	000	CITIES SERVICE OIL COMPANY	ALICE	CT-2	110	1200		NO	NO	NO		2
C-00919	CULBERSON	000	CITIES SERVICE OIL COMPANY	ALICE	CT-3	1	870		NO	NO	NO		2
C-00921	CULBERSON	000	CITIES SERVICE OIL COMPANY	ALICE	CT-4	1	580		NO	NO	NO		1
C-00886	CULBERSON	000	CITIES SERVICE OIL COMPANY	ALICE	CT-5	0	1089		NO	NO	NO		6
C-00925	CULBERSON	000	CITIES SERVICE OIL COMPANY	ANN	CT-1	1	690		NO	NO	NO		3
C-00861	CULBERSON	000	CITIES SERVICE OIL COMPANY	ANN	CT-2	1	1137		NO	NO	NO		4
C-00888	CULBERSON	000	CITIES SERVICE OIL COMPANY	ANN	CT-3	1	850		NO	NO	NO		4
C-00893	CULBERSON	000	CITIES SERVICE OIL COMPANY	ANN	CT-4	0	854		NO	NO	NO		3
C-00924	CULBERSON	000	CITIES SERVICE OIL COMPANY	ARCO	3	1	1300		NO	NO	NO		5
C-00928	CULBERSON	000	CITIES SERVICE OIL COMPANY	ARMSTRONG	CT-1	14300	14650		NO	NO	NO		1
C-00927	CULBERSON	000	CITIES SERVICE OIL COMPANY	ATLAS	CT-1	0	715		NO	NO	NO		2
C-00844	CULBERSON	000	CITIES SERVICE OIL COMPANY	ATLAS	2	243	328		NO	NO	NO		2

					1	225	3151		NO	NO	NO		109
				TEST HOLE	11-1	0	1925	CASTILE	NO	NO	NO	PERMIAN	6
			...ON LAKE SULPHUR	TEST HOLE	11-4	0	1800	CASTILE	NO	NO	NO	PERMIAN	4
	...ERSON	000	JEFFERSON LAKE SULPHUR	TEST HOLE	12-9	0	1535	CASTILE	NO	NO	NO	PERMIAN	12
C-00989	CULBERSON	000	JEFFERSON LAKE SULPHUR	TEST HOLE	12-9	0	1762	CASTILE	NO	NO	NO	PERMIAN	11
C-00997	CULBERSON	000	JEFFERSON LAKE SULPHUR	TEST HOLE	12-11	0	1000	CASTILE	NO	NO	NO	PERMIAN	2
C-00990	CULBERSON	000	JEFFERSON LAKE SULPHUR	TEST HOLE	13-1	0	1200	CASTILE	NO	NO	NO	PERMIAN	8
C-00995	CULBERSON	000	JEFFERSON LAKE SULPHUR	TEST HOLE	14-5	0	2000	CASTILE	NO	NO	NO	PERMIAN	6
C-00994	CULBERSON	000	JEFFERSON LAKE SULPHUR	TEST HOLE	14-7	0	1475	CASTILE	NO	NO	NO	PERMIAN	4
C-00996	CULBERSON	000	JEFFERSON LAKE SULPHUR	TEST HOLE	14-8	0	1000	CASTILE	NO	NO	NO	PERMIAN	2
C-06072	CULBERSON	029	SHELL DEV. CO.(F.E. LOZO)	KENT-REYNOLDS RANCH	1	12	171	COX	NO	NO	YES	L. CRETAC.	8
C-06061	CULBERSON	000	SHELL DEV. CO.(PERKINS)	T-DIAMOND	1	1	197	BUDA	NO	NO	NO	L. CRETAC.	20
C-01275	CULBERSON	000	SUN OIL COMPANY	TXL	F-1	2540	2618	DELAWARE	NO	NO	NO	PERMIAN	5
C-00462	CULBERSON	000	WILLIAMS	UPDIKE(BLACK JOHN)	1		-		NO	NO	NO		19
C-00458	CULBERSON	000	WILLIAMS	UPDIKE(BLACK JOHN)		2900	3015	DELAWARE	NO	NO	NO	PERMIAN	1
C-00078E	DALLAS	000	MAGNOLIA PETROLEUM COMPANY	TRIGG	1	9062	9062		NO	NO	NO		1
C-00785	DALLAS	000	PRAIRIE PRODUCTION COMPANY	SMITH	C-1	0	23		NO	NO	NO	PRECAMBRN	3
C-01394	DAWSON	000	SUN OIL COMPANY	HARDY (W. LAMESA)	1	7957	10115		NO	NO	NO		7
C-00832	DELTA	000	TEXAS WATER PROJECT	BORING(SD)	1	1	61		NO	NO	NO		1
C-00833	DELTA	000	TEXAS WATER PROJECT	BORING(SD)	2	1	51		NO	NO	NO		1
T-00037	DEWITT	000	DIXEL RESOURCES	PETER JABLONSKI	1	14257	14424		NO	NO	NO		
C-00672	DEWITT	000	GETTY OIL COMPANY	BURNS	1	9238	9623	WILCOX	NO	YES	YES	EOCENE	28
T-00044	DEWITT	000	GETTY OIL COMPANY	GILBERT	1	1985	2069	ANACACHO	NO	NO	NO	U. CRETAC.	34
T-00045	DEWITT	000	GETTY OIL COMPANY	GILBERT	2	1955	2117	ANACACHO	NO	NO	NO	U. CRETAC.	41
T-00042	DEWITT	000	GETTY OIL COMPANY	GREELE	1	1985	3236	ANACACHO	NO	NO	NO	U. CRETAC.	57
T-00043	DEWITT	000	GETTY OIL COMPANY	GREELE	2	1949	2045	ANACACHO	NO	NO	NO	U. CRETAC.	33
C-00617	DEWITT	000	GULF BASIN-BUR. RECLAM.	HOCHEIM DAM SITE	1-15	0	50		NO	NO	NO		54
C-00086A	DEWITT	000	SHELL OIL COMPANY	BROWN, C.S.	1	15945	18000	EDWARDS	NO	NO	NO	L. CRETAC.	7
C-00541	DEWITT	000	SHELL OIL COMPANY	ROEHL, WALTER O.	1	13754	13768	EDWARDS	NO	NO	NO	L. CRETAC.	7
C-00774	DEWITT	000	TEXAS BASIN- BUR. OF RECLAM.	CUERO DAM SITE	1-14	0	100	EDWARDS	NO	NO	NO	L. CRETAC.	49
C-00349	DEWITT	000	TEXAS EASTERN TRANS.CORP.	GARBE	1	14043	14241		NO	YES	NO		14
C-01111	DICKENS	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	16	33	135	WHITEHORSE	NO	NO	NO	PERMIAN	4
C-01112	DICKENS	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	17	0	65	QTRMASTER	NO	NO	NO	PERMIAN	2
C-01113	DICKENS	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	18	0	104	DOCKUM	NO	NO	NO	TRIASSIC	6
C-01114	DICKENS	000	NOTRH TEXAS CANAL ROUTE	TEST HOLE	19	0	115		NO	NO	NO		3
C-01116	DICKENS	000	NOTRH TEXAS CANAL ROUTE	TEST HOLE	21	0	75	OGALLALA	NO	NO	NO	PLIOCENE	3
C-01115	DICKENS	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	20	0	56	OGALLALA	NO	NO	NO	PLIOCENE	1
C-01081E	DIMMIT	000	DELRAY OIL COMPANY	BAGGET	1-25	5456	5511	SAN MIGUEL	NO	NO	NO	U. CRETAC.	9
C-00668I	DIMMIT	000	DELRAY OIL COMPANY	HUCK	1	5444	5504	SAN MIGUEL	NO	NO	NO	U. CRETAC.	10
C-00668C	DIMMIT	000	DELRAY OIL COMPANY	JONES	3-16	5450	5499	SAN MIGUEL	NO	NO	NO	U. CRETAC.	7
C-00668D	DIMMIT	000	DELRAY OIL COMPANY	JONES	4-16	5449	5509	SAN MIGUEL	NO	NO	NO	U. CRETAC.	6
C-01081D	DIMMIT	000	DELRAY OIL COMPANY	JONES	6-16	5460	5521	SAN MIGUEL	NO	NO	NO	U. CRETAC.	10
C-00105G	DIMMIT	000	DELRAY OIL COMPANY	ROGERS	6-14	5415	5474	SAN MIGUEL	NO	NO	NO	U. CRETAC.	8
C-00105F	DIMMIT	000	DELRAY OIL COMPANY	ROGERS	8-14	5440	5496	SAN MIGUEL	NO	NO	NO	U. CRETAC.	8
C-00668B	DIMMIT	000	LONE STAR GAS	BRAY	1	2902	3397	SAN MIGUEL	NO	NO	NO	U. CRETAC.	15
C-01081B	DIMMIT	000	LONE STAR GAS	BRAY	2	2907	3428	SAN MIGUEL	NO	NO	NO	U. CRETAC.	11
C-00161B	DIMMIT	000	TESORO PETROLEUM CORPORATION	CRENSHAW	1	0	0	ANACACHO	NO	NO	NO	U. CRETAC.	1
C-00665A	DIMMIT	000	TESORO PETROLEUM CORPORATION	CRENSHAW	50	4922	4982	ANACACHO	NO	NO	NO	U. CRETAC.	10
C-00665B	DIMMIT	000	TESORO PETROLEUM CORPORATION	CRENSHAW	51	5158	5188	ANACACHO	NO	NO	NO	U. CRETAC.	1
C-01601	DIMMIT	000	TESORO PETRO CO.	CRENSHAW	51	5158	5188		NO	NO	NO		4
C-00161	DIMMIT	000	TESORO PETROLEUM CORPORATION	SAN MIGUEL	52	5147	5170	ANACACHO	NO	NO	NO	U. CRETAC.	2
C-00161C	DIMMIT	000	TESORO PETROLEUM CORPORATION	SAN MIGUEL	54	5084	5098	ANACACHO	NO	NO	NO	U. CRETAC.	2
C-00161D	DIMMIT	000	TESORO PETROLEUM CORPORATION	SAN MIGUEL	55	5050	5106	ANACACHO	NO	NO	NO	U. CRETAC.	
T-00033	DIMMIT	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	0	1800	1800	SAN MIGUEL	NO	NO			
C-00105D	DIMMIT	000	WOOD, W. H.	WEATHERS	1	2990	3000	SAN ...					
C-00368	DIMMIT	000	OTHERS	HANCHETT, LEE	1								

						[illegible]	112		NO	NO	NO		1
				FOSTER	E-1	12955	13116	HONEYCUT	NO	YES	NO	ORDOVICIAN	23
			CORPORATION	CONNEL	30-E	7335	8580	ELLENBURG	NO	YES	NO	ORDOVICIAN	35
		000	GULF OIL CORPORATION	CONNEL -B-	32-E	8017	9055	ELLENBURG	NO	YES	NO	ORDOVICIAN	32
C-00292	ECTOR	000	GULF OIL CORPORATION	CONNEL -B-	34-E	7330	7395	MONTOYA	NO	NO	NO	ORDOVICIAN	26
C-00275	ECTOR	000	GULF OIL CORPORATION	FOGELSON -A-	1	5438	8925	ELLENBURG	NO	NO	NO	ORDOVICIAN	51
C-00062	ECTOR	000	HUMBLE OIL AND REFINING	YARBROUGH-ALLEN	22	10528	10771	HONEYCUT	NO	NO	NO	ORDOVICIAN	15
C-00105A	ECTOR	000	KERR-MCGEE CORPORATION	FOSTER	C-101	4157	4422	SAN ANDRES	NO	NO	NO	PERMIAN	42
C-00300	ECTOR	000	KERR-MCGEE CORPORATION	FOSTER	C-107	4203	4494	SAN ANDRES	NO	NO	NO	PERMIAN	40
T-00065	ECTOR	000	KERR-MCGEE CORPORATION	GIST	A-504	4320	4412		NO	NO	NO		34
C-06129	ECTOR	000	KERR-MCGEE CORPORATION	GIST	B-501	4225	4318		NO	NO	NO		15
C-00298D	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	3	4010	4016	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00298E	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	5	4204	4221	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00298F	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN -E-	23	4159	4162	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00298G	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN -G-	25	4090	4093	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00298H	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	29	4098	4102	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00298I	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	35	4102	4105	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00299A	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	38	4086	4089	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00299B	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	47	4124	4127	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00299C	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	49	4110	4125	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00299D	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	51	4085	4100	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00299E	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	54	4106	4131	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-01081C	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	76	4102	5164	SAN ANDRES	NO	NO	NO	PERMIAN	13
C-00299F	ECTOR	000	PHILLIPS PETROLEUM COMPANY	COWDEN	78	4108	4111	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00095A	ECTOR	000	SHELL OIL COMPANY	EAST HARPER	266	4023	4134	SAN ANDRES	NO	NO	NO	PERMIAN	19
C-00095B	ECTOR	000	SHELL OIL COMPANY	EAST HARPER	379	4030	4164	SAN ANDRES	NO	NO	NO	PERMIAN	22
C-00171C	ECTOR	000	SHELL OIL COMPANY	HARPER, W.E.	382	4095	4252	SAN ANDRES	NO	NO	NO	PERMIAN	19
C-00089C	ECTOR	000	SHELL OIL COMPANY	EAST HARPER	463	4131	4360	SAN ANDRES	NO	NO	NO	PERMIAN	40
C-00089E	ECTOR	000	SHELL OIL COMPANY	TXL NORTH UNIT	739-W	6100	6200	ELLENBURG	NO	NO	NO	ORDOVICIAN	17
C-00058	ECTOR	000	SHELL OIL COMPANY	UNIVERSITY	D-10	8756	8795	ELLENBURG	NO	YES	NO	ORDOVICIAN	1
C-00501	ECTOR	000	STANOLIND	CORRIGAN	9	4113	4601	SAN ANDRES	NO	NO	NO	PERMIAN	42
C-01384	ECTOR	000	SUN OIL COMPANY	RUMSEY, DAVID	D-2	5657	5674	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-01312	ECTOR	000	SUN OIL COMPANY	WILLIAMSON	5	5560	5608	SAN ANDRES	NO	NO	NO	PERMIAN	16
C-01431	ECTOR	000	SUN OIL COMPANY	RUMSEY, DAVID	B-5	5563	5779	SAN ANDRES	NO	NO	NO	PERMIAN	1
C-00152B	ECTOR	000	TENNECO	BAGLEY	10	4103	4230	GRAYBURG	NO	YES	YES	PERMIAN	13
C-00152A	ECTOR	000	TENNECO	FOSTER	219-D	4043	4361	GRAYBURG	NO	YES	YES	PERMIAN	49
C-00300A	ECTOR	000	TENNECO	FOSTER	D-222	4175	4401	SAN ANDRES	NO	YES	YES	PERMIAN	37
C-00152C	ECTOR	000	TENNECO	JUDKINS	3-A	4215	4378	SAN ANDRES	NO	YES	YES	PERMIAN	22
C-00064	EDWARDS	000	HUMBLE OIL AND REFINING	GUTHRIE	1	3818	4139	HONEYCUT	NO	YES	NO	ORDOVICIAN	20
C-06028	EDWARDS	016	SHELL DEV. CO.(C.I.SMITH)	HYDE, LEE	1	0	100	GEORGETOWN	NO	NO	NO	L. CRETAC.	8
C-00089B	EDWARDS	000	TEXACO	PHILLIPS	1	4743	5312	HONEYCUT	NO	NO	NO	ORDOVICIAN	55
C-06033	ERATH	035	SHELL DEV. CO.(D.L.AMSBURY)	DUFFAU(L.W.WEEKS)	1	[illegible]	165	PALUXY	NO	NO	NO	L. CRETAC.	17
C-00497	FANNIN	000	GULF OIL CORPORATION	SMITH-LAW	1	5704	7288		NO	NO	NO		4
C-01100	FANNIN	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	4	4	48	GOBER	NO	NO	NO	U. CRETAC.	2
C-01310	FANNIN	000	SUN OIL COMPANY	TUCKER	1	[illegible]	[illegible]		NO	NO	NO		15
C-01519	FAYETTE	000	AMOCO	WEGENHOFT	1	13162	13200		NO	NO	NO		2
C-00529	FAYETTE	000	GRAY OIL COMPANY	WEITING	1	11675	11695	EDWARDS	NO	NO	NO	L. CRETAC.	1
C-00530	FAYETTE	000	SMITH, LLOYD	BUESCHER	1	4951	5043		NO	NO	YES		3
C-00522	FAYETTE	000	SOHIO PETROLEUM COMPANY	WEITING	1	11376	11738	EDWARDS	NO	NO	NO	L. CRETAC.	9
C-01278	FAYETTE	000	SUN OIL COMPANY	GRAY	1	11276	13764		NO	NO	NO		8
C-00665E	FAYETTE	000	STAPP OIL	BERRY	1	11140	11272		NO	NO	NO		11
C-00436	FISHER	000	GENERAL CRUDE OIL COMPANY	FLANNAGAN	7	2850	2875		NO	YES	NO		1
C-00435	FISHER	000	GENERAL CRUDE OIL COMPANY	FLANNAGAN	8	3089	3107		NO	YES	NO		[illegible]
C-00471	FISHER	000	GENERAL CRUDE OIL COMPANY	PURKEE	1	7015	7020		NO	NO	NO		
C-00011	FISHER	000	GENERAL CRUDE OIL COMPANY	WEBB	2	5475	5650	CANYON					
C-00010	FISHER	000	GENERAL CRUDE OIL COMPANY	WEBB	3								
[illegible]	FISHER	000	SKELLY OIL COMPANY	[illegible]									

Moore Business Forms, Inc. S

					24	30	70		NO	NO	NO		2
			...ANT	STEELE	1	5330	5336	STRAWN	NO	NO	NO	PENNSYLVAN	1
			...EARCH EXPLORATION	FOSTER FARMS	1	15157	15464		NO	NO	NO		17
	FORT BEND	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY	7	15	100	ALLUVIUM	NO	NO	NO	QUATERNARY	5
C-00611	FORT BEND	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY	8	16	52	ALLUVIUM	NO	NO	NO	QUATERNARY	2
C-00612	FORT BEND	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY	10	16	48	ALLUVIUM	NO	NO	NO	QUATERNARY	3
C-00613	FORT BEND	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY	11	16	70	ALLUVIUM	NO	NO	NO	QUATERNARY	3
C-00614	FORT BEND	000	TEXAS BASIN-BUR. OF RECLAM.	BRAZOS RIVER VALLEY	12	16	48	ALLUVIUM	NO	NO	NO	QUATERNARY	3
C-01300	FRANKLIN	000	HAMON, JAKE L.	CHITSEY	1	13061	13260		NO	NO	NO		53
C-00798	FRANKLIN	000	TEXAS WATER PROJECT	BORING (NES)	3	1	51		NO	NO	NO		1
C-00199	FRANKLIN	000	TEXAS WATER PROJECT	BORING (NES)	4	1	58		NO	NO	NO		1
C-00801	FRANKLIN	000	TEXAS WATER PROJECT	BORING (NES)	6	1	61		NO	NO	NO		1
C-00467	FREESTONE	000	HUMPHREYS CORPORATION	EDWARDS	1	2999	3035		NO	NO	NO		1
C-00454	FREESTONE	000	HUMPHREYS CORPORATION	SIMMONS	5	2926	2947		NO	NO	NO		2
C-00442	FREESTONE	000	RIO BRAVO OIL COMPANY	H. AND T.C.	14	3595	3595		NO	NO	NO		1
T-00060	FREESTONE	000	TEXACO	BUTLER G/U	2	10015	12454		NO	NO	NO		56
T-00061A	FREESTONE	000	TEXACO	MCKNIGHT	1	11930	13688		NO	NO	NO		8
T-00061B	FREESTONE	000	TEXACO	MCKNIGHT	2	13630	13688		NO	NO	NO		17
C-00783	FRIO	000	FRIO RIVER	TEST HOLE	8	0	0		NO	NO	NO		1
C-00666B	FRIO	000	GETTY OIL CO.	BEALL	1	5610	5980		NO	NO	NO		39
C-00491	FRIO	000	HOWETH	MCWILLIAMS	B-1	5943	6271		NO	NO	NO		16
C-00648	FRIO	000	HUMBLE OIL AND REFINING	TEACHING CORE	5	6087	6142	COW CREEK	NO	NO	NO	L. CRETAC.	7
C-00649	FRIO	000	HUMBLE OIL AND REFINING	TEACHING CORE	6	6419	6537	COW CREEK	NO	NO	NO	L. CRETAC.	7
C-00650	FRIO	000	HUMBLE OIL AND REFINING	TEACHING CORE	7	7176	7250	COW CREEK	NO	NO	NO	L. CRETAC.	8
C-00651	FRIO	000	HUMBLE OIL AND REFINING	TEACHING CORE	8	6140	6263	COW CREEK	NO	NO	NO	L. CRETAC.	13
C-00653	FRIO	000	HUMBLE OIL AND REFINING	TEACHING CORE	10	5937	5973	COW CREEK	NO	NO	NO	L. CRETAC.	4
C-00191	FRIO	000	LONE STAR PRODUCTION	CALVERT	1	6406	8904	GLEN ROSE	NO	NO	NO	L. CRETAC.	20
C-00719	FRIO	000	MITCHELL AND ASSOCIATES	MCWILLIAMS	1	5969	6084		NO	NO	NO		16
C-01552	FRIO	000	MONCRIEF, W. A.	RHEINER, DAN J.	2	6175	7343	SLIGO	NO	NO	NO	L. CRETAC.	71
T-00005	FRIO	000	PRAIRIE PRODUCTION	BENDELE	1	7906	8237	AUSTIN	NO	NO	NO	U. CRETAC.	40
T-00009	FRIO	000	QUINTANA PETROLEUM	HALFF	1	6082	6423		NO	NO	NO		26
C-01323	FRIO	000	SUN OIL COMPANY	JOHNSON-HASSIE	1	0	0		NO	NO	NO		1
C-01526	FRIO	000	TENNECO	HALF-OPENHEIMER	1	8648	9887	PEARSALL	NO	NO	NO	L. CRETAC.	86
C-01556	FRIO	000	TENNECO	MACK, JOHN G.	1	7435	7850	PEARSALL	NO	NO	NO	L. CRETAC.	99
C-01546	FRIO	000	TENNECO	SIRIANNI, L.G.	1	5854	6500	SLIGO	NO	NO	NO	L. CRETAC.	127
C-01540	FRIO	000	TENNECO	STOKER, M.F.I.	1	6740	7409	SLIGO	NO	NO	NO	L. CRETAC.	84
C-01550	FRIO	000	TENNECO AND PENNZOIL UNITED	EDGAR, H.E.	1	5135	6135	SLIGO	NO	NO	NO	L. CRETAC.	115
C-01532	FRIO	000	TENNECO AND PENNZOIL UNITED	GOAD, T.J.	1	5662	6342	SLIGO	NO	NO	NO	L. CRETAC.	148
C-01533	FRIO	000	TENNECO AND PENNZOIL UNITED	GOAD, T.J.	2	5936	6775	PEARSALL	NO	NO	NO	L. CRETAC.	94
C-01538	FRIO	000	TENNECO AND PENNZOIL UNITED	MACHEN, O.W.	1	5093	6270	SLIGO	NO	NO	NO	L. CRETAC.	125
C-01539	FRIO	000	TENNECO AND PENNZOIL UNITED	ROBERTS, W.A.	1	5792	6949	SLIGO	NO	NO	NO	L. CRETAC.	98
C-01553	FRIO	000	TENNECO AND PENNZOIL UNITED	WILBECK, W.M.	1	5630	6766	SLIGO	NO	NO	NO	L. CRETAC.	130
C-05013	FRIO	000	TESORO PETROLEUM CORPORATION	CALVERT, J.H.	1	5574	6295	AUSTIN	NO	NO	YES	U. CRETAC.	69
C-00182	GAINES	000	ATLANTIC-RICHFIELD COMPANY	BURLESON	1	8391	11606	BARNETT	NO	YES	NO	MISSISSIPI	33
C-00789	GALVESTON	000	HIGH ISLAND SULPHUR	SALT DOME	X-6	1489	1724	CAP ROCK	NO	NO	NO		40
C-00790	GALVESTON	000	HIGH ISLAND SULPHUR	TEST HOLE	5	1538	1868	CAP ROCK	NO	NO	NO		26
C-06110	GARZA		GETTY OIL COMPANY	KIRKPATRICK	A-1	8120	8222		NO	NO	NO		35
C-00159A	GARZA	000	KERR-MCGEE CORPORATION	SWENSON	2-A	7822	7829	ELLENBURG	NO	NO	NO	ORDOVICIAN	3
C-06065	GILLESPIE	025	SHELL DEV CO (B F PERKINS)	TANNER, J.O.	1	3	130	GLEN ROSE	NO	NO	NO	L. CRETAC.	12
C-06056	GILLESPIE	025	SHELL DEV CO (F L STRICKLIN)	BAUER RANCH	1	5	78	GLEN ROSE	NO	NO	NO	L. CRETAC.	7
T-00016A	GILLESPIE	000	U.S. AIR FORCE	BG-CR	19	10	200	GNEISS	NO	YES	NO	PRECAMBRN	14
C-00445	GILLESPIE	000	WPA	FIELDER	2	3	130	GLEN ROSE	NO	NO	NO	L. CRETAC.	13
C-06116	GLASSCOCK	000	LINGEN EXPL	NORWOOD		7485	7732		NO	NO	NO		57
C-00554	GLASSCOCK	000	STANDARD OF TEXAS	CURRIE	1	7923	9884	ELLENBURG	NO	YES	NO	ORDOVI...	
C-00667	GLASSCOCK	000	STD. OIL	MCDOWELL	30-2	2220	2400	SAN ANDRES					
C-01390	GLASSCOCK	000	SUN OIL COMPANY	DRIVER	36-2	[illegible]							

					27	4895	[illegible]		NO	NO	NO		4
				JACOBS	1-A	11350	11740		NO	NO	NO		21
			SUN OIL COMPANY	RAMIREZ	B-2	4551	4554		NO	NO	NO		1
[illegible]	GONZALES	000	TESORO PETROLEUM CORPORATION	HENDERSHOT, C.J.	1	4536	4833	AUSTIN	NO	NO	YES	U. CRETAC.	49
T-00003	GONZALES	000	PRAIRIE PRODUCTION	HURT	1	4449	4690	AUSTIN	NO	NO	YES	U. CRETAC.	54
C-01060	GRAY	000	ERNEY, DON	CORBIN	1	0	0		NO	NO	NO		18
C-00266	GRAY	000	GULF OIL CORPORATION	SHACKLTON, E.A.	1	7898	7928	ARBUCKLE	NO	YES	NO	ORDOVICIAN	3
C-00074	GRAY	000	GULF OIL CORPORATION	SHACKLTON	1	7899	7927	ARBUCKLE	NO	YES	NO	ORDOVICIAN	2
C-00668H	GRAY	000	PHILLIPS PETROLEUM COMPANY	BENTON	4	2940	2945	GRAN. WASH	NO	NO	NO		1
C-00152	GRAY	000	PHILLIPS PETROLEUM COMPANY	DELP	2	11070	11540	HONEYCUT	NO	YES	NO	ORDOVICIAN	70
C-00156	GRAY	000	PHILLIPS PETROLEUM COMPANY	STRICKLER	1	10102	11272	ELLENBURG	NO	YES	NO	ORDOVICIAN	64
C-00559	GRAY	000	PHILLIPS PETROLEUM COMPANY	TROY, A.	1	9662	11043	ARBUCKLE	NO	NO	NO	ORDOVICIAN	2
C-00430	GRAY	000	PHILLIPS PETROLEUM COMPANY	WOOD, J.E.	6	2577	2588		NO	YES	NO		4
C-00276	GRAY	000	PHOENIX	RALPH	1	3120	3261		NO	NO	NO		2
C-01014	GRAY	000	STANDARD OF TEXAS	MATHERS	2	7480	7949		NO	NO	NO		59
C-01024	GRAY	000	STANDARD OF TEXAS	MATHERS	3-1	7730	7869		NO	NO	NO		31
C-00723	GRAY	000	TENNECO	COMBS	126	2792	2977		NO	NO	NO		59
C-01013	GRAY	000	WILCOX OIL COMPANY	COMBS	118	2638	2888		NO	NO	NO		89
C-00720	GRAY	000	WILCOX OIL COMPANY	COMBS	143	2744	2839		NO	NO	NO		31
C-00721	GRAY	000	WILCOX OIL COMPANY	COMBS	144	2714	2827		NO	NO	NO		37
C-00722	GRAY	000	WILCOX OIL COMPANY	COMBS	145	2716	2849		NO	NO	NO		44
C-00078B	GRAYSON	000	HIBBERT OIL COMPANY	SHORT	1	7881	7901	JOINS	NO	NO	NO	ORDOVICIAN	1
B-000830D	GRAYSON	000	HIBBERT OIL	SHORT	1	7871	7881	OIL CREEK	NO	NO	NO	ORDOVICIAN	1
C-00078C	GRAYSON	000	MAGNOLIA PETROLEUM COMPANY	GODWIN	1	12130	12145	OIL CREEK	NO	NO	NO	ORDOVICIAN	1
B-000836	GRAYSON	000	MAGNOLIA PETROLEUM COMPANY	HODGES (SKIPS)	1	7562	7781	ELLENBURG	NO	NO	NO	ORDOVICIAN	1
C-00077A	GRAYSON	000	MAGNOLIA PETROLEUM COMPANY	HODGES	2	7668	7687	ELLENBURG	NO	NO	NO	ORDOVICIAN	1
C-00077B	GRAYSON	000	MAGNOLIA PETROLEUM COMPANY	HODGES	6	6881	7519	ELLENBURG	NO	NO	NO	ORDOVICIAN	2
C-01059	GRAYSON	000	SINCLAIR-PRARIE, ET. AL	WILLIAMS, M.	1	3574	4286		NO	YES	NO		10
C-01346	GRAYSON	000	SUN OIL COMPANY	CUNNINGHAM	1	5108	5330		NO	YES	NO	PENNSYLVAN	4
C-01333	GRAYSON	000	SUN OIL COMPANY	DAWKINS	1	3999	4043		NO	YES	NO		1
C-01273	GRAYSON	000	SUN OIL COMPANY	GODWIN	1	6226	6407		NO	YES	NO	PENNSYLVAN	6
C-01338	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	1	6730	6820		NO	YES	NO	PENNSYLVAN	3
C-01337	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	2	6756	6781		NO	YES	NO	PENNSYLVAN	3
C-01336	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	3	6750	6772		NO	YES	NO	PENNSYLVAN	2
C-01227A	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	4	6738	6761		NO	YES	NO	PENNSYLVAN	5
C-01248	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	5	6722	6762		NO	YES	NO	PENNSYLVAN	3
C-01246	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	6	6760	6810		NO	YES	NO	PENNSYLVAN	2
C-01374	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	7	6752	6792		NO	YES	NO	PENNSYLVAN	3
C-01247	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	8	6720	6775		NO	YES	NO	PENNSYLVAN	3
C-01411	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	9	6728	6741		NO	NO	NO	PENNSYLVAN	1
C-01245	GRAYSON	000	SUN OIL COMPANY	GRIFFIN	10	6668	6713		NO	NO	NO	PENNSYLVAN	2
C-01320	GRAYSON	000	SUN OIL COMPANY	SHANKLES	1	8867	9014		NO	YES	NO	PENNSYLVAN	40
C-01291	GRAYSON	000	SUN OIL COMPANY	SHANKLES	2	7685	7762	BAKER SAND	NO	YES	NO	ORDOVICIAN	23
B-000876	GRAYSON	000	SUPERIOR OIL COMPANY	HENDERSON	1	6124	6555	W.SPR.CRK.	NO	YES	NO	ORDOVICIAN	15
B-48107	GRAYSON	000	SUPERIOR OIL COMPANY	PRIVITTE	1	7750	8147	W.SPR.CRK.	NO	YES	NO	ORDOVICIAN	13
C-00465	GREGG	000	HUMBLE OIL AND REFINING	CLEMONS	1	3656	3657	WOODBINE	NO	YES	NO	U. CRETAC.	1
C-00156H	GUADALUPE	000	DELRAY OIL COMPANY	DENMAN	B-14	2393	2526	BUDA LIME	NO	NO	NO	U. CRETAC.	3
C-00089G	GUADALUPE	000	DELRAY OIL COMPANY	L.G.DENMAN	12	2326	2486	DARST CRK	NO	NO	NO	U. CRETAC.	7
C-00156C	GUADALUPE	000	DELRAY OIL COMPANY	POOLEY	10	1884	1947	AUSTIN CHK	NO	NO	NO	U. CRETAC.	4
C-00157C	GUADALUPE	000	DELREY OIL	UNKNOWN	X	1930	2025		NO	NO	NO		5
C-00156F	GUADALUPE	000	DELRAY OIL COMPANY	UNKNOWN		2294	2447	AUSTIN CHK	NO	NO	NO	U. CRETAC.	5
C-00268	GUADALUPE	000	EICHEN, ELIZABETH	EDDY, J.	1	1	953		NO	YES	NO		16
C-00483	GUADALUPE	000	FROST, JACK	BLANKS ESTATE	1	1700	1941	GEORGETOWN	NO	YES	NO	L. CRETAC.	3
C-00214	GUADALUPE	000	GOODRICH	SHANKLIN	11	2102	2167	EAGLEFORD	NO	YES	NO	U. CRETAC.	[illegible]
C-00545	GUADALUPE	000	GULF OIL CORPORATION	DIX, T.	20	3058	5415	HOSSTON	NO	[illegible]	[illegible]		
C-00336	GUADALUPE	000	HARMANSON	GATZKE	4	[illegible]							
C-00208	GUADALUPE	000	KENNER BROTHERS	ANDERSON									

				CARL?, F.	1	2817	4671		NO	NO	NO	L. CRETAC.	152
			PRAIRIE PRODUCTION COMPANY	BLUMBERG	A-1	3163	3386	AUSTIN	NO	NO	NO	U. CRETAC.	35
C-00006	GUADALUPE	000	PRAIRIE PRODUCTION COMPANY	BLUMBERG	B-1	4090	4285	AUSTIN	NO	NO	NO	U. CRETAC.	61
C-00187	GUADALUPE	000	PRODUCERS OF NEVADA	DERLIC, E.	1	1920	2213	GEORGETOWN	NO	YES	NO	L. CRETAC.	102
C-00301	GUADALUPE	000	STANOLIND	SCHMIDT, THEO	1	1372	2614	HOSSTON	NO	YES	NO	L. CRETAC.	401
C-00631	GUADALUPE	000	STANOLIND	SCHMIDT, THEO	1	1392	2804	HOSSTON	NO	YES	NO	L. CRETAC.	30
C-01416	GUADALUPE	000	SUN OIL COMPANY	GATZKE	4	2205	2556		NO	NO	NO	L. CRETAC.	7
C-01121	HALE	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	27	0	60		NO	NO	NO		2
C-01122	HALE	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	28	0	75		NO	NO	NO		3
C-01119	HALE	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	25	0	50		NO	NO	NO		1
C-01120	HALE	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	26	0	60		NO	NO	NO		1
C-01444	HALE	000	STANDARD OF TEXAS	KELIEHOR	1	8462	8492		NO	YES	NO	PENNSYLVAN	10
C-00421	HAMILTON	000	SEABOARD	DAWSON, J.	1	2975	3309	ELLENBURG	NO	YES	NO	ORDOVICIAN	6
C-00431	HAMILTON	000	SEABOARD	DAWSON, J.	1	2518	5344	ELLENBURG	NO	YES	NO	ORDOVICIAN	29
C-06024	HAMILTON	033	SHELL DEV CO (D L AMSBURY)	HAMILTON (CROUCH)	1	5	150	PALUXY	NO	NO	NO	L. CRETAC.	14
C-06025	HAMILTON	033	SHELL DEV CO (D L AMSBURY)	HAMILTON (MID-TEX)	2	0	125	PALUXY	NO	NO	NO	L. CRETAC.	10
C-06023	HAMILTON	034	SHELL DEV CO (D L AMSBURY)	HAMILTON (STREGER)	3	5	140	PALUXY	NO	NO	NO	L. CRETAC.	15
C-06029	HAMILTON	034	SHELL DEV CO (D L AMSBURY)	OLIN-GAR.PARKER FARM	1	0	170	PALUXY	NO	NO	NO	L. CRETAC.	17
C-00587	HANSFORD	000	GULF OIL CORPORATION	ALEXANDER	1	6803	6820	U. MORROW	NO	NO	NO	PENNSYLVAN	7
C-00069	HANSFORD	000	GULF OIL CORPORATION	COLLARD	1	8484	8494	L. MORROW	NO	NO	NO	PENNSYLVAN	1
C-01138	HANSFORD	000	PALO DURO CREEK SITE	TEST HOLE	1	0	139		NO	NO	NO		5
C-01383	HARDEMAN	000	HUMBLE OIL AND REFINING	MCSPADDEN	1	5450	8185	CHAPPEL	NO	NO	NO	MISSISSIPPI	1
C-01085	HARDEMAN	000	HUMBLE OIL AND REFINING	WILLIAMS	1	5037	8504	ELLENBURG	NO	NO	NO	ORDOVICIAN	1
C-00395C	HARDEMAN	000	SHELL OIL COMPANY	CONLEY	A-1	8069	8214	ELLENBURG	NO	NO	NO	ORDOVICIAN	18
C-00171A	HARDEMAN	000	SHELL OIL COMPANY	SCHUR	2	7962	8238	ELLENBURG	NO	NO	NO	ORDOVICIAN	41
C-01069	HARDEMAN	000	STANDARD OF TEXAS	COFFEE, R.H.	1	8140	8143	CHAPPEL	NO	NO	NO	MISSISSIPPI	1
C-01031	HARDEMAN	000	STANDARD OF TEXAS	COFFEE, R.H.	1	8113	8307	CHAPPEL	NO	NO	NO	MISSISSIPPI	1
C-01087	HARDEMAN	000	STANDARD OF TEXAS	DICKEY	1	8610	8678	CHAPPEL	NO	NO	NO	MISSISSIPPI	1
C-01225	HARDEMAN	000	SUN OIL COMPANY	QUANAH CITY UNIT	1	8700	8903	CHAPPEL	NO	NO	NO	MISSISSIPPI	56
C-01197	HARDEMAN	000	SUN OIL COMPANY	THOMPSON-QUANAH UNIT	1	8320	8471	CHAPPEL	NO	NO	NO	MISSISSIPPI	52
C-01409	HARDEMAN	000	SUN OIL COMPANY	THOMPSON	1	8423	8475	CHAPPEL	NO	NO	NO	MISSISSIPPI	16
C-00623	HARDEMAN	000	GULF BASIN-BUR. RECLAIM.	NECHES-PIN ISLAND	1-10	15	100		NO	NO	NO		34
C-00524	HARDIN	000	OIL RESERVES CORPORATION	KIRBY STEPENSON B	1-K	8404	8562		NO	YES	NO		7
T-00061	HARDIN	000	TEXACO	SOUR LAKE	587	664	679		NO	NO	NO		2
C-00488	HARDIN	000	TEX. GULF PROD. CO.	CHRISTIAN, ET. AL	1	2101	3364		NO	YES	NO		4
C-00370	HARRIS	000	AMERADA-STANOLIND	BODE	1	5335	6173		NO	NO	NO		11
C-00624	HARRIS	000	GULF BASIN-BUR. RECLAM.	BUFFALO BAYOU SHIP	1-5	0	0		NO	NO	NO		2
C-00620	HARRIS	000	GULF BASIN-BUR. RECLAM.	SAN JACINTO VALLEY	1-11	15	100		NO	NO	NO		49
C-01422	HARRIS	000	HUMBLE OIL AND REFINING	TOMBALL	11	8820	9866		NO	NO	NO		7
T-00047	HARRIS	000	PAN AMERICAN CORPORATION	BROWN	1	14020	14755		NO	NO	NO		13
C-00463	HARRIS	000	RIO BRAVO OIL COMPANY	P.S.B.	8	3312	3329		NO	NO	NO		1
C-01423	HARRIS	000	SUN OIL COMPANY	CHAMBERS	9	4835	4886		NO	NO	NO		1
C-01188	HARRIS	000	SUN OIL COMPANY	KRATKY	1	8131	8272		NO	NO	NO		5
C-01181	HARRIS	000	SUN OIL COMPANY	MATLAGE	2	5540	5624		NO	YES	NO		7
C-01189	HARRIS	000	SUN OIL COMPANY	MAURITZ UNIT 11	1	2646	8859		NO	NO	NO		4
C-01183	HARRIS	000	SUN OIL COMPANY	WINTREE, O.K.	4	2199	2707		NO	NO	NO		7
C-00160H	HARRISON	000	ATLANTIC REFINING COMPANY	BOSCH	1	6575	6775		NO	NO	NO		12
C-00078A	HARRISON	000	MAGNOLIA PETROLEUM COMPANY	WRIGHT	1	4699	4761		NO	NO	NO		1
C-00835	HARRISON	000	TEXAS WATER PROJECT	TEST HOLE (FCM) 1	1	1	125		NO	NO	NO		4
C-00838	HARRISON	000	TEXAS WATER PROJECT	TEST HOLE (MD) 1	1	1	116		NO	NO	NO		4
C-00836	HARRISON	000	TEXAS WATER PROJECT	TEST HOLE (FCM) 2	2	1	98		NO	NO	NO		4
C-00686	HARTLEY	000	STANDARD OF TEXAS	BIVINS	12	3190	5549		NO	NO	NO		25
C-00687	HARTLEY	000	STANDARD OF TEXAS	BIVINS	14	3452	3655		NO	NO	NO		16
C-00688	HARTLEY	000	STANDARD OF TEXAS	BIVINS	15	3361	5690		NO	NO	NO		30
C-01445	HARTLEY	000	STANDARD OF TEXAS	JOHNSON	1	8952	8958	ARBUCKLE	NO	NO	NO		
C-01542	HARTLEY	000	STANDARD OF TEXAS	JOHNSON	1								

							1220	SLIGO	NO	NO	NO	L. CRETAC.	6
				WATTERSON	1	1063	1108		NO	NO	NO		13
	HAYS	000	WOODWARD	SCHUBERT	1	3297	3338		NO	YES	NO		2
C-01019	HEMPHILL	000	HAMON, JAKE L.	HUMPHERYS	3-A	7679	7769		NO	NO	NO		26
C-01091	HEMPHILL	000	HUMBLE OIL AND REFINING	MIAMI CATTLE CO.	1	13193	13650		NO	NO	NO		2
C-01299	HEMPHILL	000	SUN OIL COMPANY	BERTRAM	1	7765	7858		NO	NO	NO		23
C-00364	HENDERSON	000	BOYD OIL COMPANY	MILLER	1	40	323		NO	NO	NO		38
C-01043	HENDERSON	000	DE ARMAN	GUNNELS	1	11342	11413		NO	NO	NO		21
C-01047	HENDERSON	000	EDSON	KEY	1	11428	11453		NO	NO	NO		7
C-00405	HENDERSON	000	EDSON	PERSONS, M.	1	3016	3118	AUSTIN	NO	YES	NO	U. CRETAC.	2
C-01426	HENDERSON	000	HUNT OIL COMPANY	WILLIAMS	1	11215	11240		NO	NO	NO		6
C-00359	HENDERSON	000	LONE STAR PRODUCTION	ALLYN ESTATE	B-1	13584	13995	SMACKOVER	NO	NO	NO	JURASSIC	24
C-00527	HENDERSON	000	RUDMAN	GILBERT	1	9742	10475	JAMES LIME	NO	YES	NO	L. CRETAC.	3
C-00171B	HENDERSON	000	SHELL OIL COMPANY	STEVENS	1	3552	4381	MANESS	NO	YES	NO	L. CRETAC.	5
C-01297	HIDALGO	000	SUN OIL COMPANY	MELLINGER	2	7214	7264		NO	YES	NO	OLIGOCENE	17
C-01274	HIDALGO	000	SUN OIL COMPANY	WEST, K.L.	1	8091	8190		NO	NO	NO	OLIGOCENE	18
C-00472	HILL	000	PHILLIPS PETROLEUM COMPANY	POSEY	1-A	3900	3910	OUACHITA	NO	YES	NO	PENNSYLVAN	1
C-01093	HOCKLEY	000	HONOLULU OIL CORPORATION	ELLWOOD	A-18	9764	9783	CANYON	NO	NO	NO	PENNSYLVAN	1
C-01094	HOCKLEY	00	HONOLULU OIL CORPORATION	ELLWOOD	A-25	9703	9735	CANYON	NO	NO	NO	PENNSYLVAN	1
C-00667D	HOCKLEY	000	MGF OIL CORP.	DAVIS	1	4684	4772	SAN ANDRES	NO	YES	YES	PERMIAN	5
C-01139	HOCKLEY	000	NORTH TEXAS CANAL ROUTE	YELLOW ILLUSION	2	0	68	DOCKUM	NO	NO	NO	TRIASSIC	9
C-01140	HOCKLEY	000	NORTH TEXAS CANAL ROUTE	YELLOW LAKE SITE	1	0	122	DOCKUM	NO	NO	NO	TRIASSIC	9
C-01359	HOCKLEY	000	SUN OIL COMPANY	BENTON LAND CO.	1	4500	4733		NO	NO	NO		52
C-01376	HOCKLEY	000	SUN OIL COMPANY	LUKER	1	7615	7690	WICHITA	NO	YES	NO	PERMIAN	24
C-01308	HOCKLEY	000	SUN OIL COMPANY	PARSONS	4	4821	4863	SAN ANDRES	NO	YES	NO	PERMIAN	3
C-06067	HOOD	036	SHELL DEV. CO.(F.E. LOZO)	DE CORDOVA BEND	PH-3	62	191	GLEN ROSE	NO	NO	NO	L. CRETAC.	13
C-01045	HOPKINS	000	SNYDER-COREY	HARGRAVES	1	9424	9460		NO	NO	NO		12
C-01191	HOPKINS	000	SUN OIL COMPANY	HOWISON	1	8973	9172		NO	NO	NO		20
C-00807	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (CCL)	1	1	111		NO	NO	NO		4
C-00808	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (CCL)	2	1	76		NO	NO	NO		3
C-00814	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (SCL)	1	1	98		NO	NO	NO		4
C-00815	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (SCL)	2	1	116		NO	NO	NO		4
C-00116	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (SCL)	3	1	111		NO	NO	NO		25
C-00817	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (SCL)	4	1	101		NO	NO	NO		4
C-00818	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (SCL)	5	1	111		NO	NO	NO		5
C-00800	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (NES)	5	1	56		NO	NO	NO		2
C-00119	HOPKINS	000	TEXAS WATER PROJECT	TEST HOLE (SCL)	6	1	91		NO	NO	NO		12
C-00525	HOUSTON	000	ELLISON	SMITH	1	7707	8247		NO	YES	NO		1
C-00406	HOUSTON	000	HUMBLE OIL AND REFINING	DAILY, H.H.	1	5712	5910		NO	YES	NO		8
C-01522	HOUSTON	000	HUNT OIL COMPANY	ELLIOTT	1	6222	6375		NO	NO	NO		1
C-00014A	HOWARD	000	PAN AMERICAN CORPORATION	GLASS	1	8181	8216	CANYON	NO	NO	NO	PENNSYLVAN	6
C-01442A	HOWARD	000	REEVES, J. LEILS	STEWART	1	2228	2430		NO	NO	NO		1
C-00014	HOWARD	000	SKELLY OIL COMPANY	GUNN	5	7170	7506	CANYON	NO	YES	NO	PENNSYLVAN	27
C-00013	HOWARD	000	SUNRAY OIL CORPORATION	WILSON	4	1	89		NO	NO	NO		4
C-00486	HUPSPETH	000	SANCHO PANZA MINES	NINE CORE HOLES	1-9	3	97		NO	NO	NO		42
C-00810	HUNT	000	TEXAS WATER PROJECT	TEST HOLE (CCL)	4	1	101		NO	NO	NO		4
C-00809	HUNT	000	TEXAS WATER PROJECT	TEST HOLE (CCL)	3	1	51	OZAN	NO	NO	NO	U. CRETAC.	2
C-00811	HUNT	000	TEXAS WATER PROJECT	TEST HOLE (CCL)	5	1	51		NO	NO	NO		2
C-00812	HUNT	000	TEXAS WATER PROJECT	TEST HOLE (CCL)	6	1	101		NO	NO	NO		3
C-00813	HUNT	000	TEXAS WATER PROJECT	TEST HOLE (CCL)	7	1	51		NO	NO	NO		2
C-01020	HUTCHINSON	000	FURR	MATHEWS	2	3511	8562	MORROW	NO	NO	NO	MISSISSIPPI	68
C-00068	HUTCHINSON	000	GULF OIL CORPORATION	AMARILLO NAT. BANK	1	8164	8284	ARBUCKLE	NO	YES	NO	ORDOVICIAN	3
C-00105B	HUTCHINSON	000	PHILLIPS PETROLEUM COMPANY	COCKRELL	103	2926	3140	GRAN. WASH	NO	NO	NO		3
C-00105H	IRION	000	ATLANTIC REFINING COMPANY	NOELKE	1	7762	7961	TANYARD	NO	NO	NO	ORDOVICIAN	18
C-01303	IRION	000	SUN OIL COMPANY	CATHEY	1	5	1726	SAN ANGELO	NO	YES	NO	PERMIAN	10
C-01383	IRION	000	SUN OIL COMPANY	NOELKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

									NO	NO	NO	PENNSYLVAN	27
		000	WATER DEVELOPMENT BOARD	JACKSBORO 20-55	220	260	280	CANYON	NO	NO	NO	PENNSYLVAN	2
C-00627	JACKSON	000	GULF BASIN-BUR. RECLAM.	LAVACA CROSSING	1-4	15	70		NO	NO	NO		15
C-00629	JACKSON	000	GULF BASIN-BUR. RECLAM.	NAVIDAD CROSSING	1-4	15	75		NO	NO	NO		14
C-01559	JACKSON	000	OCCIDENTAL OIL CO.	MCHANEY	3	9660	9749	FRIO	YES	NO	YES	OLIGOCENE	15
C-01179	JACKSON	000	SUN OIL COMPANY	ARNOLD	1	8544	8697	FRIO	YES	YES	YES	OLIGOCENE	7
C-01187	JACKSON	000	SUN OIL COMPANY	DILLIE	1	7750	7795	FRIO	YES	YES	YES	OLIGOCENE	3
C-01186	JACKSON	000	SUN OIL COMPANY	MAURITZ UNIT	12	8616	8776	FRIO	YES	YES	YES	OLIGOCENE	8
C-01341	JACKSON	000	SUN OIL COMPANY	MCDANIELS	1	9367	9687	WILCOX	YES	NO	YES	EOCENE	12
C-01412	JACKSON	000	SUN OIL COMPANY	MCDANIELS	5	5873	9266		YES	YES	YES		5
C-01185	JACKSON	000	SUN OIL COMPANY	NIESSLIE	1	7120	8656	FRIO	YES	NO	YES	OLIGOCENE	6
C-01420	JACKSON	000	SUN OIL COMPANY	ROGERS, G.W.		6672	6673	FRIO	NO	YES	YES	OLIGOCENE	1
C-01184	JACKSON	000	SUN OIL COMPANY	WRIGHT	1	8571	8669	FRIO	YES	YES	YES	OLIGOCENE	4
C-01180	JEFFERSON	000	SUN OIL COMPANY	MALBOULES	2	7412	7498		YES	NO	NO		2
C-01192	JIM HOGG	000	SUN OIL COMPANY	RAMIREZ	4-B	4512	4545		NO	NO	NO		4
C-01279	JIM HOGG	000	SUN OIL COMPANY	WEIL	1	4126	4156	YEGUA-JACK	YES	YES	YES	EOCENE	10
C-00493	JIM WELLS	000	MAGNOLIA PETROLEUM COMPANY	KRSKA	1	7639	7690		NO	NO	NO		3
C-01261	JONES	000	SUN OIL COMPANY	MCDONALD	1	5672	5998	STRAWN	NO	NO	NO	PENNSYLVAN	1
C-01096	JONES	000	TEX. PAC. COAL AND OIL CO.	HYER	1	3380	3406		NO	NO	NO		9
C-01099	JONES	000	TEX. PAC. COAL AND OIL CO.	WHALEY	1	3223	5148	STRAWN	NO	NO	NO	PENNSYLVAN	28
T-00026	KARNES	000	CONTINENTAL OIL COMPANY	BODDEN	3C	108	113	JACKSON	NO	NO	NO	EOCENE	2
T-00026	KARNES	000	CONTINENTAL OIL COMPANY	BODDEN	4C	130	134	JACKSON	NO	NO	NO	EOCENE	2
T-00026	KARNES	000	CONTINENTAL OIL COMPANY	BODDEN	89C	135	138	JACKSON	NO	NO	NO	EOCENE	6
T-00026	KARNES	000	CONTINENTAL OIL COMPANY	BODDEN	90C	118	126	JACKSON	NO	NO	NO	EOCENE	3
B-00065F	KARNES	000	CONTINENTAL OIL COMPANY	FRIAR UL-147 (18")	19	100	121	JACKSON	NO	NO	NO	EOCENE	1
B-00065F	KARNES	000	CONTINENTAL OIL COMPANY	FRIAR UL-147 (18")	272	80	101	JACKSON	NO	NO	NO	EOCENE	1
B-00064F	KARNES	000	CONTINENTAL OIL COMPANY	GABRYSCH UL104(143)	105	35	50	JACKSON	NO	NO	NO	EOCENE	1
T-00026B	KARNES	000	CONTINENTAL OIL COMPANY	HAHN	154C	186	230	JACKSON	NO	NO	NO	EOCENE	6
T-00026B	KARNES	000	CONTINENTAL OIL COMPANY	HAHN	156	190	195	JACKSON	NO	NO	NO	EOCENE	2
T-00026B	KARNES	000	CONTINENTAL OIL COMPANY	HAHN	156C	217	233	JACKSON	NO	NO	NO	EOCENE	5
T-00026B	KARNES	000	CONTINENTAL OIL COMPANY	HAHN	157C	197	235	JACKSON	NO	NO	NO	EOCENE	6
T-00026B	KARNES	000	CONTINENTAL OIL COMPANY	HAHN	158	204	237	JACKSON	NO	NO	NO	EOCENE	6
T-00026B	KARNES	000	CONTINENTAL OIL COMPANY	HAHN	160C	227	233	JACKSON	NO	NO	NO	EOCENE	2
T-00026B	KARNES	000	CONTINENTAL OIL COMPANY	HAHN	161C	229	238	JACKSON	NO	NO	NO	EOCENE	4
B-00068A	KARNES	000	CONTINENTAL OIL COMPANY	KELLNER UL-771	440-C	114	131	JACKSON	NO	NO	NO	EOCENE	1
B-00068B	KARNES	000	CONTINENTAL OIL COMPANY	KELLNER UL-771	441-C	111	132	JACKSON	NO	NO	NO	EOCENE	1
B-00068C	KARNES	000	CONTINENTAL OIL COMPANY	KELLNER UL-771	442-C	108	123	JACKSON	NO	NO	NO	EOCENE	1
B-00068D	KARNES	000	CONTINENTAL OIL COMPANY	KELLNER UL-771	443-C	85	121	JACKSON	NO	NO	NO	EOCENE	1
B-00063G	KARNES	000	CONTINENTAL OIL COMPANY	MOY	352	54	59	JACKSON	NO	NO	NO	EOCENE	1
B-00064A	KARNES	000	CONTINENTAL OIL COMPANY	MOY	353	56	62	JACKSON	NO	NO	NO	EOCENE	1
B-00063D	KARNES	000	CONTINENTAL OIL COMPANY	MOY (SKIPS)	354	62	87	JACKSON	NO	NO	NO	EOCENE	2
B-00066F	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	16	9	19	JACKSON	NO	NO	NO	EOCENE	1
B-00066G	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-7	84-C	100	112	JACKSON	NO	NO	NO	EOCENE	1
B-00067A	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-7	155-C	101	107	JACKSON	NO	NO	NO	EOCENE	1
B-00066D	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	262	11	16	JACKSON	NO	NO	NO	EOCENE	1
B-00066E	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-	273-C	3	19	JACKSON	NO	NO	NO	EOCENE	1
B-00067B	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-	287-C	17	18	JACKSON	NO	NO	NO	EOCENE	1
B-00067C	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	288-C	7	25	JACKSON	NO	NO	NO	EOCENE	1
B-00066C	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-72	335-C	3	25	JACKSON	NO	NO	NO	EOCENE	1
B-00066A	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	569-C	10	22	JACKSON	NO	NO	NO	EOCENE	1
B-00068G	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	573	95	105	JACKSON	NO	NO	NO	EOCENE	1
B-00066B	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	586-C	9	25	JACKSON	NO	NO	NO	EOCENE	1
B-00069A	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	605	76	84	JACKSON	NO	NO	NO	EOCENE	1
B-00069B	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-72	611-C	[illegible]	26	JACKSON	NO	NO	NO	EOCENE	1
B-00069C	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	612-C	12	22	JACKSON	NO	NO	NO	EOCENE	1
B-00069D	KARNES	000	CONTINENTAL OIL COMPANY	NIESCHWIETZ UL-725	612C1	12	18	JACKSON	NO	NO	NO	EOCENE	1

				...NDRUCK UL-1797	95	256	299	JACKSON	NO	NO	NO	EOCENE	1
			...OMPANY	SCHROEDER	107C	159	162	JACKSON	NO	NO	NO	EOCENE	1
			...CONTINENTAL OIL COMPANY	SCHROEDER	108C	162	166	JACKSON	NO	NO	NO	EOCENE	2
...	KARNES	000	CONTINENTAL OIL COMPANY	SPOONAMORE	200C	157	168	JACKSON	NO	NO	NO	EOCENE	4
T-00026D	KARNES	000	CONTINENTAL OIL COMPANY	SPOONAMORE	202C	161	168	JACKSON	NO	NO	NO	EOCENE	3
T-00026D	KARNES	000	CONTINENTAL OIL COMPANY	SPOONAMORE	203C	161	166	JACKSON	NO	NO	NO	EOCENE	2
T-00026D	KARNES	000	CONTINENTAL OIL COMPANY	SPOONAMORE	204C	162	165	JACKSON	NO	NO	NO	EOCENE	1
T-00026D	KARNES	000	CONTINENTAL OIL COMPANY	SPOONAMORE	205C	160	167	JACKSON	NO	NO	NO	EOCENE	2
B-00068F	KARNES	000	CONTINENTAL OIL COMPANY	STEINMANN UL-97(135)	6	40	70	JACKSON	NO	NO	NO	EOCENE	1
B-00063C	KARNES	000	CONTINENTAL OIL COMPANY	STEINMANN UL-97(135)	7	53	104	JACKSON	NO	NO	NO	EOCENE	1
B-00064D	KARNES	000	CONTINENTAL OIL COMPANY	ST. OF TEX. 62461	33-A	135	160	JACKSON	NO	NO	NO	EOCENE	1
B-00064E	KARNES	000	CONTINENTAL OIL COMPANY	ST. OF TEX. 62461	43-B	89	99	JACKSON	NO	NO	NO	EOCENE	1
T-00026A	KARNES	000	CONTINENTAL OIL COMPANY	STOOHJE	292C	131	133	JACKSON	NO	NO	NO	EOCENE	1
C-05043	KARNES	000	GENERAL CRUDE OIL COMPANY	ALEXANDER	1	13540	13677	EDWARDS	NO	NO	NO	L. CRETAC.	20
C-05014	KARNES	000	GENERAL CRUDE OIL COMPANY	CARL STRAWN ESTATE	1	13573	13729		NO	NO	NO		13
C-00673	KARNES	000	GENERAL CRUDE	GORDON	1	13409	13573	EDWARDS	NO	NO	NO	L. CRETAC.	23
C-00300B	KARNES	000	GENERAL CRUDE OIL COMPANY	GRUNEWALD-BROWN	1	13035	13094	SLIGO	NO	NO	NO	L. CRETAC.	5
C-00300C	KARNES	000	GENERAL CRUDE OIL COMPANY	MCDOWELL	1	15705	15916	SLIGO	NO	NO	NO	L. CRETAC.	3
C-00159G	KARNES	000	GENERAL CRUDE OIL COMPANY	ROLF	1	13047	15525	SLIGO	NO	NO	NO	L. CRETAC.	23
C-05012	KARNES	000	GENERAL CRUDE OIL COMPANY	TIPS	1	13558	13735	EDWARDS	NO	NO	NO	L. CRETAC.	27
C-05018	KARNES	000	GENERAL CRUDE OIL COMPANY	WERNLI, ALBERT	1	13070	13209	EDWARDS	NO	NO	NO	L. CRETAC.	20
C-05017	KARNES	000	GENERAL CRUDE OIL COMPANY	WESSENDORF, JOE	1	13520	13628	EDWARDS	NO	NO	NO	L. CRETAC.	32
C-00615	KARNES	000	GULF BASIN-BUR. RECLAM.	FALLS CITY DAM	2-14	0	0		NO	NO	NO		69
C-00787	KARNES	000	PAN AMERICAN CORPORATION	KORTH, H.M.	1	11340	11607		NO	NO	YES	CRETACEOUS	72
T-00048	KARNES	000	HUNT OIL COMPANY	G.F. HUCKMAN	1	13458	13562		NO	NO	NO		45
C-05028	KARNES	000	SEABOARD	KULODZIEJEZYK	1	5094	7474	WILCOX	YES	YES	YES	EOCENE	164
C-00180	KARNES	000	SEABOARD	SZALWINSKI	1	9980	11713		NO	NO	NO	CRETACEOUS	5
C-00061A	KARNES	000	SUN OIL CO	HANDY SUE G.	1	13207	16261						205
C-01417	KARNES	000	SUN OIL COMPANY	HUBBLE	1	13730	14030	EDWARDS	NO	NO	NO	L. CRETAC.	3
C-01266	KARNES	000	SUN OIL COMPANY	PATTON, D.W.	1	8323	8535		NO	NO	YES	CRETACEOUS	68
T-00029F	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	39	145	149	JACKSON	NO	NO	NO	EOCENE	1
T-00030	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	46	160	184	JACKSON	NO	NO	NO	EOCENE	5
C-05009	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	46	173	183	JACKSON	NO	NO	NO	EOCENE	2
C-05004	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	97	90	108	JACKSON	NO	NO	NO	EOCENE	2
T-00031F	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	98	95	110	JACKSON	NO	NO	NO	EOCENE	4
T-00031D	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	154	70	90	JACKSON	NO	NO	NO	EOCENE	7
T-00032G	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	155	60	83	JACKSON	NO	NO	NO	EOCENE	16
T-00032I	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	156	60	78	JACKSON	NO	NO	NO	EOCENE	7
T-00032H	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	157	60	85	JACKSON	NO	NO	NO	EOCENE	10
C-05033	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	266	102	120	JACKSON	NO	NO	NO	EOCENE	6
C-05034	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	349	90	117	JACKSON	NO	NO	NO	EOCENE	10
C-05003	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	359	109	110	JACKSON	NO	NO	NO	EOCENE	1
C-05035	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	363	90	121	JACKSON	NO	NO	NO	EOCENE	5
C-05036	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	364	90	120	JACKSON	NO	NO	NO	EOCENE	9
C-05037	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	368	90	120	JACKSON	NO	NO	NO	EOCENE	11
C-05038	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	369	90	119	JACKSON	NO	NO	NO	EOCENE	8
C-05008	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	373	109	115	JACKSON	NO	NO	NO	EOCENE	2
C-05039	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	374	90	120	JACKSON	NO	NO	NO	EOCENE	11
C-05041	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	376	90	120	JACKSON	NO	NO	NO	EOCENE	10
C-05042	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	377	90	120	JACKSON	NO	NO	NO	EOCENE	8
C-05044	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	378	90	120	JACKSON	NO	NO	NO	EOCENE	11
C-05045	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	379	90	116	JACKSON	NO	NO	NO	EOCENE	8
C-05046	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	380	94	117	JACKSON	NO	NO	NO	EOCENE	
C-05047	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	381	90	115	JACKSON	NO	NO			
C-05048	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	386	96							
C-05005	KARNES	000	SUSQUEHANNA WESTERN	WINERICH									

Moore Business Forms, Inc. S

					428	90	118	JACKSON	NO	NO	NO	EOCENE	8
				WINERICH	429	90	118	JACKSON	NO	NO	NO	EOCENE	8
			WESTERN	WINERICH	430	90	120	JACKSON	NO	NO	NO	EOCENE	6
		SUSQUEHANNA	WESTERN	WINERICH	431	90	120	JACKSON	NO	NO	NO	EOCENE	10
C-05062	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	432	90	118	JACKSON	NO	NO	NO	EOCENE	8
C-05063	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	433	90	118	JACKSON	NO	NO	NO	EOCENE	9
C-05064	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	434	90	118	JACKSON	NO	NO	NO	EOCENE	10
C-05065	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	435	90	112	JACKSON	NO	NO	NO	EOCENE	7
C-05066	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	436	90	120	JACKSON	NO	NO	NO	EOCENE	8
C-05067	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	437	90	120	JACKSON	NO	NO	NO	EOCENE	10
C-05068	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	438	90	120	JACKSON	NO	NO	NO	EOCENE	10
C-05069	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	439	90	117	JACKSON	NO	NO	NO	EOCENE	8
C-05070	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	440	90	119	JACKSON	NO	NO	NO	EOCENE	9
C-05071	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	441	105	120	JACKSON	NO	NO	NO	EOCENE	6
C-05072	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	442	105	119	JACKSON	NO	NO	NO	EOCENE	5
C-05073	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	443	90	120	JACKSON	NO	NO	NO	EOCENE	10
C-05074	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	444	105	114	JACKSON	NO	NO	NO	EOCENE	4
C-05075	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	445	90	119	JACKSON	NO	NO	NO	EOCENE	8
C-05076	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	446	90	115	JACKSON	NO	NO	NO	EOCENE	7
C-05077	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	447	90	115	JACKSON	NO	NO	NO	EOCENE	8
C-05078	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	448	105	119	JACKSON	NO	NO	NO	EOCENE	5
C-05079	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	449	104	120	JACKSON	NO	NO	NO	EOCENE	6
C-05080	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	450	105	119	JACKSON	NO	NO	NO	EOCENE	4
C-05081	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	451	105	120	JACKSON	NO	NO	NO	EOCENE	6
C-05082	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	452	104	115	JACKSON	NO	NO	NO	EOCENE	4
C-05083	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	453	105	119	JACKSON	NO	NO	NO	EOCENE	5
C-05084	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	454	104	120	JACKSON	NO	NO	NO	EOCENE	6
C-05085	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	455	105	115	JACKSON	NO	NO	NO	EOCENE	4
C-05086	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	456	105	115	JACKSON	NO	NO	NO	EOCENE	3
C-05087	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	457	105	115	JACKSON	NO	NO	NO	EOCENE	3
C-05088	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	458	105	119	JACKSON	NO	NO	NO	EOCENE	5
C-05089	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	459	105	121	JACKSON	NO	NO	NO	EOCENE	4
C-05090	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	460	105	120	JACKSON	NO	NO	NO	EOCENE	5
C-05091	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	461	107	120	JACKSON	NO	NO	NO	EOCENE	4
C-05092	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	462	105	120	JACKSON	NO	NO	NO	EOCENE	6
C-05093	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	463	105	120	JACKSON	NO	NO	NO	EOCENE	5
C-05094	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	464	105	120	JACKSON	NO	NO	NO	EOCENE	6
C-05095	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	465	105	120	JACKSON	NO	NO	NO	EOCENE	5
C-05096	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	456	105	120	JACKSON	NO	NO	NO	EOCENE	4
C-05097	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	467	105	120	JACKSON	NO	NO	NO	EOCENE	5
C-05098	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	468	105	120	JACKSON	NO	NO	NO	EOCENE	5
C-05099	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	469	105	120	JACKSON	NO	NO	NO	EOCENE	6
C-05100	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	470	110	120	JACKSON	NO	NO	NO	EOCENE	4
C-05107	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	471	110	113	JACKSON	NO	NO	NO	EOCENE	1
C-05101	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	472	100	118	JACKSON	NO	NO	NO	EOCENE	6
C-05102	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	473	101	110	JACKSON	NO	NO	NO	EOCENE	3
C-05103	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	474	100	115	JACKSON	NO	NO	NO	EOCENE	6
C-05104	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	475	100	119	JACKSON	NO	NO	NO	EOCENE	6
C-05105	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	476	103	119	JACKSON	NO	NO	NO	EOCENE	4
C-05106	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	477	100	118	JACKSON	NO	NO	NO	EOCENE	8
C-05107	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	479	113	120	JACKSON	NO	NO	NO	EOCENE	3
C-05108	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	481	105	120	JACKSON	NO	NO	NO	EOCENE	
C-05109	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	482	107	119	JACKSON	NO	NO	NO		
C-05110	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	484	105	120	JACKSON					
C-05111	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	485	105							
C-05112	KARNES	000 SUSQUEHANNA	WESTERN	WINERICH	486								

				WINERICH	512	105	120	JACKSON	NO	NO	NO	EOCENE	6
			...TERN	WINERICH	513	105	120	JACKSON	NO	NO	NO	EOCENE	6
			SUSQUEHANNA WESTERN	WINERICH	514	105	119	JACKSON	NO	NO	NO	EOCENE	5
	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	515	105	120	JACKSON	NO	NO	NO	EOCENE	5
C-05006	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	523	110	119	JACKSON	NO	NO	NO	EOCENE	2
T-00028	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	536	105	120	JACKSON	NO	NO	NO	EOCENE	5
T-00028	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	537	100	120	JACKSON	NO	NO	NO	EOCENE	5
T-00028A	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	539	130	119	JACKSON	NO	NO	NO	EOCENE	6
T-00028A	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	540	108	109	JACKSON	NO	NO	NO	EOCENE	1
T-00028B	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	541	100	113	JACKSON	NO	NO	NO	EOCENE	3
T-00028B	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	545	105	120	JACKSON	NO	NO	NO	EOCENE	5
T-00028C	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	547	105	120	JACKSON	NO	NO	NO	EOCENE	5
T-00028C	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	548	105	117	JACKSON	NO	NO	NO	EOCENE	4
T-00028D	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	549	105	120	JACKSON	NO	NO	NO	EOCENE	4
T-00028D	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	550	105	121	JACKSON	NO	NO	NO	EOCENE	6
T-00028E	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	551	105	123	JACKSON	NO	NO	NO	EOCENE	6
T-00028E	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	552	105	121	JACKSON	NO	NO	NO	EOCENE	6
T-00028F	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	554	105	120	JACKSON	NO	NO	NO	EOCENE	5
T-00028F	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	556	105	120	JACKSON	NO	NO	NO	EOCENE	6
T-00028G	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	559	105	119	JACKSON	NO	NO	NO	EOCENE	5
T-00028H	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	564	104	119	JACKSON	NO	NO	NO	EOCENE	6
T-00028G	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	565	105	120	JACKSON	NO	NO	NO	EOCENE	6
T-00028H	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	568	105	120	JACKSON	NO	NO	NO	EOCENE	6
T-00031G	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1013	48	75	JACKSON	NO	NO	NO	EOCENE	10
T-00026E	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1100	81	107	JACKSON	NO	NO	NO	EOCENE	8
T-00031E	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1101	75	103	JACKSON	NO	NO	NO	EOCENE	6
T-00031E	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1102	73	99	JACKSON	NO	NO	NO	EOCENE	9
T-00029G	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1752	90	114	JACKSON	NO	NO	NO	EOCENE	7
T-00029H	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1754	88	114	JACKSON	NO	NO	NO	EOCENE	8
T-00031I	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1755	59	116	JACKSON	NO	NO	NO	EOCENE	13
T-00032E	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1756	25	50	JACKSON	NO	NO	NO	EOCENE	8
T-00029E	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1757	13	20	JACKSON	NO	NO	NO	EOCENE	2
T-00029D	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1758	10	30	JACKSON	NO	NO	NO	EOCENE	5
T-00029C	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1759	106	125	JACKSON	NO	NO	NO	EOCENE	6
T-00029B	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1760	22	47	JACKSON	NO	NO	NO	EOCENE	8
T-00029	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1761	30	50	JACKSON	NO	NO	NO	EOCENE	5
T-00029A	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1762	28	50	JACKSON	NO	NO	NO	EOCENE	6
T-00031	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1763	25	50	JACKSON	NO	NO	NO	EOCENE	8
T-00031A	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1764	10	35	JACKSON	NO	NO	NO	EOCENE	6
T-00031A	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1765	23	40	JACKSON	NO	NO	NO	EOCENE	5
T-00031B	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1766	5	20	JACKSON	NO	NO	NO	EOCENE	5
T-00031B	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1767	10	23	JACKSON	NO	NO	NO	EOCENE	3
T-00031C	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1768	30	48	JACKSON	NO	NO	NO	EOCENE	3
T-00030B	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1768	33	51	JACKSON	NO	NO	NO	EOCENE	3
T-00029I	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1769	30	50	JACKSON	NO	NO	NO	EOCENE	6
T-00032	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1770	30	49	JACKSON	NO	NO	NO	EOCENE	6
T-00032A	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1771	85	116	JACKSON	NO	NO	NO	EOCENE	11
T-00031H	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1772	85	116	JACKSON	NO	NO	NO	EOCENE	13
T-00030D	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1773	85	116	JACKSON	NO	NO	NO	EOCENE	13
T-00030E	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1774	85	115	JACKSON	NO	NO	NO	EOCENE	12
T-00030C	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1776	88	113	JACKSON	NO	NO	NO	EOCENE	9
T-00032B	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1777	85	116	JACKSON	NO	NO	NO	EOCENE	
T-00032C	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1783	6	40	JACKSON	NO	NO			
T-00032D	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1784	10	39						
T-00032F	KARNES	000	SUSQUEHANNA WESTERN	WINERICH	1785								

Moore Business Forms, Inc. S

[illegible]	[illegible]			[illegible]	1	3	62	GLEN ROSE	YES	NO	NO	L. CRETAC.	6
[illegible]	KENDALL	000	WATER DEVELOPMENT BOARD	RB 68-02-807	3	220	690	HOSSTON	NO	YES	NO	L. CRETAC.	13
C-00684	KENDALL	000	WATER DEVELOPMENT BOARD	RB 57-57-907	1	160	580	GLEN ROSE	NO	YES	NO	L. CRETAC.	19
T-00038	KENDALL	000	WATER DEVELOPMENT BOARD	RB 68-11-718	2	250	872	HOSSTON	NO	YES	NO	L. CRETAC.	23
C-00015	KENT	000	CHAPMAN-MCFARLAN	COGDELL	25	4900	6878	CANYON	NO	NO	NO	PENNSYLVAN	23
C-00016	KENT	000	GENERAL CRUDE OIL COMPANY	COLEMAN	193-2	6223	6546	CANYON	NO	NO	NO	PENNSYLVAN	55
C-01380	KENT	000	SUN OIL COMPANY	WALLACE	2	6955	7115		NO	YES	NO	MISSISSIPPI	55
C-00489	KENT	000	SUN OIL COMPANY	WALLACE, B.	T-4	6600	6775	STRAWN	NO	YES	NO	PENNSYLVAN	10
C-01448	KERR	000	BELCO PETROLEUM	SCHREINER	1	3300	3051	ELLENBURG	NO	NO	NO	ORDOVICIAN	16
C-06030	KERR	014	SHELL DEV. CO.(F. STRICKLIN)	DEER VALLEY RANCH	1	10	236	GLEN ROSE	NO	NO	NO	L. CRETAC.	22
C-00138	KERR	000	ROWSEY OIL COMPANY	NOWLIN	2	3980	7395	RILEY	NO	NO	NO	CAMBRIAN	12
C-00115	KERR	000	TUCKER DRILLING COMPANY	PERKINS	1	2835	3333	HICKORY	NO	YES	NO	CAMBRIAN	16
C-00087A	KIMBLE	000	HUMBLE OIL AND REFINING	WOODWARD	1	1990	2076	GORMAN	NO	YES	NO	ORDOVICIAN	3
C-01107	KING	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	12	0	81	BLAINE	NO	NO	NO	PERMIAN	2
C-01108	KING	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	13	0	80	BLAINE	NO	NO	NO	PERMIAN	5
C-01109	KING	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	14	0	110	WHITEHORSE	NO	NO	NO	PERMIAN	7
C-01110	KING	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	15	0	100	WHITEHORSE	NO	NO	NO	PERMIAN	2
C-00365	KINNEY	000	MORRISON, R.W.	ANACACHO RANCH	1	3115	3165		NO	NO	NO		2
C-01095	KLEBERG	000	CONTINENTAL OIL COMPANY	BAFFIN BAY ST.TR.70	1	10150	12243		NO	YES	NO		3
C-01240	KLEBERG	000	SUN OIL COMPANY	BAFFIN ST. TR. 376	1	8927	8950		NO	YES	NO		8
C-00575	KNOX	000	STANDARD OF TEXAS	MCGUIRE	1	4898	4956	CANYON	NO	YES	NO	PENNSYLVAN	17
C-01209	KNOX	000	SUN OIL COMPANY	ELLIS	1	5705	5720	CADDO	NO	YES	NO	PENNSYLVAN	5
C-01214	KNOX	000	SUN OIL COMPANY	HAMILTON	2	2516	2551	TANNEHILL	NO	YES	NO	PERMIAN	1
C-01344	KNOX	000	SUN OIL COMPANY	HAMILTON	3	2508	2525	TANNEHILL	NO	YES	NO	PERMIAN	6
C-01213	KNOX	000	SUN OIL COMPANY	HAMILTON	4	2485	2488	DOTHAN	NO	YES	NO	PERMIAN	1
C-01452	LAMAR	000	PARKER AND CHAPMAN	NORRELL WC 84	1	6673	6707		NO	YES	NO		2
C-00834	LAMAR	000	TEXAS WATER PROJECT	TEST HOLE (SD)	3	1	81		NO	NO	NO		3
C-00784	LAMB	000	ALKALI LAKES	UNKNOWN	1	0	0		NO	NO	NO		11
C-01028	LAMB	000	ATLANTIC REFINING COMPANY	RYAN	1	3818	3876	SAN ANDRES	NO	NO	NO	PERMIAN	18
C-01048	LAMB	000	CROWN CENTRAL PET. CORP.	BAUMGERT	1	4048	4100	SAN ANDRES	NO	NO	NO	PERMIAN	15
C-01050	LAMB	000	FELMONT OIL CORPORASTION	GRAY	1	3835	3897	SAN ANDRES	NO	NO	NO	PERMIAN	4
C-01074	LAMB	000	HUMBLE OIL AND REFINING	FOWLER	1	4080	4081	SAN ANDRES	NO	YES	NO	PERMIAN	1
C-01084	LAMB	000	HUMBLE OIL AND REFINING	FOWLER, A.E.	1	4054	4099	SAN ANDRES	NO	YES	NO	PERMIAN	7
C-01123	LAMB	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	29	0	70		NO	NO	NO		1
C-01124	LAMB	000	NORTH TEXAS CANAL ROUTE	TEST HOLE	30	0	51		NO	NO	NO		2
C-01057	LAMB	000	SHELL OIL COMPANY	IVEY-MCCARY	1	3892	4017	SAN ANDRES	NO	YES	NO	PERMIAN	20
C-01137	LAMB	000	TEXAS BASIN-BUR. OF RECLAM.	BULL LAKE SITE	3	0	121		NO	NO	NO		8
C-00424	LAMPASAS	000	ONYX	CAGLE	1	899	941		NO	NO	NO		5
C-05320	LASALLE	000	GETTY OIL COMPANY	HURT, LLOYD	1	6732	7305		NO	NO	NO		52
C-00664I	LASALLE	000	PLYMOUTH OIL COMPANY	ARCHBISHOP	1	1956	2300		NO	NO	YES	CRETACEOUS	3
C-6700	LASALLE	000	REMUDA OIL AND GAS	TALGOT	1	7220	7269		NO	NO	NO		8
C-00668	LASALLE	000	SHELL OIL COMPANY	CRISP	A-1	9882	10199	EDWARDS	NO	NO	YES	L. CRETAC.	32
C-00666G	LASALLE	000	SHELL OIL COMPANY	CRISP	B-1	9949	10333	EDWARDS	NO	NO	YES	L. CRETAC.	42
C-00666D	LASALLE	000	SHELL OIL COMPANY	EVANS	1	10300	10557	EDWARDS	NO	NO	YES	L. CRETAC.	29
C-00667E	LASALLE	000	SHELL OIL COMPANY	KRAUSE	1	9979	10444	EDWARDS	NO	NO	YES	L. CRETAC.	51
C-00667F	LASALLE	000	SHELL OIL COMPANY	KRAUSE	2	9940	10346	EDWARDS	NO	NO	YES	L. CRETAC.	44
C-05002	LASALLE	000	SHELL OIL COMPANY	KRAUSE	3	10140	10492	EDWARDS	NO	NO	YES	L. CRETAC.	53
C-00667G	LASALLE	000	SHELL OIL COMPANY	MARTIN, A.	1	10295	10602	EDWARDS	NO	NO	YES	L. CRETAC.	38
C-00666E	LASALLE	000	SHELL OIL COMPANY	MARTIN, A.	A-1	10446	10722	EDWARDS	NO	NO	YES	L. CRETAC.	31
C-00667H	LASALLE	000	SHELL OIL COMPANY	MARTIN, A.	B-1	10276	10513	EDWARDS	NO	NO	YES	L. CRETAC.	25
C-06091	LASALLE	000	STANDARD OF TEXAS	SOUTH TEX. SYNDICATE	1	4760	10531	STUART CTY	NO	NO	NO	L. CRETAC.	2
C-00314	LASALLE	000	STANOLIND	MARTIN	1	10276	11014	EDWARDS	NO	YES	NO	L. CRETAC.	10
C-01369	LASALLE	000	SUN OIL COMPANY	COOKE	1	10240	10616	EDWARDS	NO	NO	NO	L. CRETAC.	2
C-01370	LASALLE	000	SUN OIL COMPANY	MAYWALD	1	9710	10540	EDWARDS	NO	NO	NO	L. CRETAC.	9
C-01345	LASALLE	000	SUN OIL COMPANY	MAYWALD	1	9903	10026	EDWARDS	NO	NO	NO	L. CRETAC.	4
C-01321	LASALLE	000	SUN OIL COMPANY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

T-0000[illegible]	LEE	000	PRAIRIE PRODUCTION	MARBURGER									
T-00018B	LEE	000	PRAIRIE PRODUCTION	SCHAUTSCHICK	1	7310	[illegible]						
T-00018A	LEE	000	PRAIRIE PRODUCTION	SMELLEY	1	8073	8149	AUSTIN	NO	NO	NO	U. CRE[illegible]	
C-00470	LEE	000	SKELLY OIL COMPANY	CORNELL	1	0	0		NO	YES	NO		1
C-01315	LEE	000	SUN OIL COMPANY	MELDE	1	6825	6877		NO	YES	YES	U. CRETAC.	2
C-00557	LEE	000	UNION PRODUCING COMPANY	CITY OF GIDDINGS	1	6160	8246		NO	NO	YES	CRETACEOUS	8
C-01347	LEON	000	SUN OIL COMPANY	BARKLEY	1	8737	10268		NO	YES	NO		15
C-01309	LEON	000	SUN OIL COMPANY	BURGIN	1	8470	8590		NO	NO	NO		41
C-01435	LEON	000	SUN OIL COMPANY	STARKEY	1	8962	8969		NO	YES	NO		1
C-06118	LEON	000	TEXAS INTL. PETRO.	HILLTOP RESORT (SKIPS)	2	6365	6750		NO	NO	NO		47
C-00618	LIBERTY	000	GULF BASIN-BUR. RECLAM.	TRINITY VALLEY	1-9	0	0		NO	NO	NO		46
T-00046	LIBERTY	000	PAN AMERICAN CORPORATION	HOWARD	1	12909	12969		NO	NO	NO		10
C-06125	LIBERTY	000	TEXACO	WILLIAMS	1-A	1078	1160		NO	NO	NO		14
C-06127	LIBERTY	000	TEXACO	WILLIAMS	2	780	797		NO	NO	NO		2
C-06128	LIBERTY	000	TEXACO	WILLIAMS	3	726	802		NO	NO	NO		15
C-00408	LIMESTONE	000	STANOLIND	NORRIS	1	4030	9951		NO	YES	YES		11
C-00988	LIMESTONE	000	VAUGHN PETROLEUM COMPANY	EASTERLING	1	11309	11480		NO	NO	NO		5
C-01086	LIPSCOMB	000	FOLLETT, W.	SCHOENHAL	1	8049	8085		NO	NO	NO		6
C-00118	LIPSCOMB	000	GULF OIL CORPORATION	PORTER	1	14046	14278	HONEYCUT	NO	YES	NO	ORDOVICIAN	10
C-00265	LIPSCOMB	000	GULF OIL CORPORATION	PORTER, A.L.	1	14045	14278	HONEYCUT	NO	YES	NO	ORDOVICIAN	16
C-01033	LIPSCOMB	000	HUBER, J.M. CORPORATION	SCHULTZ	2	6194	6229	MORROW	NO	NO	NO	PENNSYLVAN	7
C-01037	LIPSCOMB	000	HUBER, J.M. CORPORATION	WAYNE	1	7428	7434	MORROW	NO	NO	NO	PENNSYLVAN	12
C-00580	LIPSCOMB	000	HUMBLE OIL AND REFINING	FREEMAN	1	8599	8726	MORROW	NO	NO	NO	PENNSYLVAN	18
C-00579	LIPSCOMB	000	HUMBLE OIL AND REFINING	LIVELY GAS UNIT	1	8666	8989	MORROW	NO	NO	NO	PENNSYLVAN	42
C-01041	LIPSCOMB	000	HUMBLE OIL AND REFINING	TUBB HEIRS	2	7241	7316	MORROW	NO	NO	NO	PENNSYLVAN	23
C-01054	LIPSCOMB	000	NORTHERN NAT. GAS	KUHLMAN	3-A	7941	8065	MORROW	NO	NO	NO	PENNSYLVAN	35
C-01029	LIPSCOMB	000	SHAMROCK OIL AND GAS	CNB (G)	7	10799	10849	MORROW	NO	NO	NO	PENNSYLVAN	14
C-01015	LIPSCOMB	000	SOTEX	CROWN-TROSPER	1	7062	7119	MORROW	NO	NO	NO	PENNSYLVAN	19
C-01016	LIPSCOMB	000	SOTEX	TROSPER	1	7002	7062	MORROW	NO	NO	NO	PENNSYLVAN	20
C-01027	LIPSCOMB	000	SUNTEX	PHILLIPS	2	6301	6357	MORROW	NO	NO	NO	PENNSYLVAN	7
B-00064G	LIVE OAK	000	CONTINENTAL OIL COMPANY	ESSE UL-212 (214)	9	160	184		NO	NO	NO	MIOCENE	1
B-00064C	LIVE OAK	000	CONTINENTAL OIL COMPANY	GUERRA UL-238 (245)	316-A	176	199		NO	NO	NO		1
B-00065C	LIVE OAK	000	CONTINENTAL OIL COMPANY	HOUSE UL-1730	127	248	265		NO	NO	NO	MIOCENE	1
B-00065D	LIVE OAK	000	CONTINENTAL OIL COMPANY	HOUSE UL-1730	28	245	271		NO	NO	NO	MIOCENE	1
B-00065E	LIVE OAK	000	CONTINENTAL OIL COMPANY	HOUSE UL-1730	78	246	271		NO	NO	NO	MIOCENE	1
C-00371	LIVE OAK	000	COQUAT	BURGESS	1	1502	2574		NO	YES	NO		6
C-00157	LIVE OAK	000	MINERAL EXPLORATION, LTD.	LYNNE, R.C.	3	6930	7046	QUEEN CITY	NO	NO	NO	EOCENE	15
C-06089	LIVE OAK	000	STANDARD OF TEXAS	ISAACKS	1	12435	12762	STUART CTY	NO	NO	NO	L. CRETAC.	23
C-01517	LIVE OAK	000	TENNECO	ALAMO LUMBER CO.	1	13340	13691	GLEN ROSE	NO	YES	NO	L. CRETAC.	24
C-01520	LIVE OAK	000	TENNECO	SCHULTZ	1	13412	13987	GLEN ROSE	NO	NO	NO	L. CRETAC.	17
C-00770	LIVE OAK	000	TEXAS BASIN-BUR. OF RECLAM.	CHOKE CANYON DAM	1-18	0	0		NO	NO	NO		75
C-00670A	LLANO	000	U.S. AIR FORCE	BG-CR	6	15	200	GNEISS	NO	YES	NO	PRECAMBRN	28
T-00014A	LLANO	000	U.S. AIR FORCE	BG-CR	8	46	201	GRANITE	NO	YES	NO	PRECAMBRN	11
T-00015A	LLANO	000	U.S. AIR FORCE	BG-CR	32	8	200	GRANITE	NO	YES	NO	PRECAMBRN	14
T-00015B	LLANO	000	U.S. AIR FORCE	BG-CR	34	15	201	GNEISS	NO	YES	NO	PRECAMBRN	13
T-00015C	LLANO	000	U.S. AIR FORCE	BG-CR	39	19	200	GRANITE	NO	YES	NO	PRECAMBRN	14
C-00283	LOVING	000	GULF OIL CORPORATION	TXL B.G.	1	4030	4057	DELAWARE	NO	YES	NO	PERMIAN	7
C-00667C	LOVING	000	MGF OIL CORP.	ARINGTON	1	4664	4725	DELAWARE	NO	YES	YES	PERMIAN	3
C-00503	LOVING	000	STANOLIND	GILLS	1	5221	5321		NO	NO	NO		5
C-01254	LOVING	000	SUN OIL COMPANY	STATE OF TEXAS	C-2	4695	4735	DELAWARE	NO	YES	NO	PERMIAN	14
C-01167	LOVING	000	SUN OIL COMPANY	TXL	1-G	4290	4340	DELAWARE	NO	YES	NO	PERMIAN	17
C-00628	LUBBOCK	000	GULF BASIN-BUR. OF RECLAM.	SAND PLAINS AREA	1-4	1	63	OGALLALA	NO	NO	NO	PLIOCENE	17
C-01141	LUBBOCK	000	NORTH TEXAS CANAL ROUTE	YELLOW HOUSE CANYON	1	0	167	OGALLALA	NO	NO	NO	PLIOCENE	9
[illegible]	[illegible]	000	NORTH TEXAS CANAL ROUTE	YELLOW HOUSE CANYON	2	0	177	OGALLALA	NO	NO	NO	PLIOCENE	7
[illegible]	[illegible]	[illegible]	[illegible] COMPANY	LUBBOCK IRRIGATION	1	4530	4609	CLEAR FORK	NO	NO	NO	PERMIAN	38
[illegible]	[illegible]	[illegible]	[illegible]	GUTHRIE LAKE	1	1	76	KL-ED-CP	NO	NO	YES	L. CRETAC.	4

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T-00016B	MASON	000	U.S. AIR FORCE	BG-CR	25	8	200	GRANITE	NO	YES	NO	PRECAMBRN	15
T-00017	MASON	000	U.S. AIR FORCE	BG-CR	28	10	200	GRANITE	NO	YES	NO	PRECAMBRN	14
C-00063A	MASON	000	WATER DEVELOPMENT BOARD	WHITE-SWN-56-06-513	2	40	299	HICKORY	NO	NO	NO	CAMBRIAN	37
C-00680	MATAGORDA	000	SUN OIL COMPANY	BRAMAN	C-27	11083	11094		NO	NO	NO		1
C-01449	MAVERICK	000	BELCO PETROLEUM	KINCAID	1	7716	7836	SLIGO	NO	NO	NO	L. CRETAC.	40
C-00670C	MAVERICK	000	BELCO PETROLEUM	CAGE	2	3288	3306	SAN MIGUEL	NO	NO	NO	U. CRETAC.	1
C-00186	MAVERICK	000	HUMBLE OIL AND REFINING	BANDERA SCHOOL LAND	1	11460	13867		NO	YES	NO		137
C-00711	MAVERICK	000	MOBIL OIL COMPANY	DAVIDSON RANCH	2	1019	1126		NO	NO	NO		1
C-00556	MAVERICK	000	UNION PRODUCING COMPANY	HALSELL	29-1	1930	6319		NO	NO	NO		11
C-00540	MAVERICK	000	UNION PRODUCING COMPANY	HALSELL	29-1	6820	8978		NO	NO	NO		2
C-00476	MAVERICK	000	WELLINGTON OIL COMPANY	CHITTIM	1	1051	3287	WASHITA	NO	YES	NO	L. CRETAC.	6
C-00062A	MCCULLOCH	000	WATER DEVELOPMENT BOARD	BEHRENS-SWN42-63-916	1	60	366	HICKORY	NO	NO	NO	CAMBRIAN	42
C-00645	MCCULLOCH	000	WATER DEVELOPMENT BOARD	SWN-56-06-614	3	198	633	GRANITE	NO	NO	YES	PRECAMBRN	61
C-00646	MCCULLOCH	000	WATER DEVELOPMENT BOARD	SWN-56-06-902	4	427	780	GRANITE	NO	NO	YES	PRECAMBRN	35
C-00998	MCLENNAN	000	ATLANTIC-RICHFIELD COMPANY	CHAPMAN	1	9280	9302		NO	NO	NO		7
C-00334	MCMULLEN	000	AMERADA PETROLEUM CORP.	HORTON	1	11519	11826		NO	YES	NO		84
C-00207	MCMULLEN	000	HUMBLE OIL AND REFINING CO.	DILWORTH	1	11100	11915	EDWARDS	NO	YES	NO	L. CRETAC.	134
C-01521	MCMULLEN	000	HUMBLE OIL AND REFINING CO.	DILWORTH	2	10210	11470	EDWARDS	NO	YES	NO	L. CRETAC.	124
C-00466	MCMULLEN	000	THAD ODAY	WOLFF	1	381	1722		NO	NO	NO		12
C-00105C	MCMULLEN	000	PHILLIPS PETROLEUM COMPANY	NUECES	A-1	10474	15359	EDWARDS	NO	NO	NO	L. CRETAC.	6
C-00667I	MCMULLEN	000	SHELL OIL COMPANY	WHEELER	1	12153	12404	EDWARDS	NO	NO	YES	L. CRETAC.	29
C-00484	MCMULLEN	000	SMITH, H.R. AND GULF	SEALY ESTATE	1	10720	12354	EDWARDS	NO	YES	NO	L. CRETAC.	5
C-01524	MCMULLEN	000	STANDARD OF TEXAS	DILWORTH	1	11002	11253	EDWARDS	NO	YES	NO	L. CRETAC.	20
C-06090	MCMULLEN	000	STANDARD OF TEXAS	HENRY	1	9979	10608	STUART CTY	NO	YES	NO	L. CRETAC.	59
C-06188	MCMULLEN	000	STANDARD OF TEXAS	ROARK	1	10325	10658	STUART CTY	NO	YES	NO	L. CRETAC.	34
T-00031	MCMULLEN	000	TENNECO	JAMBERS RANCH		11161	11360		NO	NO	NO		17
C-00679	MEDINA	000	B AND L PRODUCTIONS	SCHWEERS	1	1089	1466		NO	NO	NO		13
C-00161H	MEDINA	000	COUCH HUFFMAN OIL CO.	WEIMERS	3	930	959		NO	NO	NO		4
T-00049	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	IB1B	397	501		NO	NO	NO		9
T-00049A	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	IB2B	152	160		NO	NO	NO		2
T-00049B	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	TT12	201	212		NO	NO	NO		2
T-00049C	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	VV12	440	442		NO	NO	NO		1
T-00049D	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	VV14	512	527		NO	NO	NO		2
T-00049E	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	VV16	304	323		NO	NO	NO		3
T-00049F	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	VV18	365	436		NO	NO	NO		9
T-00049G	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	VV24	142	322		NO	NO	NO		2
T-00049H	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	VV20	443	463		NO	NO	NO		4
T-00049I	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	XX16	430	448		NO	NO	NO		3
T-00050	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	XX18	434	615		NO	NO	NO		12
T-00050A	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	XX20	254	458		NO	NO	NO		7
T-00050B	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	XX21	413	422		NO	NO	NO		1
T-00050C	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	XX22	254	420		NO	NO	NO		4
T-00050D	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	YY22	453	490		NO	NO	NO		5
T-00050E	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	ZZ19	104	140		NO	NO	NO		7
T-00050F	MEDINA	000	GULF OIL	SOUTHWEST TEXAS	ZZ20	560	590		NO	NO	NO		6
C-01567	MEDINA	000	HUGHES	CADENHEAD	1	4395	4459	SLIGO	NO	NO	NO	L. CRETAC.	21
C-01566	MEDINA	000	HUGHES AND HUGHES	PLACHY, ANTON ET AL	1	4330	4789	PEARSALL	NO	NO	NO	L. CRETAC.	38
C-00494	MEDINA	000	LOPEZ, M.M.	BURRELL, OTTO	6	771	2010		NO	NO	NO		117
C-00528	MEDINA	000	LOPEZ, M. M.	LOPEZ	0	1072	1128		NO	NO	NO		17
C-00157F	MEDINA	000	MARCO DRILLING COMPANY	HOOD	B-2	364	918	SAN MIGUEL	NO	NO	NO	U. CRETAC.	11
C-01565	MEDINA	000	MONCRIEF, W.A.	COLLINS, JOE E.	1	4435	4950	SLIGO	NO	NO	NO	L. CRETAC.	30
C-00161G	MEDINA	000	OKLA.-SOUTHLAND DRLG.	ZERR, TONY	1	707	717		NO	NO	NO		2
C-06050	MEDINA	013	SHELL DEV CO (B F PERKINS)	HONDO CREEK-W.SPROTT	1	0	75	GLEN ROSE	NO	NO	NO	L. CRETAC.	8
C-01555	MEDINA	000	TENNECO	CARROLL, JOHN W.	1	3487	4360	SLIGO	NO	NO	NO	L. CRETAC.	91
[illegible]	[illegible]	[illegible]	[illegible]	NEY, H.L., TRUSTEE	1	3223	3751	SLIGO	NO	NO	NO	L. CRETAC.	191
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NO	NO	NO	L. CRETAC.	71

C-06393	MEDINA	000	WATER DEVELOPMENT BOARD	RP-2 70-38-9[illegible]2		[illegible]	775	GLEN ROSE	NO	NO	NO	L. CRETAC.	22
C-06994	MEDINA	000	WATER DEVELOPMENT BOARD	TD-3 69-39-504		0	650	GLEN ROSE	NO	NO	NO	L. CRETAC.	27
C-00114	MIDLAND	000	MAGNOLIA PETROLEUM COMPANY	NOBLE	1	13367	13450	HONEYCUT	NO	YES	NO	ORDOVICIAN	10
C-00354	MIDLAND	000	MAGNOLIA PETROLEUM COMPANY	WINDHAM	A-2	12567	13088	GORMAN	NO	NO	NO	ORDOVICIAN	42
C-01052	MIDLAND	000	SINCLAIR OIL AND GAS	SANDERS	6	9227	10360	CANYON	NO	NO	NO	PENNSYLVAN	7
C-00577	MIDLAND	000	STANDARD OF TEXAS	SIMMS, J. E.	2	12473	12543	FUSSELMAN	NO	NO	NO	SILURIAN	24
C-00508	MIDLAND	000	STANOLIND	MIDKIFF, HERB	1	7538	8100	SPRAYBERRY	NO	NO	NO	PERMIAN	57
C-01357	MIDLAND	000	SUN OIL COMPANY	HUTCHINSON	7	7182	7873	SPRAYBERRY	NO	YES	NO	PERMIAN	162
C-00630	MILAM	000	BYRD AND VOYLES	GREEN, LUCINDA	1	5080	5388	BUDA	NO	NO	NO	L. CRETAC.	32
C-00166	MILAM	000	BYRD AND VOYLES	GREEN	1	5693	5769	EDWARDS	NO	NO	NO	L. CRETAC.	21
C-00177	MILAM	000	BYRD AND VOYLES	GREEN	2	5635	5718	KIAMICHI	NO	NO	NO	L. CRETAC.	26
T-00002A	MILAM	000	CADDO OIL COMPANY	MCVOY	1	3388	3458	NAVARRO	NO	YES	NO	U. CRETAC.	24
C-00197	MILAM	000	COFFEE	DAVIS	1	3729	3795		NO	NO	YES	CRETACEOUS	4
C-00369	MILAM	000	EISER, M. W.	CITIZENS NAT. BANK	1	2152	2321		NO	YES	NO		20
C-00150	MILAM	000	HARRISON, DAN	SMITH	1	1888	3512		NO	NO	YES	CRETACEOUS	118
C-00440	MILAM	000	LEE, JOHN ET. AL	ISAACKS	1	2053	3398		NO	NO	NO		1
C-00367	MILAM	000	WILSON-BROACH	WHITE, E. L.	1	2604	3092	GLEN ROSE	NO	YES	NO	L. CRETAC.	3
C-00308	MILLS	000	MAGNOLIA PETROLEUM COMPANY	SCHUSTER	1	2041	2960		NO	YES	NO		41
C-00310	MILLS	000	MAGNOLIA PETROLEUM COMPANY	SINGLETON	1	1941	2011		NO	YES	NO		20
C-00307	MILLS	000	MAGNOLIA PETROLEUM COMPANY	SULLIVAN	1	1913	2047		NO	YES	NO		49
C-00782	MILLS	000	TEXAS BASIN-BUR. OF RECLAM.	CAT CLAW SITE		0	36		NO	NO	NO		1
C-00578	MITCHELL	000	STANDARD OF TEXAS	BONE	1	3325	3543	CLEARFORK	NO	NO	NO	PERMIAN	69
C-00416	MITCHELL	000	STANDARD OF TEXAS	CLARK	2-2	1842	1849		NO	NO	NO		1
C-00565	MITCHELL	000	STANDARD OF TEXAS	MILLER	18-W	2850	3140	CLEARFORK	NO	NO	NO	PERMIAN	96
C-00446	MONTAGUE	000	HUMPHEYS CORPORATION	HINTON	1	527	1814		NO	NO	NO		4
C-00451	MONTAGUE	000	HUMPHEYS CORPORATION	HOWARD	1	834	835		NO	NO	NO		1
C-00448	MONTAGUE	000	HUMPHEYS CORPORATION	HYNDS	1	892	944		NO	NO	NO		1
C-00449	MONTAGUE	000	HUMPHEYS CORPORATION	HYNDS	2	935	935		NO	NO	NO		1
C-00450	MONTAGUE	000	HUMPHEYS CORPORATION	HYNDS	3	912	934		NO	NO	NO		1
C-00429	MONTAGUE	000	HUMPHEYS CORPORATION	MADDOX	3	2040	2276		NO	NO	NO		55
C-00447	MONTAGUE	000	HUMPHEYS AND BOYD	JONES	3	227	422		NO	NO	NO		1
C-00081E	MONTAGUE	000	MAGNOLIA PETROLEUM COMPANY	CARMINATI	1	5638	5643	STRAWN	NO	NO	NO	PENNSYLVAN	1
C-01154	MONTAGUE	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	4	266	747		NO	NO	NO		25
C-01090	MONTAGUE	000	STANDARD OF TEXAS	ELKIN, R. P.	1	6988	7143	ELLENBURG	NO	NO	NO	ORDOVICIAN	9
C-01017	MONTAGUE	000	STANDARD OF TEXAS	MCCALL, C. S.	1	6925	6975	ELLENBURG	NO	NO	NO	ORDOVICIAN	18
C-01025	MONTAGUE	000	STANDARD OF TEXAS	ROBERTS	4	7192	7445	ELLENBURG	NO	NO	NO	ORDOVICIAN	88
C-01097	MONTAGUE	000	STEMMONS	CLINGERSMITH	2	971	989		NO	NO	NO		6
C-00481	MONTGOMERY	000	SUPERIOR OIL COMPANY	MCMAHAN	1	9105	12418		NO	YES	YES		4
C-00715	MOORE	000	SINCLAIR OIL AND GAS	MASTERSON ESTATE	16	3456	3503		NO	YES	NO		3
C-00056A	MOORE	000	SOCONY-MOBIL OIL COMPANY	COON, R. S.	25-7	3214	3445		NO	NO	NO		36
C-00713	MOORE	000	STANDARD OF TEXAS	MASTERSON ESTATE	7	3350	3449		NO	YES	NO		6
C-00714	MOORE	000	STANDARD OF TEXAS	MASTERSON ESTATE	11	3346	3444		NO	NO	NO		5
C-00796	MORRIS	000	TEXAS WATER PROJECT	TEST HOLE (XCN)	2	1	57		NO	NO	NO		2
C-00829	MORRIS	000	TEXAS WATER PROJECT	TEST HOLE (ND)	2	1	103		NO	NO	NO		2
C-00831	MORRIS	000	TEXAS WATER PROJECT	TEST HOLE (ND)	4	1	101		NO	NO	NO		4
C-01395	MOTLEY	000	GENERAL CRUDE OIL COMPANY	BIRNIE	1	8740	8809	STRAWN	NO	YES	NO	PENNSYLVAN	19
C-00469	MOTLEY	000	GENERAL CRUDE OIL COMPANY	SWENSON	5-1	5149	5149	STRAWN	NO	YES	NO	PENNSYLVAN	1
C-00788	NACOGDOCHE	000	PAN AMERICAN CORPORATION	BLACKBURN, ANNIE P.	1	4791	4818		NO	NO	NO		9
C-06126	NACOGDOCHE	000	TEXACO	BURT	1	10495	10544		NO	NO	NO		1
C-01005	NAVARRO	000	MCCORMICK	LAFERRO	1	9032	9049		NO	NO	NO		3
C-00464	NAVARRO	000	NEW BLOCK OIL COMPANY	BOUNDS	1	2956	2958		NO	NO	NO		1
C-06131	NAVARRO	000	TEXACO	MATHIS-NCT O/A	1	6864	6902		NO	NO	NO		1
C-06122	NAVARRO	000	TEXACO	MONTGOMERY	12	6185	6839						16
C-00391	NAVARRO	000	WHEELOCK AND COLLINS	CERF	1	6215	6488	PALUXY	NO	YES	NO	L. CRETAC.	1
C-00456	NAVARRO	000	WHEELOCK AND COLLINS	CERF	1	3832	6184	PALUXY	NO	YES	NO	L. CRETAC.	3
C-01518	NEWTON	000	AMOCO	ARCO [illegible]									

C-01281	NOLAN	000	SUN OIL COMPANY	BEAVER	1	6096	6617	STRAWN	NO	NO	NO	PENNSYLVAN	130
C-01210	NOLAN	000	SUN OIL COMPANY	BOYD	1	5944	6034	STRAWN	NO	NO	NO	PENNSYLVAN	7
C-01204	NOLAN	000	SUN OIL COMPANY	BRIDGEFORD	1	6059	6134	STRAWN	NO	YES	NO	PENNSYLVAN	11
C-01237	NOLAN	000	SUN OIL COMPANY	FEATHERSTONE	1	6924	6926	ELLENBURG	NO	YES	NO	ORDOVICIAN	1
C-01211	NOLAN	000	SUN OIL COMPANY	FEATHERSTONE	2	6072	6939	ELLENBURG	NO	YES	NO	ORDOVICIAN	7
C-01212	NOLAN	000	SUN OIL COMPANY	FEATHERSTONE	3	5636	6288	STRAWN	NO	YES	NO	PENNSYLVAN	2
C-01285	NOLAN	000	SUN OIL COMPANY	HARP	2	5301	5864	STRAWN	NO	YES	NO	PENNSYLVAN	35
C-01200	NOLAN	000	SUN OIL COMPANY	HARP	3	5565	5796	CANYON	NO	YES	NO	PENNSYLVAN	5
C-01201	NOLAN	000	SUN OIL COMPANY	HARP	4	5496	5740	CANYON	NO	NO	NO	PENNSYLVAN	8
C-01208	NOLAN	000	SUN OIL COMPANY	HOLLINS, BESSIE	1	6313	6362	STRAWN	NO	YES	NO	PENNSYLVAN	15
C-01199	NOLAN	000	SUN OIL COMPANY	LEEPER	1	6787	6817	ODOM	NO	YES	NO	PENNSYLVAN	14
C-01276	NOLAN	000	SUN OIL COMPANY	LONG	1	6008	6447	STRAWN	NO	NO	NO	PENNSYLVAN	88
C-01433	NOLAN	000	SUN OIL COMPANY	MADDOX	1	6788	6860	STRAWN	NO	NO	NO	PENNSYLVAN	5
C-01282	NOLAN	000	SUN OIL COMPANY	MEDLOCK	1	6184	6490	STRAWN	NO	NO	NO	PENNSYLVAN	96
C-01353	NOLAN	000	SUN OIL COMPANY	PARRAMORE, E.	2	5844	7068	CADDO	NO	YES	NO	PENNSYLVAN	7
C-01268	NOLAN	000	SUN OIL COMPANY	PARRAMORE, E.	3	6906	6946	CADDO	NO	YES	NO	PENNSYLVAN	15
C-01268	NOLAN	000	SUN OIL COMPANY	PARRAMORE, E.	4	6826	7101	CADDO	NO	YES	NO	PENNSYLVAN	3
C-01202	NOLAN	000	SUN OIL COMPANY	PARRAMORE, E.	5	6902	7164	CADDO	NO	NO	NO	PENNSYLVAN	24
C-01408	NOLAN	000	SUN OIL COMPANY	RAYBURN, H. F.	1	5971	6511	STRAWN	NO	NO	NO	PENNSYLVAN	19
C-01443	NOLAN	000	SUN OIL COMPANY	RAYBURN, W. D.	1	5975	6564	STRAWN	NO	NO	NO	PENNSYLVAN	17
C-01217	NOLAN	000	SUN OIL COMPANY	SHAW	1	4840	6413	STRAWN	NO	NO	NO	PENNSYLVAN	9
C-00127	NOLAN	000	U.S. SMELTING AND REFNG. CO.	TXL-A	3	6136	6262		NO	YES	NO	CAMBRIAN	3
C-01061	OCHILTREE	000	HORIZON	SPENCE	1-928	7990	8005	MORROW	NO	YES	NO	PENNSYLVAN	1
C-00562	OCHILTREE	000	PHILLIPS PETROLEUM COMPANY	MCLAIN	1	5700	9001	MORROW	NO	YES	NO	PENNSYLVAN	4
C-00558	OCHILTREE	000	PHILLIPS PETROLEUM COMPANY	PSHIGODA	1	5602	9027	MORROW	NO	YES	NO	PENNSYLVAN	6
C-01071	OCHILTREE	000	SINCLAIR OIL AND GAS	STEPHENSON	1	8630	8645	MORROW	NO	NO	NO	PENNSYLVAN	2
C-01271	OCHILTREE	000	SUN OIL COMPANY	IRVIN	2	7084	7107	MORROW	NO	NO	NO	PENNSYLVAN	8
C-01243	OCHILTREE	000	SUN OIL COMPANY	SWINK	1-A	9766	9790	MORROW	NO	YES	NO	PENNSYLVAN	7
C-01051	OCHILTREE	000	UNION PRODUCING COMPANY	FARNS BKHALTS 30	3WI	7935	7963	MORROW	NO	NO	NO	PENNSYLVAN	5
C-00460	PALO PINTO	000	BURTON-MCKEE	STRAWN COAL CO.	8	4845	4845	ELLENBURG	NO	NO	NO	ORDOVICIAN	1
C-00459	PALO PINTO	000	GORDON, W. K.	MCDONALD	2	4845	4868	ELLENBURG	NO	NO	NO	ORDOVICIAN	1
C-01153	PALO PINTO	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	3	200	669		NO	NO	NO		31
C-01162	PALO PINTO	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	5	23	148		NO	NO	NO		6
C-01155	PALO PINTO	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	5	18	204		NO	NO	NO		14
C-01164	PALO PINTO	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	6	51	314		NO	NO	NO		7
C-01156	PALO PINTO	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	6	17	503		NO	NO	NO		28
C-01157A	PALO PINTO	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	7	31	219		NO	NO	NO		5
C-06133	PANOLA	000	CHAMPLIN PETROLEUM COMPANY	BAKER ESTATE	1	10736	10798		NO	NO	MO		11
C-01251	PANOLA	000	SUN OIL COMPANY	HANCOCK	1	5922	5933	TRAVIS PK	NO	NO	NO	L. CRETAC.	111
C-00345	PARMER	000	GULF OIL CORPORATION	KELIEHOR	1-A	9578	9622		NO	YES	NO	PRECAMBRN	15
C-00941	PECOS	000	AMAX	UNIVERSITY	A-6	565	923	YATES	NO	NO	NO	PERMIAN	142
C-00945	PECOS	000	AMAX	UNIVERSITY	A-7	713	903	YATES	NO	NO	NO	PERMIAN	77
C-00944	PECOS	000	AMAX	UNIVERSITY	A-8	455	625		NO	NO	NO		68
C-00942	PECOS	000	AMAX	UNIVERSITY	A-9	490	850	YATES	NO	NO	NO	PERMIAN	107
C-00943	PECOS	000	AMAX	UNIVERSITY	A-10	780	950	YATES	NO	NO	NO	PERMIAN	65
C-00946	PECOS	000	AMAX	UNIVERSITY	1-23	1	1141	YATES	NO	NO	NO	PERMIAN	2
C-00948	PECOS	000	AMAX	UNIVERSITY	3-23	5	1196	YATES	NO	NO	NO	PERMIAN	2
C-00949	PECOS	000	AMAX	UNIVERSITY	4-23	5	1180	YATES	NO	NO	NO	PERMIAN	2
C-00950	PECOS	000	AMAX	UNIVERSITY	5-23	5	1116		NO	NO	NO	PERMIAN	2
C-00951	PECOS	000	AMAX	UNIVERSITY	6-23	5	1205	YATES	NO	NO	NO	PERMIAN	2
C-00952	PECOS	000	AMAX	UNIVERSITY	7-23	5	[illegible]	YATES	NO	NO	NO	PERMIAN	2
C-00953	PECOS	000	AMAX	UNIVERSITY	9-23	5	1070	YATES	NO	NO	NO	PERMIAN	2
C-00938	PECOS	000	AMAX	UNIVERSITY	11-23	151	1047	YATES	NO	NO	NO	PERMIAN	302
C-00954	PECOS	000	AMAX	UNIVERSITY	12-23	0	1086	YATES	NO	NO	NO	PERMIAN	2
				UNIVERSITY	13-23	[illegible]	1050	YATES	NO	NO	NO	PERMIAN	264

C-00956	PECOS	000	AMAX	UNIVERSITY	15-23	0	690		NO	NO	NO		1
C-00957	PECOS	000	AMAX	UNIVERSITY	16-23	0	1100	YATES	NO	NO	NO	PERMIAN	2
C-00947	PECOS	000	AMAX	UNIVERSITY	2-23	5	1210	YATES	NO	NO	NO	PERMIAN	2
C-00939	PECOS	000	AMAX	UNIVERSITY	26-23	280	1050	YATES	NO	NO	NO	PERMIAN	199
C-00958	PECOS	000	AMAX	UNIVERSITY	28-23	2	1831	YATES	NO	NO	NO	PERMIAN	3
C-00959	PECOS	000	AMAX	UNIVERSITY	29-23	0	1085	YATES	NO	NO	NO	PERMIAN	2
C-00960	PECOS	000	AMAX	UNIVERSITY	30-23	0	1045	YATES	NO	NO	NO	PERMIAN	2
C-00968	PECOS	000	AMAX	UNIVERSITY	32-23	0	1025	YATES	NO	NO	NO	PERMIAN	2
C-00969	PECOS	000	AMAX	UNIVERSITY	34-23	0	1070	YATES	NO	NO	NO	PERMIAN	2
C-00961	PECOS	000	AMAX	UNIVERSITY	37-23	0	1000	YATES	NO	NO	NO	PERMIAN	2
C-00962	PECOS	000	AMAX	UNIVERSITY	50-23	1	1048	YATES	NO	NO	NO	PERMIAN	2
C-00963	PECOS	000	AMAX	UNIVERSITY	51-23	2	1085	YATES	NO	NO	NO	PERMIAN	2
C-00964	PECOS	000	AMAX	UNIVERSITY	54-23	2	1030	YATES	NO	NO	NO	PERMIAN	2
C-00965	PECOS	000	AMAX	UNIVERSITY	55-23	2	1030	YATES	NO	NO	NO	PERMIAN	2
C-00966	PECOS	000	AMAX	UNIVERSITY	55-23	2	1045	YATES	NO	NO	NO	PERMIAN	2
C-00970	PECOS	000	AMAX	UNIVERSITY	56-23	0	300		NO	NO	NO		2
C-00967	PECOS	000	AMAX	UNIVERSITY	58-23	2	1040	YATES	NO	NO	NO	PERMIAN	2
C-01434	PECOS	000	HUMBLE OIL AND REFINING	NEAL, ROXIE	1	10850	10878	STRAWN	NO	NO	NO	PENNSYLVAN	3
C-00081	PECOS	000	PHILLIPS PETROLEUM COMPANY	GLENNA	1	13927	14519	HONEYCUT	NO	YES	NO	ORDOVICIAN	53
C-00076	PECOS	000	PHILLIPS PETROLEUM COMPANY	PUCKETT	1-C	13235	14901		NO	YES	NO	PRECAMBRN	122
C-00299H	PECOS	000	PHILLIPS PETROLEUM COMPANY	RIXSE	2	5419	5430	WOLFCAMP	NO	NO	NO	PERMIAN	2
C-00668E	PECOS	000	PHILLIPS PETROLEUM COMPANY	SILVERMAN	3	5013	6141	WOLFCAMP	NO	NO	NO	PERMIAN	3
C-00986	PECOS	000	PIPER PETROLEUM COMPANY	ALLIED	3	0	1021	YATES	NO	NO	NO	PERMIAN	5
C-01009	PECOS	000	PIPER PETROLEUM COMPANY	ALLIED	4	0	1050	YATES	NO	NO	NO	PERMIAN	5
C-00971	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-1	0	1200	YATES	NO	NO	NO	PERMIAN	2
C-00975	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-2	0	1200	YATES	NO	NO	NO	PERMIAN	1
C-00980	PECOS	000	PIPER PETROLEUM COMPANY	ARCO -140-	2-A-1	0	1000	YATES	NO	NO	NO	PERMIAN	1
C-00976	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-3	0	1200	YATES	NO	NO	NO	PERMIAN	2
C-00972	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-4	0	1200	YATES	NO	NO	NO	PERMIAN	2
C-00979	PECOS	000	PIPER PETROLEUM COMPANY	ARCO -140-	4-A-1	0	1000	YATES	NO	NO	NO	PERMIAN	1
C-00973	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-5	0	1200	YATES	NO	NO	NO	PERMIAN	2
C-00974	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-6	0	1051	YATES	NO	NO	NO	PERMIAN	1
C-00981	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-7	0	1000	YATES	NO	NO	NO	PERMIAN	2
C-00977	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-8	0	950	YATES	NO	NO	NO	PERMIAN	2
C-00978	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-9	0	957	YATES	NO	NO	NO	PERMIAN	2
C-00982	PECOS	000	PIPER PETROLEUM COMPANY	ARCO	A-10	0	500		NO	NO	NO		1
C-00983	PECOS	000	PIPER PETROLEUM COMPANY	BENNETT	3	0	1000	YATES	NO	NO	NO	PERMIAN	5
C-01006	PECOS	000	PIPER PETROLEUM COMPANY	BENNETT	4	0	950	YATES	NO	NO	NO	PERMIAN	4
C-00987	PECOS	000	PIPER PETROLEUM COMPANY	COCHRAN	3	0	779	YATES	NO	NO	NO	PERMIAN	4
C-01007	PECOS	000	PIPER PETROLEUM COMPANY	COCHRAN	4	0	845	YATES	NO	NO	NO	PERMIAN	3
C-00940	PECOS	000	PIPER PETROLEUM COMPANY	DRAKE	3	0	950	YATES	NO	NO	NO	PERMIAN	4
C-00940A	PECOS	000	PIPER PETROLEUM COMPANY	LEONA	3	0	950	YATES	NO	NO	NO	PERMIAN	4
C-00984	PECOS	000	PIPER PETROLEUM COMPANY	ROBERTSON	3	0	945	YATES	NO	NO	NO	PERMIAN	4
C-01008	PECOS	000	PIPER PETROLEUM COMPANY	ROBERTSON	4	0	950	YATES	NO	NO	NO	PERMIAN	5
C-00985	PECOS	000	PIPER PETROLEUM COMPANY	W.X.C.	7	0	1000	YATES	NO	NO	NO	PERMIAN	5
C-01010	PECOS	000	PIPER PETROLEUM COMPANY	W.X.C.	8	0	1000	YATES	NO	NO	NO	PERMIAN	6
C-06070	PECOS	000	SHELL DEV CO (B F PERKINS)	HOVEY (GRAEFF RAN.)	1	11	250	BUDA	NO	NO	NO	L. CRETAC.	23
C-00573	PECOS	000	STANDARD OF TEXAS	CANNON, C.C.	17	2546	8536	SIMPSON	NO	NO	NO	ORDOVICIAN	41
C-00103	PECOS	000	STANDARD OF TEXAS	OWENS	1	9350	9662	HONEYCUT	NO	YES	NO	ORDOVICIAN	36
C-00418	PECOS	000	STANDARD OF TEXAS	SMITH -4-	15-1	1596	1671	GRAYBURG	NO	NO	NO	PERMIAN	15
C-00376	PECOS	000	STANDARD OF TEXAS	SMITH -5-	16-1	1543	1658	GRAYBURG	NO	NO	NO	PERMIAN	13
C-00378	PECOS	000	STANDARD OF TEXAS	SMITH -5-	16-2	1550	1562	GRAYBURG	NO	NO	NO	PERMIAN	3
C-00379	PECOS	000	STANDARD OF TEXAS	SMITH -2-	16-2	1557	1579	GRAYBURG	NO	NO	NO	PERMIAN	5
C-00410	PECOS	000	STANDARD OF TEXAS	SMITH -1-	21-6	1707	1708	GRAYBURG	NO	NO	NO	PERMIAN	1
C-00415	PECOS	000	STANDARD OF TEXAS	SMITH -1-	23-2	1492	1523	GRAYBURG	NO	NO	NO	PERMIAN	7

C-01298	PECOS	000	SUN OIL COMPANY	SCOTT STATE	1	3050	3200	TUBB	NO	YES	NO	PERMIAN	51
C-01379	PECOS	000	SUN OIL COMPANY	SCOTT STATE	3	3065	3160	TUBB	NO	YES	NO	PERMIAN	34
C-01351	PECOS	000	SUN OIL COMPANY	SCOTT	1	3013	3065	TUBB	NO	NO	NO	PERMIAN	10
C-01305	PECOS	000	SUN OIL COMPANY	TERRELL ST.	1	18545	18626	ELLENBURG	NO	NO	NO	ORDOVICIAN	3
C-01002	POLK	000	MITCHELL AND INTNL. NUCLEAR	SOUTHLAND PAPER MILL	2	12372	12440		NO	NO	NO		13
C-06123	POTTER	000	COLORADO INTST GAS	BIVINS	55R	1980	2126		NO	NO	NO		8
C-01038	POTTER	000	HARRINGTON, D. D.	BUSH	1-A	3205	3322		NO	NO	NO		23
C-00691	POTTER	000	STANDARD OF TEXAS	BIVINS	7	3470	3699		NO	NO	NO		10
C-00689	POTTER	000	STANDARD OF TEXAS	BIVINS	12	3528	3646		NO	NO	NO		3
C-00690	POTTER	000	STANDARD OF TEXAS	BIVINS	13	3319	3659		NO	NO	NO		8
C-00098	PRESIDIO	000	GULF OIL CORPORATION	MITCHELL BROS.-STATE	1	15035	15984	HONEYCUT	NO	NO	NO	ORDOVICIAN	64
C-06117	PRESIDIO	000	PIONEER NUCLEAR	SOLOTARIO		15	2406		NO	NO	NO		254
C-00999	RAINS	000	TENNECO	GREENE	1	13600	14880		NO	NO	NO		2
C-06132	RAINS	000	TEXACO	IRVINE G/U	1	13330	13437		NO	NO	NO		3
T-00063A	RAINS	000	TEXACO	LYNCH	1	13079	13135		NO	NO	NO		3
T-00063	RAINS	000	TEXACO	W.V. MOORE	1	13127	13177		NO	NO	NO		3
T-00062A	RAINS	000	TEXACO	WADE, J. J.	1	13060	13203		NO	NO	NO		7
C-00669I	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	178	4786	4984	SAN ANDRES	NO	NO	NO	PERMIAN	18
T-00012	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	A	4786	4990	SAN ANDRES	NO	NO	NO	PERMIAN	33
C-05021	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	B	4816	4958	SAN ANDRES	NO	NO	NO	PERMIAN	13
C-00669H	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	D	4843	4948	SAN ANDRES	NO	NO	NO	PERMIAN	13
C-05025	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	D	4843	4977	SAN ANDRES	NO	NO	NO	PERMIAN	19
C-05029	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHELD	E	4770	4925	SAN ANDRES	NO	NO	NO	PERMIAN	24
T-00041B	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	F	4734	4968	SAN ANDRES	NO	NO	NO	PERMIAN	15
C-00670	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	121	4784	4968	SAN ANDRES	NO	NO	NO	PERMIAN	4
C-05022	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	G	4765	4993	SAN ANDRES	NO	NO	NO	PERMIAN	33
C-05024	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	H	4802	4927	SAN ANDRES	NO	NO	NO	PERMIAN	21
C-05019	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	I	4770	4972	SAN ANDRES	NO	NO	NO	PERMIAN	29
C-05021	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	J	4816	4958	SAN ANDRES	NO	NO	NO	PERMIAN	13
T-00041A	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	K	4782	4964	SAN ANDRES	NO	NO	NO	PERMIAN	10
C-00670B	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	114	4782	4964	SAN ANDRES	NO	NO	NO	PERMIAN	3
C-05016	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	L	4340	4806	SAN ANDRES	NO	NO	NO	PERMIAN	35
C-05026	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	M	4786	4990	SAN ANDRES	NO	NO	NO	PERMIAN	30
C-05027	RAINS	000	TEXAS PAC. COAL AND OIL CO.	NAME WITHHELD	N	0	0	SAN ANDRES	NO	NO	NO	PERMIAN	6
C-00159F	RAINES	000	T ANDP OIL	UNKNOWN	X	4816	4978		NO	NO	NO		22
C-01056	RANDALL	000	BURDELL	WINTERS	1	4696	4702		NO	NO	NO		3
C-06111L	RANDALL	000	GRUY FEDERAL INCORPERATED	REX WHITE	1	35	3991						448
C-06111S	RANDALL	000	GRUY FEDERAL INCORPERATED	REX WHITE	1	35	3991						448
C-01132	RANDALL	000	VIERSON PETROLEUM COMPANY	DAM SITE	1	0	158		NO	NO	NO		15
C-01133	RANDALL	000	VIERSON PETROLEUM COMPANY	DAM SITE	2	10	148		NO	NO	NO		11
C-00366	REAGAN	000	BIG LAKE OIL COMPANY	UNIVERSITY	1-C	8431	8654	ELLENBURG	NO	YES	NO	ORDOVICIAN	31
C-06121	REAGAN	000	GETTY OIL	J.T. NUNWELL		8325	8325		NO	NO	NO		50
C-00101	REAGAN	000	HUMBLE OIL AND REFINING	SAWYER	1-G	10362	10403	ELLENBURG	NO	YES	NO	ORDOVICIAN	4
C-00137	REAGAN	000	HUMBLE OIL AND REFINING	UNIVERSITY	1-M	10883	11073	HONEYCUT	NO	YES	NO	ORDOVICIAN	24
C-00419	REAGAN	000	STANDARD OF TEXAS	UNIVERSITY	5	2960	3199	SAN ANDRES	NO	NO	NO	PERMIAN	27
C-01372	REAGAN	000	SUN OIL COMPANY	JOLONICK	1	6766	6988	SPRAYBERRY	NO	YES	NO	PERMIAN	11
C-00331	REAGAN	000	SUN OIL COMPANY	JOLONICK	1	6766	6988	SPRAYBERRY	NO	YES	NO	PERMIAN	75
C-00332	REAGAN	000	SUN OIL COMPANY	JOLONICK	3	6338	6420		NO	NO	NO		16
C-01419	REAGAN	000	SUN OIL COMPANY	JOLONICK	2	7705	7765	SPRAYBERRY	NO	YES	NO	PERMIAN	3
C-00333	REAGAN	000	SUN OIL COMPANY	JOLONICK	2	7705	7765	SPRAYBERRY	NO	YES	NO	PERMIAN	20
C-01373	REAGAN	000	SUN OIL COMPANY	JOLONICK	3	6370	6420	SPRAYBERRY	NO	YES	NO	PERMIAN	3
C-01392	REAGAN	000	SUN OIL COMPANY	SUGG	1-29	4971	5000	SPRAYBERRY	NO	NO	NO	PERMIAN	0
C-01232	REAGAN	000	SUN OIL COMPANY	UNIVERSITY	1	9345	9396	ELLENBURG	NO	NO	NO	ORDOVICIAN	15
C-01231	REAGAN	000	SUN OIL COMPANY	UNIVERSITY	1-A	9354	9498	ELLENBURG	NO	NO	NO	ORDOVICIAN	35
C-00389	REAGAN	000	TEXONO AND LAND COMPANY	UNIVERSITY	2-B	8131	8475	ELLENBURG	NO	NO	NO	ORDOVICIAN	29
C-00316	REAL	000	STANOLIND	KNIPPA	11	2114	7414	HONEYCUT	NO	NO	NO	ORDOVICIAN	76

					2	1	[illegible]		NO	NO	NO		4
			[illegible] WATER PROJECT	BORING (RCN)	3	1	51		NO	NO	NO		2
C-00805	RED RIVER	003	TEXAS WATER PROJECT	BORING (RCN)	4	1	76		NO	NO	NO		2
C-00856	REEVES	000	CITIES SERVICE OIL COMPANY	STATE -15-	CT-1	0	250		NO	NO	NO		1
C-00884	REEVES	000	CITIES SERVICE OIL COMPANY	STATE -15-	CT-1	0	1200		NO	NO	NO		3
C-00891	REEVES	000	CITIES SERVICE OIL COMPANY	STATE -15-	CT-1	250	1533		NO	NO	NO		5
C-00890	REEVES	000	CITIES SERVICE OIL COMPANY	STATE -23-	CT-1	0	1300		NO	NO	NO		5
C-00889	REEVES	000	CITIES SERVICE OIL COMPANY	STATE -22-	CT-2	0	1050		NO	NO	NO		4
C-00926	REEVES	000	CITIES SERVICE OIL COMPANY	STATE -22-	CT-2	0	1525		NO	NO	NO		6
C-00294	REEVES	000	GULF OIL CORPORATION	GRISSOM (TOYAN UNIT)	6	12482	12711		NO	NO	NO	DEVONIAN	18
C-06071	REEVES	017	SHELL DEV. CO.(F.E.LOZO)	LEE MTN.-GRAEFF RAN.	1	2	227	COX	NO	NO	YES	L. CRETAC.	12
C-06086	REEVES	000	STANOLIND OIL AND GAS	LEGEAR	1	4813	6180	DELAWARE	NO	NO	NO	PERMIAN	23
C-00512	REEVES	000	STANOLIND OIL AND GAS	WAHLENMAIR-STATE	1	4972	5023		NO	NO	NO		4
C-01229	REEVES	000	SUN OIL COMPANY	HOUSSELS	1	10075	10369	DEAN	NO	NO	NO	PERMIAN	94
C-01259	REEVES	000	SUN OIL COMPANY	RAWLINS	1	4493	4592	DELAWARE	NO	YES	NO	PERMIAN	33
C-01294	REEVES	000	SUN OIL COMPANY	STATE -G-	1	3955	4032	DELAWARE	NO	NO	NO	PERMIAN	25
C-00776	REFUGIO	000	TEXAS BASIN-BUR. OF RECLAM.	ARANSAS RIVER	1-2-3	0	0		NO	NO	NO		10
C-00775	REFUGIO	000	TEXAS BASIN-BUR. OF RECLAM.	MISSION RIVER	1-5	0	0		NO	NO	NO		13
C-01136	ROBERTS	000	CANADIAN RIVER	SITE HOLE	1	0	239		NO	NO	NO		2
C-01136A	ROBERTS	000	CANADIAN RIVER	SITE HOLE	2	0	219		NO	NO	NO		7
C-00264	ROBERTS	000	GULF OIL CORPORATION	HAGGARD	1	12232	12582	HONEYCUT	NO	YES	NO	ORDOVICIAN	31
C-00080	ROBERTS	000	GULF OIL CORPORATION	HAGGARD	1	12232	12596	HONEYCUT	NO	YES	NO	ORDOVICIAN	19
C-01032	ROBERTS	000	HUBER, J. M. CORPORATION	LEDRICK	1	3583	3665		NO	NO	NO		8
C-00561	ROBERTS	000	PHILLIPS PETROLEUM COMPANY	GAY	3	4106	6527	TORONTO	NO	YES	NO		8
C-00560	ROBERTS	000	PHILLIPS PETROLEUM COMPANY	LOCKE	1	6233	6417		NO	YES	NO		3
C-00206	ROBERTS	000	SINCLAIR OIL AND GAS	LIPS	1	9541	10706		NO	YES	NO	ORDOVICIAN	344
T-00004	ROBERTSON	000	PRAIRIE PRODUCTION	FREISTINO	1	6373	6904	AUSTIN	NO	NO	NO	U. CRETAC.	37
C-00519	ROBERTS	000	STANOLIND	KILLIBREW	1	9103	9189		NO	NO	NO		2
C-00017	RUNNELS	000	HIAWATHA OIL AND GAS COMPANY	RICHARDS	2	5243	5274	GARNER	NO	YES	NO	PENNSYLVAN	5
C-01328	RUNNELS	000	SUN OIL COMPANY	CARTER	2	5310	5361	GARNER	NO	YES	NO	PENNSYLVAN	17
C-00392	RUSK	000	HUMBLE OIL AND REFINING	LADD, DAVE	3-A	0	0		NO	NO	NO		1
C-00393	RUSK	000	HUMBLE OIL AND REFINING	WOOLEY, J.	2	3700	3705	EAGLEFORD	NO	YES	NO	U. CRETAC.	1
C-00396	RUSK	000	HUMBLE OIL AND REFINING	WOOLEY	7	0	0		NO	NO	NO		2
C-00394	RUSK	000	HUMBLE OIL AND REFINING	WOOLEY	9	3694	3694	EAGLEFORD	NO	YES	NO	U. CRETAC.	1
C-00395	RUSK	000	HUMBLE OIL AND REFINING	WOOSTER	1	3730	3735	AUSTIN	NO	YES	NO	U. CRETAC.	1
C-00498	RUSK	000	STANOLIND	MCMURRAY	1	7340	7468		NO	NO	NO	L. CRETAC.	7
C-00526	RUSK	000	VOIGT	DURAN	1	6776	7173	TRAVISPEAK	NO	YES	NO	L. CRETAC.	1
C-00482	SAN JACINT	000	SHELL OIL COMPANY	C.C. AND C.	4	8231	8246		NO	YES	YES		1
C-00480	SAN JACINT	000	SHELL OIL COMPANY	FOSTER LUMBER CO.	4	8244	8270		NO	YES	YES		2
C-00619	SAN PARTIC	000	GULF BASIN-BUR. RECLAM.	NUECES RIVER VALLEY	1-8	0	0		NO	NO	NO		33
C-00664H	SAN PATRIC	000	SHELL OIL COMPANY	J.R. KIRK	1	8059	8419		NO	YES	YES		1
C-00087C	SAN SABA	000	BRYANT AND ASSOCIATES	POOL, C.V.	1	59	138		NO	NO	NO		4
C-00181	SAN SABA	000	GRIFFITH, BOBBIE	SOFTOGE	1	2122	2311		NO	NO	NO	CAMBRIAN	33
C-00777	SAN SABA	000	TEXAS BASIN-BUR. OF RECLAM.	RYE VALLEY DAM		0	0		NO	NO	NO		1
C-00773	SAN SABA	000	TEXAS BASIN-BUR. OF RECLAM.	SAN SABA DAM	1-4	0	0		NO	NO	NO		36
C-00108	SCHLEICHER	000	AMERICAN PETROFINA COMPANY	SAUER	1	7115	7657	WILBERNS	NO	NO	NO	CAMBRIAN	19
C-00066	SCHLEICHER	000	ATLANTIC REFINING COMPANY	ROBERTS	1	6952	7049	TANYARD	NO	NO	NO	ORDOVICIAN	4
C-00423	SCHLEICHER	000	LONE STAR GAS	SHELL-PAGE	1	5600	5686	CANYON	NO	YES	NO	PENNSYLVAN	16
C-00105	SCHLEICHER	000	MAGNOLIA PETROLEUM COMPANY	BALL, MARY	1	4450	4739	HONEYCUT	NO	YES	NO	ORDOVICIAN	37
C-01068	SCHLEICHER	000	SINCLAIR OIL AND GAS	UNIVERSITY -100-	1	7098	7242		NO	YES	NO		5
C-01386	SCHLEICHER	000	SUN OIL COMPANY	THONERSON	1	5263	5313	STRAWN	NO	NO	NO	PENNSYLVAN	1
C-00124	SCURRY	000	A. M. TRADING PROD. CORP.	HOWELL	A-1	7379	7550	ELLENBURG	NO	YES	NO	ORDOVICIAN	13
C-00030	SCURRY	000	GENERAL CRUDE OIL COMPANY	LAND	3	6766	6873	CANYON	NO	NO	NO	PENNSYLVAN	2
C-00036	SCURRY	000	HIAWATHA OIL AND GAS COMPANY	CARDEN	1	6640	6728	CANYON	NO	YES	NO	PENNSYLVAN	1
C-00139	SCURRY	000	HUMBLE OIL AND REFINING	MOORE	1	6636	6894	WOLFCAMP	NO	NO	NO	PERMIAN	[illegible]
C-00102	SCURRY	000	HUMBLE OIL AND REFINING	MOORE	1-B	8196	8238	ELLENBURG	[illegible]				
C-00023	SCURRY	000	LION OIL COMPANY	MCLAUGHLIN									

					4	0	0		NO	NO	NO		1
				JOYCE	5	6743	6819	CANYON	NO	NO	NO	PENNSYLVAN	7
				JOYCE	6	6743	6766	CANYON	NO	NO	NO	PENNSYLVAN	1
		000	MONTEX	PAYNE	1	0	0		NO	NO	NO		1
-00041	SCURRY	000	MONTEX	PAYNE	2	6746	6773	CANYON	NO	NO	NO	PENNSYLVAN	1
C-00021	SCURRY	000	OHIO OIL COMPANY	HAYS	2	6631	6845	CANYON	NO	YES	NO	PENNSYLVAN	21
C-00043	SCURRY	000	PAN AMERICAN CORPORATION	BIGGS	1-A	6819	6875	CANYON	NO	NO	NO	PENNSYLVAN	1
C-00033	SCURRY	000	PAN AMERICAN CORPORATION	CARRELL, M.	5	6697	6817	CANYON	NO	YES	NO	PENNSYLVAN	2
C-00037	SCURRY	000	PAN AMERICAN CORPORATION	CASSTEVENS	1	6824	6852	CANYON	NO	NO	NO	PENNSYLVAN	1
C-00042	SCURRY	000	PAN AMERICAN CORPORATION	DAVIS	2	6584	6808	CANYON	NO	NO	NO	PENNSYLVAN	3
C-00044	SCURRY	000	PAN AMERICAN CORPORATION	WOOLEVER	1	6688	6718	CANYON	NO	YES	NO	PENNSYLVAN	1
C-00024	SCURRY	000	PHILLIPS PETROLEUM COMPANY	MEBANE	4	6799	6927	CANYON	NO	YES	NO	PENNSYLVAN	40
C-00539	SCURRY	000	SCURRY	MISC. REEF SAMPLES		0	0		NO	NO	NO	PENNSYLVAN	2
C-00029	SCURRY	000	STANDARD OF TEXAS	BROWN	2-5	6267	7546		NO	NO	NO	PENNSYLVAN	9
C-01424	SCURRY	000	SUN OIL COMPANY	ARLEDGE, G.H.	1	6822	6823	CANYON	NO	YES	NO	PENNSYLVAN	1
C-01429	SCURRY	000	SUN OIL COMPANY	DAVIS	1	1	25		NO	YES	NO		3
C-01307	SCURRY	000	SUN OIL COMPANY	DAVIS	2	2660	2763	GLORIETA	NO	NO	NO	PERMIAN	35
C-01326	SCURRY	000	SUN OIL COMPANY	RANDALLS	D4	2656	2757	SAN ANGELO	NO	NO	NO	PERMIAN	34
C-01314	SCURRY	000	SUN OIL COMPANY	SHANNON	2-D	8125	8135	ELLENBURG	NO	NO	NO	ORDOVICIAN	3
C-01375	SCURRY	000	SUN OIL COMPANY	SHANNON	E-1	8111	8123	ELLENBURG	NO	NO	NO	ORDOVICIAN	3
C-01175	SCURRY	000	SUN OIL COMPANY	SHANNON	E-2	19	124		NO	NO	NO		12
C-01306	SCURRY	000	SUN OIL COMPANY	SHANNON	4	2692	2825		NO	NO	NO		46
C-01313	SCURRY	000	SUN OIL COMPANY	TAYLOR	1	8104	8113	ELLENBURG	NO	NO	NO	ORDOVICIAN	4
C-00034	SCURRY	000	SUN OIL COMPANY	VOSS	12	6740	6767	CISCO	NO	NO	NO	PENNSYLVAN	1
C-00032	SCURRY	000	SUNRAY OIL CORPORATION	CLOUD	3	6740	6775	CANYON	NO	YES	NO	PENNSYLVAN	4
C-00035	SCURRY	000	SUNRAY OIL CORPORATION	HARDY	2-A	6789	6839	CANYON	NO	YES	NO	PENNSYLVAN	1
C-00026	SCURRY	000	TIDEWATER OIL COMPANY	HOUSE	3	6315	6778	CANYON	NO	YES	NO	PENNSYLVAN	15
C-00318	SCURRY	000	WILSHIRE OIL COMPANY	LUNSFORD	8	6741	6941	CANYON	NO	NO	NO	PENNSYLVAN	26
C-00319	SCURRY	000	WILSHIRE OIL COMPANY	RHINEHART	1	6605	6798	CANYON	NO	YES	NO	PENNSYLVAN	20
C-00157D	SHACKELFOR	000	DELRAY OIL COMPANY	BROOKS	2	3850	3877		NO	NO	NO		2
C-00156A	SHACKELFOR	000	SMALLEY DRILLING	EKDAHL	1	1559	1580	FLIPPEN	NO	NO	NO	PENNSYLVAN	1
C-00156D	SHACKELFOR	000	DELRAY OIL COMPANY	EKDAHL	2	1550	1574	FLIPPEN	NO	NO	NO	PENNSYLVAN	2
C-00158A	SHACKELFOR	000	SMALLEY DRILLING COMPANY	EKDAHL	3	1573	1580	FLIPPEN	NO	NO	NO	PENNSYLVAN	1
C-00158B	SHACKELFOR	000	SMALLEY DRILLING COMPANY	EKDAHL	4	1555	1576	FLIPPEN	NO	NO	NO	PENNSYLVAN	2
C-00158	SHACKELFOR	000	SMALLEY DRILLING COMPANY	EKDAHL	5	1551	1573	FLIPPEN	NO	NO	NO	PENNSYLVAN	2
C-01405	SHACKELFOR	000	SUN OIL COMPANY	COATES	F-1	1610	1634	SWASTIKA	NO	NO	NO	PENNSYLVAN	6
C-01277	SHACKELFOR	000	SUN OIL COMPANY	COATES	F-2	1594	1619	SWASTIKA	NO	NO	NO	PENNSYLVAN	9
C-01176	SHACKELFOR	000	SUN OIL COMPANY	COATES	F-3	1611	1636	SWASTIKA	NO	NO	NO	PENNSYLVAN	9
C-01301	SHACKELFOR	000	SUN OIL COMPANY	COATES	J-1	1649	1669	SWASTIKA	NO	NO	NO	PENNSYLVAN	7
C-01203	SHACKELFOR	000	SUN OIL COMPANY	COATES	J-3	1622	1638	SWASTIKA	NO	NO	NO	PENNSYLVAN	6
C-01302	SHACKELFOR	000	SUN OIL COMPANY	COATES	K-1	1598	1623	SWASTIKA	NO	NO	NO	PENNSYLVAN	9
C-01300	SHACKELFOR	000	SUN OIL COMPANY	COATES	L-1	1602	1611	SWASTIKA	NO	NO	NO	PENNSYLVAN	3
C-00532	SHACKELFOR	000	YOUNG, W. R.	COOK -90-	B-51	5027	5240		NO	NO	NO	MISSISSIPPI	72
C-00157A	SHELBY	000	ATLANTIC REFINING COMPANY	FROST	1	4160	8016		NO	NO	NO		17
C-01001	SMITH	000	PAN AMERICAN CORPORATION	GRIMES, GENEVA	1	11615	11788		NO	NO	NO		49
C-01178	SMITH	000	SUN OIL COMPANY	BELL	1	2210	8312	PETTIT LS	NO	YES	YES	L. CRETAC.	34
C-01421	SMITH	000	SUN OIL COMPANY	FLEMING OIL UNIT	1	7553	7606		NO	NO	NO		12
C-01174	SMITH	000	SUN OIL COMPANY	FREIDLANDER	3	7580	7735		NO	YES	NO		53
C-01169	SMITH	000	SUN OIL COMPANY	MARTIN	1	5022	5109		NO	NO	NO		29
C-01396	SMITH	000	SUN OIL COMPANY	MCCLUNG	1	8326	8419		NO	NO	NO		31
C-01430	SMITH	000	SUN OIL COMPANY	PACE	39-B	7850	7900		NO	NO	NO		1
C-01265	SMITH	000	SUN OIL COMPANY	SMITH, EDNA B.	1	8230	8345		NO	YES	NO		39
C-01397	SMITH	000	SUN OIL COMPANY	SMITH, EDNA B.	2	8249	8379		NO	YES	NO		[illegible]
C-01378	SMITH	000	SUN OIL COMPANY	SMITH, EDNA B.	3	8245	8368		NO	YES	NO		
C-01377	SMITH	000	SUN OIL COMPANY	SMITH, EDNA B.	4	8205	8306						
C-01170	SMITH	000	SUN OIL COMPANY	SMITH, EDNA B.	6								

				... GARZA	7	5721	5769		NO	NO	NO		6
			... OIL COMPANY	MENDOZA	1	6618	6672	QUEEN C	NO	NO	YES	EOCENE	17
...1	STARR	000	TENNECO	SLICK-STATE	C-7	4910	5832	FRIO	NO	NO	YES	OLIGOCENE	11
C-01562	STARR	000	TENNECO	SLICK	24	7588	7633		NO	YES	NO		10
C-00589	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	1	0	75	ALLUVIUM	NO	NO	NO	HOLOCENE	6
C-00590	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	2	0	79	ALLUVIUM	NO	NO	NO	HOLOCENE	5
C-00591	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	3	0	60	ALLUVIUM	NO	NO	NO	HOLOCENE	4
C-00592	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	4	0	75	ALLUVIUM	NO	NO	NO	HOLOCENE	6
C-00593	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	5	0	85	ALLUVIUM	NO	NO	NO	HOLOCENE	5
C-00594	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	6	0	70	ALLUVIUM	NO	NO	NO	HOLOCENE	5
C-00595	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	7	0	63	ALLUVIUM	NO	NO	NO	HOLOCENE	5
C-00596	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	8	0	63	ALLUVIUM	NO	NO	NO	HOLOCENE	5
C-00597	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	9	0	59	ALLUVIUM	NO	NO	NO	HOLOCENE	5
C-00598	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	10	0	31	ALLUVIUM	NO	NO	NO	HOLOCENE	3
C-00599	STARR	000	TEXAS BASIN-BUR. OF RECLAM.	EL ALAMO DIVERSION	11	0	110	ALLUVIUM	NO	NO	NO	HOLOCENE	10
C-01070	STEPHENS	000	CALIFORNIA OIL COMPANY	KULBETH	1	15955	15963		NO	NO	NO		3
C-01066	STEPHENS	000	CALIFORNIA OIL COMPANY	KULBETH	1	72	75		NO	NO	NO		1
C-00157G	STEPHENS	000	SIGMORE OIL CORPORATION	LANGFORD	4-A	2872	2907	LAUDERDALE	NO	NO	NO	PENNSYLVAN	3
C-00158C	STEPHENS	000	SIGMORE OIL CORPORATION	LANGFORD	G-2	2816	2899	LAUDERDALE	NO	NO	NO	PENNSYLVAN	4
C-00157H	STEPHENS	000	SIGMORE OIL CORPORATION	LANGFORD	32	2746	2833	LAUDERDALE	NO	NO	NO	PENNSYLVAN	5
C-00712	STERLING	000	MERIWEATHER	HARRIS, T. H.	1	2592	2621	CANYON	NO	NO	NO	PENNSYLVAN	6
C-01196	STERLING	000	SUN OIL COMPANY	CLARK, G.	1	5058	5109		NO	NO	NO		15
C-01226	STERLING	000	SUN OIL COMPANY	COLE, M.	2	5140	5272		NO	NO	NO		55
C-01295	STERLING	000	SUN OIL COMPANY	SPRINGER	2	1459	1474	SAN ANGELO	NO	YES	NO	PERMIAN	5
C-01335	STERLING	000	SUN OIL COMPANY	STRINGER, B.L.	D-1	1617	1626	SAN ANGELO	NO	YES	NO	PERMIAN	3
C-00116	STONEWALL	000	SEABOARD	UPSHAW	4	6067	6243	TANYARD	NO	YES	NO	ORDOVICIAN	25
C-01252	STONEWALL	000	SUN OIL COMPANY	MARTIN	1	5377	5422	STRAWN	NO	NO	NO	PENNSYLVAN	15
C-01415	STONEWALL	000	SUN OIL COMPANY	MARTIN	7-A	5350	5429	STRAWN	NO	YES	NO	PENNSYLVAN	26
C-01260	STONEWALL	000	SUN OIL COMPANY	MCARTHUR	1	3645	3649	SADDLE CRK	NO	YES	NO	PERMIAN	1
C-00725	STONEWALL	000	U. S. GEOLOGIC SURVEY	PERMIAN PROJECT	27	121	485		NO	NO	NO		31
C-00119	SUTTON	000	HUMBLE OIL AND REFINING	HARRISON	1	6823	6922	HONEYCUT	NO	YES	NO	ORDOVICIAN	12
C-00151	SUTTON	000	HUMBLE OIL AND REFINING	HARRISON	1	6823	6924	HONEYCUT	NO	YES	NO	ORDOVICIAN	25
C-00087H	SUTTON	000	HUMBLE OIL AND REFINING	NORTH BRANCH UNIT 3	1	5870	5970		NO	YES	NO		2
C-00475	SUTTON	000	NATIONAL POTASH CO.	ROSS	1	1	109		NO	NO	NO		0
C-01264	SUTTON	000	SUN OIL COMPANY	DUNBAR	1	5325	6002		NO	NO	NO		111
C-01227	SUTTON	000	SUN OIL COMPANY	DUNBAR, B.B.	1	6004	6027		NO	YES	NO		8
C-01381	SUTTON	000	SUN OIL COMPANY	JOY CASH	1	2691	2701		NO	NO	NO		1
C-01393	SUTTON	000	SUN OIL COMPANY	THEIRS ESTATE	1	2570	3016		NO	NO	NO		1
C-01446	SWISHER	000	STANDARD OF TEXAS	JOHNSON	1	7820	7829	CANYON	NO	NO	NO	PENNSYLVAN	2
C-00269	TAYLOR	000	MASON-JOHNSON	ATLAS MILLILE SITE	LT-1	0	225		NO	NO	NO		6
C-01258	TAYLOR	000	SUN OIL COMPANY	BRADSHAW	2	4222	4237	FRY SAND	NO	YES	NO	PENNSYLVAN	5
C-01410	TAYLOR	000	SUN OIL COMPANY	BRADSHAW	4	4215	4246	FRY SAND	NO	YES	NO	PENNSYLVAN	4
C-01318	TAYLOR	000	SUN OIL COMPANY	BRADSHAW	5	4675	4700	GARNER	NO	NO	NO	PENNSYLVAN	9
C-01316	TAYLOR	000	SUN OIL COMPANY	CARTWRIGHT	1	4528	4650	GRAY	NO	YES	NO	PENNSYLVAN	11
C-01329	TAYLOR	000	SUN OIL COMPANY	FREDRICKSON	1	4226	4541	JENNINGS	NO	YES	NO	PENNSYLVAN	5
C-01286	TAYLOR	000	SUN OIL COMPANY	PARMELLY	1	3009	3029	FLIPPEN	NO	YES	NO	PENNSYLVAN	7
C-01432	TAYLOR	000	SUN OIL COMPANY	RICHARDS	1	1	29		NO	YES	NO		3
C-01319	TAYLOR	000	SUN OIL COMPANY	RICHARDS	2	4389	4459	GOEN LIME	NO	YES	NO	PENNSYLVAN	24
C-00767	TERRELL	000	FOREST OIL CORPORATION	JUDKINS (SKIPS)	1	17628	20338	ELLENBURG	NO	NO	NO	ORDOVICIAN	15
C-00175	TERRELL	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	FI-15	0	965	GLEN ROSE	NO	NO	NO	L. CRETAC.	99
C-06034	TERRELL	000	SHELL DEV CO (B F PERKINS)	JESSUP, E. H.	1	2	122	BUDA	NO	NO	NO	L. CRETAC.	6
C-00538	TERRY	000	STANOLIND	SCALES	1	9520	9950	CANYON	NO	YES	NO	PENNSYLVAN	2
C-00537	TERRY	000	STANOLIND	SCALES	5	9881	9986	CANYON	NO	YES	NO	PENNSYLVAN	2
T-00066	TERRY	000	TENNECO	CENTRAL GLORIETA UNIT	10	5991	6047	GLORIETA	NO	NO	NO		
C-00045	TERRY	000	UNION PRODUCING COMPANY	COTTEN	1	9970	10187						
C-00802	TITUS	000	TEXAS WATER PROJECT	BORING (CNS)									

Moore Business Forms, Inc. S

[illegible]	TOM GREEN	[illegible]	[illegible]	JOHNSON	1	[illegible]	[illegible]		NO	YES	NO		1
C-00847	TOM GREEN	000	PLYMOUTH OIL COMPANY	GREEN	B-20	4785	4867	STRAWN	NO	YES	NO	PENNSYLVAN	7
C-01287	TOM GREEN	000	SUN OIL COMPANY	BRADEN	1	4923	5363	STRAWN	NO	YES	NO	PENNSYLVAN	10
C-01496	TOM GREEN	000	SUN OIL COMPANY	LINTHICUM	2	5481	5492	STRAWN	NO	NO	NO	PENNSYLVAN	4
C-01355	TOM GREEN	000	SUN OIL COMPANY	LINTHICUM	4	5468	5495	STRAWN	NO	YES	NO	PENNSYLVAN	5
C-01267	TOM GREEN	000	SUN OIL COMPANY	LINTHICUM	5	5141	5244	STRAWN	NO	YES	NO	PENNSYLVAN	9
C-01284	TOM GREEN	000	SUN OIL COMPANY	LINTHICUM	6	5243	5278	STRAWN	NO	YES	NO	PENNSYLVAN	2
C-01215	TOM GREEN	000	SUN OIL COMPANY	NEILL	1	5403	6113	STRAWN	NO	YES	NO	PENNSYLVAN	1
C-01283	TOM GREEN	000	SUN OIL COMPANY	PULLIAM	2	0	0		NO	YES	NO		3
C-01350	TOM GREEN	000	SUN OIL COMPANY	PULLIAM	3	5154	5255	STRAWN	NO	NO	NO	PENNSYLVAN	10
C-01407	TOM GREEN	000	SUN OIL COMPANY	PULLIAM	4	5121	5282	STRAWN	NO	YES	NO	PENNSYLVAN	6
C-01205	TOM GREEN	000	SUN OIL COMPANY	PULLIAM	5	731	5640	STRAWN	NO	YES	NO	PENNSYLVAN	7
C-00321	TRAVIS	000	ANDERSON-PRICHARD	SCHILLER	1	1060	1211		NO	NO	NO		14
C-00320	TRAVIS	000	ANDERSON-PRICHARD	SCHILLER	2	1107	1227		NO	NO	NO		7
C-00319	TRAVIS	000	ANDERSON-PRICHARD	SCHILLER	3	1072	1226		NO	NO	NO		13
C-00441	TRAVIS	000	BYBEE-MARSHBURN, ET. AL.	ROSS	1	159	970		NO	NO	NO		2
C-00678	TRAVIS	000	CITY OF AUSTIN	AUSTIN TUNNEL	A-2	22	250	AUSTIN	NO	NO	NO	U. CRETAC.	10
C-00677	TRAVIS	000	CITY OF AUSTIN	AUSTIN TUNNEL	A-4	32	205	AUSTIN	NO	NO	NO	U. CRETAC.	8
C-00676	TRAVIS	000	CITY OF AUSTIN	AUSTIN TUNNEL	A-7	5	2500	AUSTIN	NO	NO	NO	U. CRETAC.	12
C-00675	TRAVIS	000	CITY OF AUSTIN	AUSTIN TUNNEL	A-9	8	223	AUSTIN	NO	NO	NO	U. CRETAC.	12
C-00674	TRAVIS	000	CITY OF AUSTIN	AUSTIN TUNNEL	V-10	12	150	AUSTIN	NO	NO	NO	U. CRETAC.	7
C-00452	TRAVIS	000	GRIFFITH, D.S.	EVANS	1	750	780		NO	NO	NO		1
C-01469	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-5	5	59	TAYLOR	NO	NO	NO	U. CRETAC.	3
C-01455	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-11	4	19	TAYLOR	NO	NO	NO	U. CRETAC.	12
C-01456	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-12	5	100	TAYLOR	NO	NO	NO	U. CRETAC.	5
C-01457	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-13	4	70	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01458	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-16	3	30	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01459	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-17	4	72	TAYLOR	NO	NO	NO	U. CRETAC.	3
C-01460	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-18	4	59	TAYLOR	NO	NO	NO	U. CRETAC.	3
C-01461	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-19	21	40	TAYLOR	NO	NO	NO	U. CRETAC.	1
C-01462	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-20	4	99	TAYLOR	NO	NO	NO	U. CRETAC.	4
C-01463	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-21	12	99	TAYLOR	NO	NO	NO	U. CRETAC.	4
C-01465	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-23	11	59	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01464	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-22	14	59	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01466	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-24	19	58	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01467	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-25	3	59	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01468	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-26	4	99	TAYLOR	NO	NO	NO	U. CRETAC.	4
C-01470	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-28	14	59	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01471	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-29	10	59	TAYLOR	NO	NO	NO	U. CRETAC.	3
C-01472	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-30	4	39	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01473	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-31	3	59	TAYLOR	NO	NO	NO	U. CRETAC.	3
C-01474	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-32	4	60	TAYLOR	NO	NO	NO	U. CRETAC.	3
C-01475	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-33	4	39	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01476	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-34	11	39	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01477	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-35	21	81	TAYLOR	NO	NO	NO	U. CRETAC.	1
C-01478	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-36	4	139	TAYLOR	NO	NO	NO	U. CRETAC.	6
C-01479	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-37	4	145	TAYLOR	NO	NO	NO	U. CRETAC.	12
C-01480	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-38	3	144	TAYLOR	NO	NO	NO	U. CRETAC.	6
C-01481	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-39	1	34	TAYLOR	NO	NO	NO	U. CRETAC.	1
C-01482	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-40	4	125	TAYLOR	NO	NO	NO	U. CRETAC.	5
C-01483	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-41	14	104	TAYLOR	NO	NO	NO	U. CRETAC.	4
C-01484	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-42	1	114	TAYLOR	NO	NO	NO	U. CRETAC.	10
C-01485	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-43	9	59	TAYLOR	NO	NO	NO	U. CRETAC.	3
C-01486	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-45	5	109	TAYLOR	NO	NO	NO	U. CRETAC.	4
C-01487	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT	CB-46	4	59	TAYLOR	NO	NO	NO	[illegible]	[illegible]
C-01488	TRAVIS	000	NATIONAL SOIL SERVICE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

C-01498	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-6		5	44	TAYLOR	NO	NO	NO	U. CRETAC.	5
C-01499	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-61		4	50	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01500	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-62		19	40	TAYLOR	NO	NO	NO	U. CRETAC.	1
C-01501	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-63		9	40	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01502	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB63A		44	69	TAYLOR	NO	NO	NO	U. CRETAC.	1
C-01503	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-64		23	39	TAYLOR	NO	NO	NO	U. CRETAC.	1
C-01504	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-65		4	39	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01505	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-66		4	5	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01506	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-67		5	50	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01507	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-68		9	50	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01508	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-69		14	44	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01509	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-70		9	50	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01510	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-71		4	99	TAYLOR	NO	NO	NO	U. CRETAC.	4
C-01511	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-72		4	50	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01512	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-73		3	30	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01513	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB-74		4	69	TAYLOR	NO	NO	NO	U. CRETAC.	2
C-01514	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB404		15	16	TAYLOR	NO	NO	NO	U. CRETAC.	1
C-01515	TRAVIS	000	NATIONAL SOIL SERVICE	DECKER LAKE PROJECT CB412		18	18	TAYLOR	NO	NO	NO	U. CRETAC.	1
C-00322	TRAVIS	000	SCHULLY OIL COMPANY	SCHMIDT, O.	1	1147	1582		NO	NO	NO		21
C-06009	TRAVIS	024	SHELL DEV CO (F E LOZO)	HAMILTON POOL	1	2	152	SYCAMORE	NO	NO	NO	L. CRETAC.	14
C-06010	TRAVIS	023	SHELL DEV CO (F E LOZO)	HAMILTON POOL	2	2	147	COW CREEK	NO	NO	NO	L. CRETAC.	7
C-06020	TRAVIS	026	SHELL DEV CO (F E LOZO)	HENSEL RANCH	1	1	214	SYCAMORE	NO	NO	NO	L. CRETAC.	15
C-06014	TRAVIS	026	SHELL DEV CO (C H MOORE)	POST OAK RIDGE	4	1	230	PALUXY	NO	NO	NO	L. CRETAC.	23
C-00779	TRAVIS	000	TEXAS BASIN-BUR. OF RECLAM.	DEL VALLEY SITE		0	0		NO	NO	NO		2
C-00361	TRAVIS	000	OTHERS	PILOT KNOB		1870	1870		NO	NO	NO	L. CRETAC.	1
C-01436B	TRINITY	000	TESORO PETROLEUM CORPORATION	CAMERON MINERALS	1	10881	11053		NO	NO	NO		14
C-6113	TRAVIS	000	USGS	TEST CORE		31	266	EDWARDS	NO	NO	NO	L. CRETAC.	21
C-06114	TRAVIS	000	USGS	TEST CORE		20	214	EDWARDS	NO	NO	NO	L. CREATAC.	13
C-06115	TRAVIS	000	USGS	TEST CORE		108	577	EDWARDS	NO	NO	NO	L. CRETAC.	41
C-00520	TYLER	000	STANOLIND	BROWN, W.S.	5	8470	8568		NO	NO	NO		6
T-00062	UPSHUR	000	TEXACO	OSCAR ABBOT	1	11616	12662		NO	NO	NO		8
C-00820	UPSHUR	000	TEXAS WATER PROJECT	BORING (FCT)	1	18	121		NO	NO	NO		3
C-00821	UPSHUR	000	TEXAS WATER PROJECT	BORING (FCT)	2	1	76		NO	NO	NO		2
C-00097	UPTON	000	GULF OIL CORPORATION	MCELROY-STATE	1	11600	12762	GORMAN	NO	NO	NO	ORDOVICIAN	98
C-00284	UPTON	000	GULF OIL CORPORATION	MCELROY RANCH -H-	1	12004	12379	ELLENBURG	NO	YES	NO	ORDOVICIAN	71
C-00287	UPTON	000	GULF OIL CORPORATION	MCELROY RANCH -D-	3	10650	12017	ELLENBURG	NO	NO	NO	ORDOVICIAN	252
C-00293	UPTON	000	GULF OIL CORPORATION	MCELROY	133	3765	4200		NO	NO	NO		91
C-00289	UPTON	000	GULF OIL CORPORATION	TXL-SS	3-E	10370	13487	ELLENBURG	NO	NO	NO	ORDOVICIAN	109
C-00055	UPTON	000	HUMBLE OIL AND REFINING	OSWALT, Z.	1	119888	12063	ELLENBURG	NO	YES	NO	ORDOVICIAN	3
C-00050	UPTON	000	SEABOARD	ZANT	1	7775	7868	SPRAYBERRY	NO	NO	NO	PERMIAN	1
C-00518	UPTON	000	STANOLIND	MCELROY RANCH	1	12150	12278	ELLENBURG	NO	NO	NO	ORDOVICIAN	7
C-00059	UPTON	000	SINCLAIR OIL AND GAS	MCELROY	9	12195	12443	HONEYCUT	NO	NO	NO	ORDOVICIAN	14
C-00188	UPTON	000	WILSHIRE OIL COMPANY	LIVESTOCK, JACOB	34-98	10445	10662	ELLENBURG	NO	YES	NO	ORDOVICIAN	65
C-00057	UPTON	000	WILSHIRE OIL COMPANY	MCELROY -14-	130	12065	12185	ELLENBURG	NO	YES	NO	ORDOVICIAN	19
C-00061	UPTON	000	WILSHIRE OIL COMPANY	MCELROY -24-	130	0	0		NO	YES	NO		20
C-00134	UPTON	000	WILSHIRE OIL COMPANY	MCELROY -14-	117	12373	12388	ELLENBURG	NO	NO	NO	ORDOVICIAN	2
C-00104	UPTON	000	WILSHIRE OIL COMPANY	WINDHAM -23-	118	12140	12865	GORMAN	NO	YES	NO	ORDOVICIAN	79
T-00323	UVALDE	000	GULF MINERAL RESOURCES	NO NAME	1	40	224	ANACACHO	NO	NO	NO	U. CRETAC.	51
C-00666	UVALDE	000	GULF MINERAL RESOURCES	NO NAME	2	96	351	ANACACHO	NO	NO	NO	U. CRETAC.	41
T-00021	UVALDE	000	GULF MINERAL RESOURCES	NO NAME	3	35	197	ANACACHO	NO	NO	NO	U. CRETAC.	72
C-05032	UVALDE	000	GULF MINERAL RESOURCES	NO NAME	4	26	218	ANACACHO	NO	NO	NO	U. CRETAC.	34
T-00020	UVALDE	000	GULF MINERAL RESOURCES	NO NAME	5	27	250	ANACACHO	NO	NO	NO	U. CRETAC.	88
T-00025	UVALDE	000	GULF MINERAL RESOURCES	NO NAME	6	57	434	ANACACHO	NO	NO	NO	U. CRETAC.	109
T-00024	UVALDE	000	GULF MINERAL RESOURCES	NO NAME	7	223	293	ANACACHO	NO	NO	NO	U. CRETAC.	21
C-00667A	UVALDE	000	GULF MINERAL RESOURCES	NO NAME	[illegible]	[illegible]	[illegible]						

T-00054D	UVALDE	000	GULF OIL	SOUTHWEST TEXAS	PP17	75	136		NO	NO	NO		10
T-00054C	UVALDE	000	GULF OIL	SOUTHWEST TEXAS	RR14	211	221		NO	NO	NO		1
T-00054B	UVALDE	000	GULF OIL	SOUTHWEST TEXAS	U8	245	475		NO	NO	NO		8
T-00054A	UVALDE	000	GULF OIL	SOUTHWEST TEXAS	V8	450	506		NO	NO	NO		3
C-00563	UVALDE	000	MOHOLE	TEST WELL	1	570	1120		NO	NO	NO		1
C-06039	UVALDE	012	SHELL DEV CO (C I SMITH)	CHALK BLUFF	1	0	97	MCKNIGHT	NO	NO	NO	L. CRETAC.	6
C-06040	UVALDE	011	SHELL DEV CO (C I SMITH)	PARDI, GEORGE	1	50	171	SALMONPEAK	NO	NO	NO	L. CRETAC.	10
C-01545	UVALDE	000	TENNECO AND PENNZOIL UNITED	KINCAID, F.T.,ET AL	1	3374	4051	PEARSALL	NO	NO	NO	L. CRETAC.	61
C-06092	UVALDE	000	WATER DEVELOPMENT BOARD	TEST YP-4 69-42-709		70	697		NO	NO	NO	CRETACEOUS	32
C-01436C	VAL VERDE	003	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE-POWERHOUSE	4-V	362	770		NO	NO	NO	L. CRETAC.	31
C-01144	VAL VERDE	003	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	E-1	495	706		NO	NO	NO	L. CRETAC.	21
C-01151	VAL VERDE	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	ID-1	650	854		NO	NO	NO	L. CRETAC.	42
C-00637A	VAL VERDE	001	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	ID-21	20	150		NO	NO	NO	L. CRETAC.	1
C-00637	VAL VERDE	001	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	ID-22	153	450		NO	NO	NO	L. CRETAC.	2
C-00172A	VAL VERDE	001	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	ID-22	0	771	KIAMICHI	NO	NO	NO	L. CRETAC.	73
C-01145	VAL VERDE	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	WO-1	496	726		NO	NO	NO	L. CRETAC.	12
C-01148	VAL VERDE	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	WO-2	582	669		NO	NO	NO	L. CRETAC.	6
C-01152	VAL VERDE	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	WO-3	650	848		NO	NO	NO	L. CRETAC.	8
C-01146	VAL VERDE	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	WO-6	577	665		NO	NO	NO	L. CRETAC.	4
C-01147	VAL VERDE	003	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	WO-7	301	706		NO	NO	NO	L. CRETAC.	23
C-01150	VAL VERDE	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	WO-9	484	491		NO	NO	NO	L. CRETAC.	2
C-01149	VAL VERDE	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	WO-9A	520	526		NO	NO	NO	L. CRETAC.	2
C-00063	VAL VERDE	000	PHILLIPS PETROLEUM COMPANY	WILSON	1	14980	16341	ELLENBURG	NO	YES	NO	ORDOVICIAN	156
C-06038	VAL VERDE	000	SHELL DEV CO (C I SMITH)	DOLAN FALLS(FAWCETT)	1	2	67		NO	NO	NO	L. CRETAC.	5
C-06078	VAL VERDE	004	SHELL DEV CO (C I SMITH)	HINDS, LUCIOUS	1	0	391	GLEN ROSE	NO	NO	NO	L. CRETAC.	46
C-06076	VAL VERDE	002	SHELL DEV CO (C I SMITH)	SLAUGHTER BEND	1	2	155	MCKNIGHT	NO	NO	NO	L. CRETAC.	17
C-06077	VAL VERDE	002	SHELL DEV CO (C I SMITH)	SLAUGHTER BEND	2	0	57	MCKNIGHT	NO	NO	NO	L. CRETAC.	6
C-00541A	VAN ZANDT	000	CRYSTAL OIL COMPANY	G.W. EASLEY	1	13006	13301		NO	NO	NO		8
C-01003	VAN ZANDT	000	PAN AMERICAN CORPORATION	NICHOLS, G.V.	3	13300	13336		NO	NO	NO		11
C-01190	VAN ZANDT	000	SUN OIL COMPANY	TRAVIS GAS UNIT	1	13010	13531		NO	NO	NO		173
C-01062	VICTORIA	000	AMERADA PETROLEUM CORP.	KOVAR	1	14514	15172	WILCOX	YES	NO	YES	EOCENE	184
C-01143	VICTORIA	000	AMERADA PETROLEUM CORP.	TALLEY	1	14440	14481	WILCOX	NO	NO	YES	EOCENE	1
C-00626	VICTORIA	000	GULF BASIN-BUR. RECLAM.	GARCITAS VALLEY	1-4	15	99		NO	NO	NO		19
C-00625	VICTORIA	000	GULF BASIN-BUR. RECLAM.	GUADALUPE VALLEY	1-14	0	100		NO	NO	NO		54
C-00664E	VICTORIA	000	SUN OIL COMPANY	URBAN, E.R.	1	13875	14119	WILCOX	YES	NO	YES	EOCENE	24
C-00622	VICTORIA	000	TEXAS BASIN-BUR. OF RECLAM.	SAN ANTONIO VALLEY	1-14	0	105		NO	NO	YES		63
C-00387	WALKER	000	LONESTAR	CEN COAL+COKE	G-4	1575	15908		NO	NO	NO		6
C-00521	WALKER	000	TIDEWATER OIL COMPANY	NEWMAN	1	11297	12271		NO	NO	NO		2
C-00343	WARD	000	DALPORT OIL COMPANY	JOHNSON	8	1885	2110		NO	YES	NO		78
C-00288	WARD	000	GULF OIL CORPORATION	ESTES, W.A.	12	2027	5347		NO	YES	NO		139
C-00274	WARD	000	GULF OIL CORPORATION	H.S.A.	206	2388	3053	QUEEN	NO	YES	NO	PERMIAN	68
C-00272	WARD	000	GULF OIL CORPORATION	H.S.A.	146	1719	2633	YATES	NO	YES	NO	PERMIAN	54
C-00273	WARD	000	GULF OIL CORPORATION	O'BRIEN	212	2551	3881	QUEEN	NO	NO	NO	PERMIAN	43
B-48109	WARD	000	SHELL OIL COMPANY	SEALY-SMITH	3	10460	10484	ELLENBURG	NO	YES	NO	ORDOVICIAN	1
C-00088A	WARD	000	SHELL OIL COMPANY	SEALY-SMITH	89	3087	3376	QUEEN	NO	NO	NO	PERMIAN	48
C-00171F	WARD	000	SHELL OIL COMPANY	SLOAN	13	3780	3930	GLORIETA	NO	NO	NO	PERMIAN	25
C-00571	WARD	000	STANDARD OF TEXAS	HARDAGE AND WILSON	1-P	7853	7949		NO	NO	NO		32
C-00547	WARD	000	STANDARD OF TEXAS	SEALY-SMITH	4-1	8567	8625		NO	NO	NO		20
C-00551	WARD	000	STANDARD OF TEXAS	SEALY-SMITH	7-1	8623	8664		NO	NO	NO		14
C-553	WARD	000	STANDARD OF TEXAS	SEALY SMITH	8-1	8600	8711		NO	NO	NO		35
C-00569	WARD	000	STANDARD OF TEXAS	STEWART	6	7724	7879		NO	NO	NO	PENNSYLVAN	51
C-00500	WARD	000	STANOLIND	SHIPLY QUEEN	12-1X	2425	2962	QUEEN	NO	NO	NO	PERMIAN	45
C-00504	WARD	000	STANOLIND	TUBBS	1	3955	8275	WADDELL	NO	NO	NO	ORDOVICIAN	15
C-00672A	WEBB	000	GETTY OIL COMPANY	BENAVIDES	1	9680	10329	WILCOX	NO	YES	YES	EOCENE	14
C-06102	WEBB	000	HUNT OIL COMPANY	REUTHINGER	1	14351	14398	SLIGO	NO	NO	NO	L. CRETAC.	6

C-01451	WEBB	000	TESORO PETROLEUM CORPORATION	[illegible]									
C-00665D	WEBB	000	TEXACO	WATKINS	1	15906	16069	SLIGO	NO	NO	NO	L. CRETAC.	5
C-00444	WEBB	000	TEXAS CENTRAL POWER COMPANY	LAREDO CITY		252	1630		NO	NO	NO		1
C-00399	WEBB	000	TEXAS CENTRAL POWER COMPANY	LAREDO		252	1326		NO	NO	NO		5
C-00621	WHARTON	000	GULF BASIN-BUR. OF RECLAM.	COLORADO VALLEY	1-9	0	0		NO	NO	NO		46
C-01018	WHEELER	000	BROOKWOOD	TAYLOR	1	7728	7849	MISSOURIAN	NO	NO	NO	PENNSYLVAN	42
C-01088	WHEELER	000	MOBIL OIL COMPANY	WALKER, M.W.	1	14970	15638	HUNTON	NO	NO	NO	DEVONIAN	6
C-00586	WHEELER	000	PAN AMERICAN CORPORATION	LEE, HATTIE	1	7256	7298	CANYON	NO	NO	NO	PENNSYLVAN	7
C-00644	WHEELER	000	PAN AMERICAN CORPORATION	LEE	C-2	7265	7429	CANYON	NO	NO	NO	PENNSYLVAN	44
C-01030	WHEELER	000	PAN AMERICAN CORPORATION	MOBEETIE	1	8237	12206	ELLENBURG	NO	NO	NO	ORDOVICIAN	69
C-01077	WHEELER	000	PAN AMERICAN CORPORATION	MOBEETIE	2	7120	7476	CANYON	NO	NO	NO	PENNSYLVAN	25
C-00583	WHEELER	000	PAN AMERICAN CORPORATION	MOBEETIE	2	7120	7476	CANYON	NO	NO	NO	PENNSYLVAN	59
C-01078	WHEELER	000	PAN AMERICAN CORPORATION	MOBEETIE	5	7208	7440	CANYON	NO	NO	NO	PENNSYLVAN	16
C-00584	WHEELER	000	PAN AMERICAN CORPORATION	MOBEETIE	5	7208	7476	CANYON	NO	NO	NO	PENNSYLVAN	39
C-01080	WHEELER	000	PAN AMERICAN CORPORATION	MOBEETIE	7	7090	7313	CANYON	NO	NO	NO	PENNSYLVAN	15
C-00581	WHEELER	000	PAN AMERICAN CORPORATION	MOBEETIE	7	7090	7313	CANYON	NO	NO	NO	PENNSYLVAN	37
C-00643	WHEELER	000	PAN AMERICAN CORPORATION	PATTERSON	4	7129	7381	CANYON	NO	NO	NO	PENNSYLVAN	83
C-01079	WHEELER	000	PAN AMERICAN CORPORATION	SCHRIBER	2	7158	7561	CANYON	NO	NO	NO	PENNSYLVAN	26
C-00585	WHEELER	000	PAN AMERICAN CORPORATION	SCHRIBER	2	7158	7561	CANYON	NO	NO	NO	PENNSYLVAN	66
C-01026	WHEELER	000	PAN AMERICAN CORPORATION	SIMMS UNIT	1	6900	6948		NO	NO	NO		16
C-01098	WHEELER	000	PHILLIPS PETROLEUM COMPANY	HEFFLEY	1-A	13710	15615	SIMPSON	NO	NO	NO	ORDOVICIAN	59
C-01021	WHEELER	000	SIDWELL, E. C. AND R. C.	BILLS	6	2118	2211		NO	NO	NO		33
C-01092	WHEELER	000	STANDARD OF TEXAS	HARRIS, GRADY	1	12215	12238	SIMPSON	NO	NO	NO	ORDOVICIAN	1
C-01058	WHEELER	000	STANDARD OF TEXAS	HARRIS, GRADY	1	12229	12242	SIMPSON	NO	NO	NO	ORDOVICIAN	3
C-01242	WHEELER	000	SUN OIL COMPANY	MCMURTY	1	2240	2332		NO	NO	NO		27
C-00377	WICHITA	000	CONTINENTAL OIL COMPANY	WAGGONER	1-E	3641	4239	ELLENBURG	NO	YES	NO	ORDOVICIAN	113
C-00084A	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	BARTON	1	3770	3802		NO	YES	NO		1
C-00083	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	BARTON	2	3752	3809		NO	YES	NO		3
C-00077F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	BREWER (SKIPS)	14	1050	3519	ELLENBURG	NO	NO	NO	ORDOVICIAN	3
B-00076F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	COOK	1	4519	4524		NO	NO	NO		1
C-00077E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	COOK, B. F.	15	1814	1826		NO	NO	NO	PENNSYLVAN	1
C-00077C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	COOK, B. F.	17	1844	1857		NO	NO	NO	PENNSYLVAN	1
C-00077D	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	COOK, B. F.	20	1831	1840		NO	YES	NO	PENNSYLVAN	1
C-00077	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	COOK	21	1847	1863		NO	NO	NO	PENNSYLVAN	1
B-00076B	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	CROPPER UNIT	55	480	513		NO	YES	NO		1
B-00076C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	CROPPER UNIT	58	488	500		NO	NO	NO		1
B-00076D	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	CROPPER UNIT	63	526	532		NO	NO	NO		1
B-00076E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	EMBREY	14	1810	1814		NO	NO	NO		1
C-00075G	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HARDIN TRUST	1	1633	1684		NO	NO	NO	PENNSYLVAN	3
C-00075F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HARDIN TRUST	74	1624	1677		NO	NO	NO	PENNSYLVAN	2
C-00075E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HARDIN TRUST	76	1631	1700		NO	NO	NO	PENNSYLVAN	2
C-00075D	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HARDIN TRUST	85	1659	1674		NO	NO	NO	PENNSYLVAN	1
C-00083E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HICKEY	14	1739	1750		NO	NO	NO	PENNSYLVAN	1
B-00076A	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HICKEY	15	1783	1800		NO	NO	NO	PENNSYLVAN	1
C-00075C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HICKEY	17	1731	1746		NO	NO	NO	PENNSYLVAN	1
C-00074B	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HICKEY	19	1742	1759		NO	NO	NO	PENNSYLVAN	1
C-00049	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HONAKER	76	589	2507		NO	NO	NO		11
C-00048	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HONAKER	77	2300	2310		NO	NO	NO		1
C-01438	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HONAKER	78	450	2158		NO	YES	NO		1
B-06109	WICHITA	000	MAGNOLIA	HONAKER	78	234	2295		NO	NO	NO	(SKIPS)	8
C-01437	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	HONAKER	78	200	2327		NO	YES	NO		1
C-00083A	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	KEMPNER	1	3735	3773	STRAWN	NO	YES	NO	PENNSYLVAN	6
C-00083B	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	KEMPNER	2-B	3788	3807	STRAWN	NO	YES	NO	PENNSYLVAN	3
C-00083C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	KEMPNER	3-B	3790	3822	STRAWN	NO	YES	NO	PENNSYLVAN	4
C-00082E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	RAMMING	1	1743	1774	GUNSIGHT	NO	NO	NO	PENNSYLVAN	3
B-00082C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	RAMMING	1-A	2009	2026		NO	NO	NO		[illegible]

C-00661D	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-35 (TEACHING)		0	216		NO	NO	NO	HOLOCENE	1
C-00661E	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-37 (TEACHING)		0	82		NO	NO	NO	HOLOCENE	1
C-00661G	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-38 (TEACHING)		0	218		NO	NO	NO	HOLOCENE	1
C-00661H	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-41 (TEACHING)		0	219		NO	NO	NO	HOLOCENE	1
C-00662A	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-42 (TEACHING)		0	70		NO	NO	NO	HOLOCENE	2
C-00662B	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-48 (TEACHING)		0	70		NO	NO	NO	HOLOCENE	2
C-00662C	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-51 (TEACHING)		0	221		NO	NO	NO	HOLOCENE	1
C-00660C	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-53 (TEACHING)		0	244		NO	NO	NO	HOLOCENE	1
C-00663B	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-55 (TEACHING)		0	234		NO	NO	NO	HOLOCENE	1
C-00664C	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-56 (TEACHING)		0	240		NO	NO	NO	HOLOCENE	1
C-00662D	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-59 (TEACHING)		0	223		NO	NO	NO	HOLOCENE	1
C-00660A	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-5 (TEACHING)		0	82		NO	NO	NO	HOLOCENE	1
C-00661I	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-61 (TEACHING)		0	220		NO	NO	NO	HOLOCENE	1
C-00662F	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-64 (TEACHING)		0	229		NO	NO	NO	HOLOCENE	1
C-00662G	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-67 (TEACHING)		0	230		NO	NO	NO	HOLOCENE	1
C-00663D	FLORIDA	000	HUMBLE OIL AND REFINING	66JC-1 (TEACHING)		0	73		NO	NO	NO	HOLOCENE	1
C-00663E	FLORIDA	000	HUMBLE OIL AND REFINING	66JC-3 (TEACHING)		0	74		NO	NO	NO	HOLOCENE	1
C-00663G	FLORIDA	000	HUMBLE OIL AND REFINING	66JC-8 (TEACHING)		0	237		NO	NO	NO	HOLOCENE	1
C-00663C	FLORIDA	000	HUMBLE OIL AND REFINING	67BAH-13 (TEACHING)		0	73		NO	NO	NO	HOLOCENE	1
C-00662H	FLORIDA	000	HUMBLE OIL AND REFINING	67BAH-3 (TEACHING)		0	74		NO	NO	NO	HOLOCENE	1
C-00661C	FLORIDA	000	HUMBLE OIL AND REFINING	67BAH-4 (TEACHING)		0	82		NO	NO	NO	HOLOCENE	1
C-00662I	FLORIDA	000	HUMBLE OIL AND REFINING	67BAH-5 (TEACHING)		0	233		NO	NO	NO	HOLOCENE	1
C-00663A	FLORIDA	000	HUMBLE OIL AND REFINING	67BAH-9 (TEACHING)		0	215		NO	NO	NO	HOLOCENE	1
C-00664D	FLORIDA	000	HUMBLE OIL AND REFINING	MISCELLANEOUS		0	86		NO	NO	NO		1
C-00657	FLORIDA	000	SUN OIL COMPANY	RED CATTLE B	21-2	0	81	SUNNILAND	NO	NO	NO	L. CRETAC.	4
C-00659	FLORIDA	000	SUN OIL COMPANY	RED CATTLE B	29-3	0	69	SUNNILAND	NO	NO	NO	L. CRETAC.	7
C-00658	FLORIDA	000	SUN OIL COMPANY	RED CATTLE B	31-2	0	71	SUNNILAND	NO	NO	NO	L. CRETAC.	4
T-00036	LOUISIANA	000	TENNECO	YATES (CLAIBORNE PA.)	1	10210	10271		NO	NO	NO		2
C-00173	MEXICO	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	ID-5	0	458	GEORGETOWN	NO	NO	NO	L. CRETAC.	153
C-00172	MEXICO	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	TR-10	0	1660	SUE PEAKS	NO	NO	NO	L. CRETAC.	146
C-00172B	MEXICO	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	ID-12	0	345	GEORGETOWN	NO	NO	NO	L. CRETAC.	31
C-00298	MEXICO	000	INTNL. BNDRY. AND WAT. COMM.	TEST HOLE	ID-17	9	492	GEORGETOWN	NO	NO	NO	L. CRETAC.	170
P-00086F	MEXICO	000	SHELL OIL CO (WALTER BLOXSOM)	CANYON DE ALAMEDA		0	0	OUTCROP	NO	NO	NO		6
P-00086G	MEXICO	000	SHELL OIL CO (WALTER BLOXSOM)	EL CEDRAL		0	0	OUTCROP	NO	NO	NO		4
P-00086C	MEXICO	000	SHELL OIL CO (WALTER BLOXSOM)	PUERTO AGUACATE		0	0	OUTCROP	NO	NO	NO		1
P-00086E	MEXICO	000	SHELL OIL CO (WALTER BLOXSOM)	RANCHO LOS OJOS		0	0	OUTCROP	NO	NO	NO		3
P-00086H	MEXICO	000	SHELL OIL CO (WALTER BLOXSOM)	SAN MANUEL		0	0	OUTCROP	NO	NO	NO		1
P-00086D	MEXICO	000	SHELL OIL CO (WALTER BLOXSOM)	SAN RAFAEL		0	0	OUTCROP	NO	NO	NO		1
C-00461	MISS.	000	DANCIGER-DEVIL SYNDICATE	DAVIS (STONE CO.)	1	5637	8520		NO	NO	NO		2
C-00175A	MONTANA	000	SHELL OIL COMPANY	STATE	1	7006	7124		NO	NO	NO		21
C-00143	NEW MEXICO	000	CONTINENTAL OIL COMPANY	BORGER (LEA CO.)	U-28	9241	9354		NO	NO	NO		17
C-00121	NEW MEXICO	00	HUMBLE OIL AND REFINING	STATE (LEA CO.)	3-V	7460	7486		NO	NO	NO		3
C-00130	NEW MEXICO	00	SHELL OIL COMPANY	STATE (LEA CO.)	5	7815	7956		NO	NO	NO		10
C-00122	NEW MEXICO	00	HUMBLE OIL AND REFINING	STATE (LEA CO.)	6-V	7542	7809		NO	NO	NO		10
T-00035	NEW MEXICO	00	RICHARDSON AND BASS	FED.-COLB (EDDY CO.)	1	15973	16278		NO	NO	NO	ORDOVICIAN	40
C-00164	NEW MEXICO	00	WILSHIRE OIL COMPANY	CARTER (LEA CO.)	43-25	4502	7467		NO	NO	NO	ORDOVICIAN	264
C-06031	OKLAHOMA	000	SHELL DEV CO (F E LOZO)	FT.TOWSON(CHOCTAW)	1	0	74	KIAMICHI	NO	NO	NO	L. CRETAC.	7
C-06032	OKLAHOMA	000	SHELL DEV CO (F E LOZO)	FT.TOWSON(CHOCTAW)	2	0	114	KIAMICHI	NO	NO	NO	L. CRETAC.	6
C-06035	OKLAHOMA	000	SHELL DEV CO (F E LOZO)	GOODWATER(MCCURTAIN)	1	0	134	KIAMICHI	NO	NO	NO	L. CRETAC.	13
C-06036	OKLAHOMA	000	SHELL DEV CO (F E LOZO)	WATERMILL(MCCURTAIN)	1	0	70	KIAMICHI	NO	NO	NO	L. CRETAC.	7
C-06037	OKLAHOMA	000	SHELL DEV CO (F E LOZO)	WATERMILL(MCCURTAIN)	2	0	77	KIAMICHI	NO	NO	NO	L. CRETAC.	5

THIS LIST CONTAINS 2347 WELLS.

[illegible]	ZAVALA	[illegible]	GULF OIL	SOUTHWEST TEXAS	[illegible]	[illegible]	[illegible]		NO	NO	NO		1
T-00051E	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	M8	446	447		NO	NO	NO		1
T-00051F	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	N1	680	779		NO	NO	NO		5
T-00051G	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	N3	654	826		NO	NO	NO		4
T-00051H	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	N4	573	799		NO	NO	NO		6
T-00052	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	R3	983	987		NO	NO	NO		1
T-00052A	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	R4	850	870		NO	NO	NO		2
T-00052B	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	S7	145	295		NO	NO	NO		7
T-00052E	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	U5	546	557		NO	NO	NO		2
T-00052C	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	V5	500	927		NO	NO	NO		10
T-00052D	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	V7	691	742		NO	NO	NO		7
T-00052F	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	X6	792	800		NO	NO	NO		2
C-00647	ZAVALA	000	HUMBLE OIL AND REFINING	TEACHING CORE	1	7700	7749	COW CREEK	NO	NO	NO	L. CRETAC.	6
C-00655	ZAVALA	000	HUMBLE OIL AND REFINING	TEACHING CORE	13	4299	4324	COW CREEK	NO	NO	NO	L. CRETAC.	3
C-00656	ZAVALA	000	HUMBLE OIL AND REFINING	TEACHING CORE	15	4766	4795	COW CREEK	NO	NO	NO	L. CRETAC.	3
C-00161A	ZAVALA	000	LICO EXPLORATION CO.	LICO	1-165	5215	5276		NO	NO	NO		7
C-00710	ZAVALA	000	MOBIL OIL COMPANY	FLOWERS-WARD RANCH	1	1167	1445		NO	NO	NO		4
C-00709	ZAVALA	000	MOBIL OIL COMPANY	LYLES RANCH	1	957	1209		NO	NO	NO		7
C-01544	ZAVALA	000	ROWE OIL COMPANY	KINCAID, E.D.,ET.AL.	1	5304	6456	SLIGO	NO	NO	NO	L. CRETAC.	61
C-01557	ZAVALA	000	TENNECO	KIEFER, CHESTER	2	7500	7764	COW CREEK	NO	NO	NO	L. CRETAC.	83
C-01530	ZAVALA	000	TENNECO	K.B. AND M.	1	5218	6456	SLIGO	NO	NO	NO	L. CRETAC.	115
C-01554	ZAVALA	000	TENNECO	NIXON, J. W.	1	7285	7371	SLIGO	NO	NO	NO	L. CRETAC.	29
C-00665B	ZAVALA	000	TESORO PETROLEUM CORPORATION	CRENSHAW	51	4536	4563		NO	NO	NO		1
C-00176	ZAVALA	000	WATER DEVELOPMENT BOARD	THDM ZX-77-11-408	1-1	440	1160	WILCOX	NO	NO	NO	EOCENE	47
C-01558	ZAVALA	000	ZAVALA PROPERTIES, INC.	MARPHY, LEONARD	1	6879	6930	PEARSALL	NO	NO	NO	L. CRETAC.	12
C-00669A	UNKNOWN	000	HORIZON OIL	BLODGETT	B	6470	6480		NO	NO	NO		1
C-00669G	UNKNOWN	000	HORIZON OIL	BUZZARD	A-1	6424	6432		NO	NO	NO		1
C-00669F	UNKNOWN	000	HORIZON OIL	CLEMENTS	3	6521	6530		NO	NO	NO		1
C-00669E	UNKNOWN	000	HORIZON OIL	DODSON	B-1	6500	6509		NO	NO	NO		1
C-00669D	UNKNOWN	000	HORIZON OIL	HAWKINS	1	6337	6437		NO	NO	NO		1
C-00669B	UNKNOWN	000	HORIZON OIL	MCGREEVY	1	6444	6450		NO	NO	NO		1
C-00669C	UNKNOWN	000	HORIZON OIL	MCGREEVY	2	6451	6460		NO	NO	NO		1
C-00669	UNKNOWN	000	HORIZON OIL	WASHER	1	6470	6480		NO	NO	NO		1
C-06083	UNKNOWN	000	TENNECO	FRELS	1	11014	11208		NO	NO	NO		14
C-06084	UNKNOWN	000	TENNECO	HARPER	1	10931	10984		NO	NO	NO		6
C-00555	UNKNOWN	000	STANDARD OF TEXAS	UNIVERSITY	13-1	12464	13722		NO	NO	NO		30
T-00036D	ARKANSAS	000	AUSTRAL OIL COMPANY	DOOLEY CK (LAFAYETTE)	1	10978	11065		NO	NO	NO		2
T-00036F	ARKANSAS	000	AUSTRAL OIL COMPANY	INT. PAPER (LAFAY.)	A-3	11044	11100		NO	NO	NO		1
T-00036G	ARKANSAS	000	AUSTRAL OIL COMPANY	INT. PAPER (LAFAY.)	B-1	10680	10784		NO	NO	NO		1
T-00036E	ARKANSAS	000	AUSTRAL OIL COMPANY	MCBRIDE (COLUMBIA CO)	1	10682	10730		NO	NO	NO		1
C-00665F	ARKANSASA	000	KLEIN PETROLEUM	BARNETT	1	10808	10838		NO	NO	NO		1
T-00036H	ARKANSAS	000	MUSLOW AND EVANS	HAYNESVILLE MERCANTIL	1	10518	10638		NO	NO	NO		3
T-00036I	ARKANSAS	000	TENNECO	NATION (COLUMBIA CO.)	1	11302	11482		NO	NO	NO		6
T-00036B	ARKANSAS	000	DALTON J. WOODS	KNIGHT (COLUMBIA CO.)	1	10744	10868		NO	NO	NO		1
T-00036A	ARKANSAS	000	DALTON J. WOODS	MCDOLE (COLUMBIA CO.)	1	10854	10976	SMACKOVER	NO	NO	NO	JURASSIC	1
T-00036C	ARKANSAS	000	DALTON J. WOODS	STUART (COLUMBIA CO.)	3	10690	10806		NO	NO	NO		1
C-00663H	FLORIDA	000	HUMBLE OIL AND REFINING	66AN-2 (TEACHING)		0	72		NO	NO	NO	HOLOCENE	2
C-00663I	FLORIDA	000	HUMBLE OIL AND REFINING	66AN-3 (TEACHING)		0	74		NO	NO	NO	HOLOCENE	2
C-00664A	FLORIDA	000	HUMBLE OIL AND REFINING	66AN-5 (TEACHING)		0	239		NO	NO	NO	HOLOCENE	1
C-00664B	FLORIDA	000	HUMBLE OIL AND REFINING	66AN-8 (TEACHING)		0	75		NO	NO	NO	HOLOCENE	1
C-00663F	FLORIDA	000	HUMBLE OIL AND REFINING	66AN-9 (TEACHING)		0	236		NO	NO	NO	HOLOCENE	1
C-00661F	FLORIDA	000	HUMBLE OIL AND REFINING	66BAH-13 (TEACHING)		0	217		NO	NO	NO	HOLOCENE	1
C-00660B	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-17 (TEACHING)		0	242		NO	NO	NO	HOLOCENE	1
C-00662E	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-18 (TEACHING)		0	227		NO	NO	NO	HOLOCENE	1
C-00660G	FLORIDA	000	HUMBLE OIL AND REFINING	66FB-19 (TEACHING)		0	[illegible]						
C-00660	FLORIDA	000	HUMBLE OIL AND REFINING	[illegible]									

T-00070	YOAKUM	000	TENNECO	BRYSON	15	5112	5229	SAN ANDRES	NO	NO	NO	PERMIAN	31
T-00069	YOAKUM	000	TENNECO	PRENTICE CLEARFORK U.	1116	5932	6633	CLEARFORK	NO	NO	NO	PERMIAN	103
T-00067	YOAKUM	000	TENNECO	WRIGHT	17	8400	8509	WICHITA	NO	NO	NO	PERMIAN	37
C-00069E	YOUNG	000	MAGNOLIA PETROLEUM COMPANY	BAGLEY	1	605	614		NO	NO	NO		1
C-00668A	YOUNG	000	PHILLIPS PETROLEUM COMPANY	LARIMORE	50	701	712		NO	NO	NO		6
C-00543	ZAPATA	000	INTNL. BNDRY. AND WAT. COMM.	SAN IGNACIO SCHOOL	1	387	1749		NO	NO	NO		319
C-01163A	ZAPATA	000	NATIONAL EXPLORATION	YZARGUIRRE, JESUS	1	9400	9436		NO	NO	NO		6
C-06130	ZAPATA	000	TEXACO	A. GARCIA-CHARCO R.	-	0	0		NO	NO	NO		154
C-00216	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	1	0	64		NO	NO	NO		2
C-00217	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	A-1	0	54		NO	NO	NO		2
C-00218	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	B-1	0	51		NO	NO	NO		2
C-00219	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	C-1	0	50		NO	NO	NO		2
C-00220	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	2	0	62		NO	NO	NO		2
C-00221	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	3	0	53		NO	NO	NO		2
C-00222	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	3-A	0	57		NO	NO	NO		1
C-00223	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	B-3	0	70		NO	NO	NO		2
C-00224	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	3-C	0	80		NO	NO	NO		3
C-00225	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	3-D	0	104		NO	NO	NO		3
C-00226	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	4	0	60		NO	NO	NO		1
C-00228	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	5-A	0	88		NO	NO	NO		3
C-00227	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	5-GIS	0	70		MO	NO	NO		2
C-00215	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	5-LO	0	203		NO	NO	NO		7
C-00229	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	6	0	61		NO	NO	NO		2
C-00230	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	8	0	52		NO	NO	NO		2
C-00231	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	10	0	51		NO	NO	NO		2
C-00232	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	12	0	40		NO	NO	NO		1
C-00233	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	14	0	86		NO	NO	NO		2
C-00234	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	15	0	92		NO	NO	NO		2
C-00235	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	16	0	96		NO	NO	NO		1
C-00236	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	17	0	83		NO	NO	NO		2
C-00237	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	18	0	88		NO	NO	NO		2
C-00238	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	19	0	50		NO	NO	NO		1
C-00239	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	20	0	80		NO	NO	NO		2
C-00240	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	21	0	70		NO	NO	NO		2
C-00241	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	22	0	83		NO	NO	NO		2
C-00242	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	23	0	46		NO	NO	NO		1
C-00243	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	24	0	40		NO	NO	NO		1
C-00244	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	25	0	45		NO	NO	NO		1
C-00245	ZAPATA	000	U. S. BOUNDRY COMMISSION	TEST HOLE	26	0	75		NO	NO	NO		2
C-00724	ZAVALA	000	COASTAL STATES	HORNER	A-1	155	165		NO	NO	NO		3
T-00044	ZAVALA	000	GETTY OIL COMPANY	GILBERT	1	1985	2069	ANACACHO	NO	NO	NO	U. CRETAC.	34
T-00045	ZAVALA	000	GETTY OIL COMPANY	GILBERT	2	1955	2117	ANACACHO	NO	NO	NO	U. CRETAC.	41
C-06134	ZAVALA	000	GETTY OIL	GREELE	1	1982	2113		NO	NO	NO		23
T-00043	ZAVALA	000	GETTY OIL COMPANY	GREELE	2	1949	2045	ANACACHO	NO	NO	NO	U. CRETAC.	33
C-06087	ZAVALA	000	GETTY OIL COMPANY	WEAVER	2-A	7292	7877	EDWARDS	NO	YES	YES	L. CRETAC.	13
C-00161F	ZAVALA	000	S. GOSE AND SHIELD CO.	HASSETT, J.	3	6210	6333	BUDA	NO	NO	NO	L. CRETAC.	7
C-00781	ZAVALA	000	GULF BASIN-BUR. RECLAM.	SAND MTN DAMSITE	1-5	0	53		NO	NO	NO		2
T-00054	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	A6	578	594		NO	NO	NO		3
T-00053I	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	D4	754	757		NO	NO	NO		1
T-00053H	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	F6	381	447		NO	NO	NO		9
T-00053D	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	H1	808	1177		NO	NO	NO		9
T-00053E	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	H2	789	1100		NO	NO	NO		5
T-00053F	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	H4	549	608		NO	NO	NO		1
T-00053G	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	H6	634	663		NO	NO	NO		9
T-00053C	ZAVALA	000	GULF OIL	SOUTHWEST TEXAS	I45	1300	1666		NO	NO	NO		6

C-00523	WILLIAMSON	00	STAFFORD	TUBBS	1	2300	2820		NO	NO	NO		2
C-01131	WILSON	000	DEAGAN FARM	TEST HOLE	1-A	0	370		NO	NO	NO		1
C-00615A	WILSON	000	GULF BASIN-BUR. OF RECLAM.	FALLS CITY DAM SITE	1	0	0		NO	NO	NO		5
T-00019	WILSON	000	PRAIRIE PRODUCTION	BRECHTEL	1	3205	3370	AUSTIN	NO	NO	NO	U. CRETAC.	52
C-00192	WILSON	000	SUN OIL COMPANY	BAIN	2	4562	4625		NO	YES	NO		20
C-01428	WILSON	000	SUN OIL COMPANY	SMITH-HOUSEMAN	1	3123	3164		NO	NO	NO		1
C-01332	WILSON	000	SUN OIL COMPANY	WISEMAN-BENDELE	1	1159	1515		NO	NO	NO		1
C-01325	WILSON	000	SUN OIL COMPANY	WISEMAN, H. W.	4	1354	1385		NO	NO	YES	CRETACEOUS	2
C-01244	WILSON	000	SUN OIL COMPANY	WISEMAN, H. W.	5	1427	1441		NO	YES	NO		1
C-01238	WILSON	000	SUN OIL COMPANY	WISEMAN, H. W.	7	1428	1442		NO	NO	NO		1
C-06082	WILSON	000	TENNECO	MCKENZIE, D. A.	1	6710	7205	PEARSALL	NO	NO	NO	L. CRETAC.	88
C-01535	WILSON	000	TENNECO AND PENNZOIL UNITED	JASIK, L. A.	1	5602	5653	GLEN ROSE	NO	NO	NO	L. CRETAC.	12
C-00666A	WILSON	000	TESORO PETROLEUM	E. S. BRYAN	1	5970	6278		NO	NO	NO	CRETACEOUS	8
T-00008	WILSON	000	TESORO PETROLEUM	KRUEGER	1	5547	5825	AUSTIN	NO	NO	YES	U. CRETAC.	56
C-00665	WILSON	000	TESORO PETROLEUM	VALCHER, EMMA	1	6653	6951	BUDA	NO	NO	YES	U. CRETAC.	35
C-00771	WILSON	000	TEXAS BASIN-BUR. OF RECLAM.	TEST HOLES	1-14	0	0		NO	NO	NO		59
C-00492	WINKLER	000	CONTINENTAL OIL COMPANY	BROWN ALTMAN	4C	3104	3207	COLBY SAND	NO	NO	NO	PERMIAN	18
C-00297	WINKLER	000	GULF OIL CORPORATION	CLAPP, O.	1	2550	3130	YATES	NO	YES	NO	PERMIAN	117
C-00285	WINKLER	000	GULF OIL CORPORATION	KEYSTONE	12	4604	4907		NO	NO	NO	DEVONIAN	55
C-00278	WINKLER	000	GULF OIL CORPORATION	KEYSTONE	49-E	4636	9157	ELLENBURG	NO	YES	NO	ORDOVICIAN	54
C-00279	WINKLER	000	GULF OIL CORPORATION	KEYSTONE	69	4555	9728	ELLENBURG	NO	NO	NO	ORDOVICIAN	87
C-00277	WINKLER	000	GULF OIL CORPORATION	KEYSTONE	82-E	5862	7813		NO	YES	NO	DEVONIAN	4
C-00109	WINKLER	000	GULF OIL CORPORATION	KEYSTONE	108-E	8945	9641	ELLENBURG	NO	YES	NO	ORDOVICIAN	59
C-01147A	WINKLER	000	PHILLIPS PETROLEUM COMPANY	BASH	2	4662	4763	GLORIETA	NO	NO	NO	PERMIAN	3
C-00298C	WINKLER	000	PHILLIPS PETROLEUM COMPANY	MCCABE	9	2766	2823	QUEEN	NO	NO	NO	PERMIAN	5
C-00105E	WINKLER	000	PHILLIPS PETROLEUM COMPANY	MCCABE	29	3009	3300	QUEEN	NO	NO	NO	PERMIAN	8
C-00550	WINKLER	000	STANDARD OF TEXAS	SEALY-SMITH	3-1	8647	8694	STRAWN	NO	NO	NO	PENNSYLVAN	7
C-00552	WINKLER	000	STANDARD OF TEXAS	SEALY-SMITH	4-1	8620	8737	STRAWN	NO	NO	NO	PENNSYLVAN	39
C-00549	WINKLER	000	STANDARD OF TEXAS	SEALY-SMITH	7-1	8548	8694	STRAWN	NO	NO	NO	PENNSYLVAN	36
C-00548	WINKLER	000	STANDARD OF TEXAS	SEALY-SMITH	14-1	8635	8717	STRAWN	NO	NO	NO	PENNSYLVAN	36
C-00567	WINKLER	000	STANDARD OF TEXAS	VEST RANCH	4-2	8560	8610	STRAWN	NO	NO	NO	PENNSYLVAN	6
C-01402	WINKLER	000	SUN OIL COMPANY	DAUGHERTY	15	3110	3261	YATES	NO	YES	NO	PERMIAN	51
C-01222	WINKLER	000	SUN OIL COMPANY	HALLEY	1-WIW	2651	3132	YATES	NO	NO	NO	PERMIAN	75
C-01233	WINKLER	000	SUN OIL COMPANY	HALLEY	2	2663	2980	YATES	NO	YES	NO	PERMIAN	44
C-01224	WINKLER	000	SUN OIL COMPANY	HALLEY	4	2660	3174	YATES	NO	YES	NO		54
C-01230	WINKLER	000	SUN OIL COMPANY	HALLEY	5-WIW	2750	3073	YATES	NO	NO	NO	PERMIAN	67
C-01223	WINKLER	000	SUN OIL COMPANY	HALLEY	6-WIW	2800	3127	YATES	NO	NO	NO	PERMIAN	64
C-01263	WINKLER	000	SUN OIL COMPANY	HALLEY	11-B	4764	4835	GLORIETA	NO	YES	NO	PERMIAN	26
C-01317	WINKLER	000	SUN OIL COMPANY	HALLEY	12-A	2721	2898	YATES	NO	NO	NO	PERMIAN	
C-01236	WINKLER	000	SUN OIL COMPANY	HALLEY	12-B	3033	4815	HOLT	NO	YES	NO	PERMIAN	80
C-01219	WINKLER	000	SUN OIL COMPANY	HALLEY	14	2751	3164	YATES	NO	NO	NO	PERMIAN	32
C-01163	WISE	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	7	31	219		NO	NO	NO		12
C-01157	WISE	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	7	33	285		NO	NO	NO		12
C-01158	WISE	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	8	616	1026		NO	NO	NO		40
C-01159	WISE	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	9	403	1421		NO	NO	NO		52
C-01160	WISE	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	10	815	1251		NO	NO	NO		37
C-01161	WISE	000	MAGNOLIA PETROLEUM COMPANY	TEST HOLE	11	772	1153		NO	NO	NO		33
C-01044	WOOD	000	PAN AMERICAN CORPORATION	BROWN	1	12873	12958		NO	NO	NO		21
C-01272	WOOD	000	SUN OIL COMPANY	MCKNIGHT-INGRAM	1	8538	8577		NO	NO	NO		13
C-01340	WOOD	000	SUN OIL COMPANY	TINNEY	2	0	0		NO	YES	NO	CRETACEOUS	2
C-01342	WOOD	000	SUN OIL COMPANY	TINNEY	1	4400	4417		NO	NO	NO	CRETACEOUS	2
C-00671D	YOAKUM	000	DORCHESTER EXPLORATION	DANIEL	1	5329	5349	SAN ANDRES	NO	NO	NO	PERMIAN	3
C-00671	YOAKUM	000	DORCHESTER EXPLORATION	LOWELAND	1-A	5313	5343	SAN ANDRES	NO	NO	NO	PERMIAN	6
C-00671F	YOAKUM	000	JACK ELAM	HARGROVE	1	5354	5399	SAN ANDRES	NO	NO	NO	[illegible]	
C-00671E	YOAKUM	000	JACK ELAM	CONE									
C-00671C	YOAKUM												

C-00074A	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	RAMMING	44	1723	1754	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
C-00074	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	RAMMING	45	1725	1748	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
C-00073G	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	RAMMING	46	1705	1723	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00073F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	RAMMING (SKIPS)	47	773	1718	GUNSIGHT	NO	NO	NO	PENNSYLVAN	2
B-00073E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	RAMMING	48	1775	1793	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00073C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	143	1295	1886	GUNSIGHT	NO	YES	NO	PENNSYLVAN	3
B-00082G	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	165	481	517		NO	YES	NO		1
B-00073A	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	165	592	1628	GUNSIGHT	NO	YES	NO	PENNSYLVAN	1
C-00081C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	167	497	1290		NO	YES	NO		1
B-00072F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	184	1615	1633	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00072E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	185	753	1621	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00072B	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	190	1371	1607		NO	NO	NO		2
B-00071G	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	192	1498	1582	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00070G	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	194	395	1626	GUNSIGHT	NO	NO	NO	PENNSYLVAN	2
B-00071E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	195	1325	1337		NO	NO	NO		1
B-00070F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	198	387	1370		NO	NO	NO		1
B-00083F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	200	1329	1333		NO	NO	NO		1
B-00071C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	201	1355	1364		NO	NO	NO		1
B-00070D	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	205	1623	1645	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
C-00070C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	207	1603	1615	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00070B	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	209	516	1492		NO	NO	NO		3
B-00070A	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	210	1355	1609	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00069F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY (SKIPS)	214	1335	1602	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00085D	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	THOM	21	1532	1533		NO	NO	NO		1
C-01439	WICHITA	000	MOBIL OIL COMPANY	HONAKER	74	4649	4656		NO	NO	NO		1
C-01441	WICHITA	000	MOBIL OIL COMPANY	HONAKER	75	[illegible]	[illegible]		NO	NO	NO		20
C-00171E	WICHITA	000	SHELL OIL COMPANY	KMA	353	3763	3961	ELLENBURG	NO	NO	NO	ORDOVICIAN	16
C-00084B	WICHITA	000	VIERSON PETR. COMPANY	KEMPNER	1	3742	3768	ELLENBURG	NO	NO	NO	ORDOVICIAN	2
B-00074G	WILBARGER	000	MAGNOLIA PETROLEUM COMPANY	H. AND T.C.	34	2228	2248		NO	NO	NO		1
B-00074E	WILBARGER	000	MAGNOLIA PETROLEUM COMPANY	H. AND T.C.	55	2238	3313		NO	NO	NO		2
B-00074F	WILBARGER	000	MAGNOLIA PETROLEUM COMPANY	H. AND T.C.	64	3310	3313		NO	NO	NO		1
C-00175B	WILBARGER	000	SHELL OIL COMPANY	CULLAR	1	6255	6746	ELLENBURG	NO	NO	NO	ORDOVICIAN	47
C-00171D	WILBARGER	000	SHELL OIL COMPANY	DAVIS	1	6153	6699	ELLENBURG	NO	NO	NO	ORDOVICIAN	54
C-01022	WILBARGER	000	STANDARD OF TEXAS	WILLIAMS	1	7283	7654	ELLENBURG	NO	NO	NO	ORDOVICIAN	1
C-00073D	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	29	1270	1283		NO	YES	NO		1
C-00073B	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	159	1759	1767	GUNSIGHT	NO	YES	NO	PENNSYLVAN	1
C-00072G	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	183	1608	1624	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
C-00072D	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	188	1594	1612	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
C-00072C	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	189	1591	1603	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
C-00072A	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	191	1571	1586	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
B-00071F	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	193	1402	1420		NO	NO	NO		1
B-00071D	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	196	1342	1353		NO	NO	NO		1
B-00071B	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	202	1348	1359		NO	NO	NO		1
B-00071A	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	203	1344	1349		NO	NO	NO		1
C-00070E	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	204	1340	1352		NO	NO	NO		1
B-00069G	WICHITA	000	MAGNOLIA PETROLEUM COMPANY	REILLY	213	1623	1634	GUNSIGHT	NO	NO	NO	PENNSYLVAN	1
C-00635	WILLIAMSON	000	ANDERSON-PRICHARD	BACHMEYER, LEO	1	1685	1704	BUDA	NO	NO	NO	L. CRETAC.	2
C-00329	WILLIAMSON	000	ANDERSON-PRICHARD	BACHMEYER, LEO	1	1335	1391	BUDA	NO	YES	NO	L. CRETAC.	16
C-00326	WILLIAMSON	000	ANDERSON-PRICHARD	ERHART	1	1433	1455	BUDA	NO	NO	NO	L. CRETAC.	7
C-00327	WILLIAMSON	000	ANDERSON-PRICHARD	GING, S. R.	1	1008	1265	BUDA	NO	YES	NO	L. CRETAC.	42
C-00323	WILLIAMSON	000	ANDERSON-PRICHARD	PREUSSE	1	1109	1138	AUSTIN	NO	YES	NO	U. CRETAC.	6
C-00426	WILLIAMSON	000	ANDERSON-PRICHARD	PREUSSE	B-1	1103	1194	AUSTIN	NO	YES	YES	U. CRETAC.	27
C-00328	WILLIAMSON	000	ANDERSON-PRICHARD	PREUSSE	2	1142	1286	BUDA	NO	YES	NO	L. CRETAC.	45
C-00330	WILLIAMSON	000	ANDERSON-PRICHARD	BACHMEYER	1	1182	1934	GEORGETOWN	NO	NO	NO	L. CRETAC.	33
C-00318	WILLIAMSON	000	ANDERSON-PRICHARD	WEISNER	1-A	1164	1235	BUDA	NO	NO	NO	L. CRETAC.	[illegible]

GEOPHYSICS, VOL. XXI, NO. 4 (OCTOBER, 1956), PP. 1087–1099, 4 FIGS.

HEAT FLOW IN WEST TEXAS AND EASTERN NEW MEXICO*

EUGENE HERRIN† AND SYDNEY P. CLARK, JR.‡

ABSTRACT

Geothermal gradients are examined in West Texas and eastern New Mexico, and it is found that the gradients in the salt section of the Permian Salado formation are nearly uniform throughout the region. The values range from 7.70 to 9.00°C/km. Measured values of the thermal conductivity of rock salt are reviewed, and it is concluded that this quantity is most likely to be about 13×10^{-3} cal/cm sec °C., with an estimated uncertainty of ten percent. From these figures, the heat flow is found to be $1.1\pm0.1\times10^{-6}$ cal/cm² sec in this region.

INTRODUCTION

The internal thermal regime of the earth is of fundamental importance to geological and geophysical theory. The source not only of magmatism and metamorphic heat but also of orogenic forces is commonly sought in deep-seated thermal processes. For many years the efforts in this field were devoted to the collection of underground temperatures with the hope of discovering the "normal" rate of increase of temperature with depth, or "normal" geothermal gradient. It has become clear, however, that geothermal gradients may differ by a factor of ten in different places, and that the gradient may be different at different depths along any given vertical. A more useful quantity both for general theory and for the estimation of temperature beyond accessible depths is the heat flow, or amount of thermal energy emerging from the earth per unit area and unit time. This quantity is equal to the product of the vertical gradient of temperature and the local thermal conductivity.

Determinations of heat flow at a few dozen places show remarkably little variation; most values fall between 0.5 and 1.5 microcalories per square centimeter per second (Birch, 1954). The reliable determinations are so few in number and so irregularly distributed geographically that it is not yet possible to perceive any clear pattern to the results. Such theory as we have suggests that correlations between heat flow and major geologic and topographic features should exist, but the theory cannot be adequately tested until the number of reliable determinations of heat flow is substantially increased.

Several hundred measurements of temperature have been made in oil wells in the United States, and if even a few of these could be used for finding heat flow, a considerable addition to our knowledge would result. In many cases only statistical summaries of the data have been published; these have so far proved to be useless for the determination of heat flow. A more serious difficulty is en-

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countered in attempting to find the thermal conductivity appropriate to the geologic section in which the temperatures were measured. The conductivities of rocks range from 0.002 to 0.020 calories per centimeter-second-degree C., and despite continuing efforts, it is still not possible to make satisfactory estimates of the thermal conductivity of sandstones, shales, or limestones on the basis of lithologic descriptions. Direct measurements of the conductivity are required, but available cores rarely provide an adequate sample of the local lithology.

It does appear possible, however, to make use of temperatures in evaporite sections. A preliminary survey showed that the gradients in the Salado salt section (Upper Permian) in West Texas and eastern New Mexico varied little over a wide area. This suggests that the average conductivity of the salt remains the

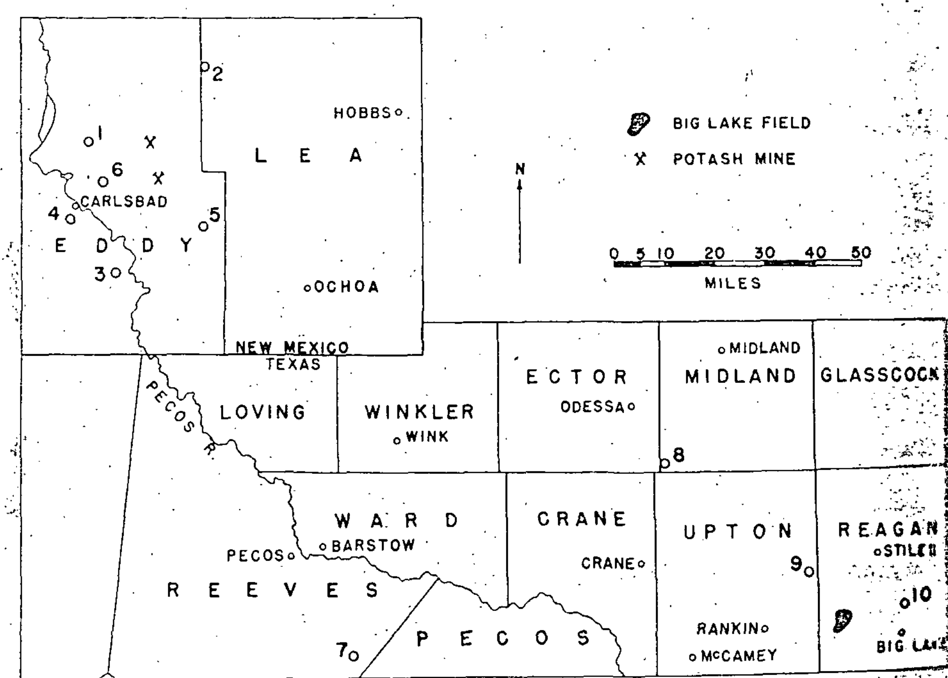

FIG. 1. Location map showing wells from which temperature data were taken.

Index of wells shown in Figure 1

1. Sandburg and Mills No. 1.
2. Cap Rock Oil and Gas No. 1.
3. Superior No. 1 Community.
4. New Mexico Producers and Refiners No. 1 Bluebird.
5. Marland-Ohio No. 1 Workman.
6. Getty No. 7 Dooley.
7. Gulf No. 1 Northrup.
8. Standard Potash No. 2 Test.
9. Donnelly and Gerke No. 1 University.
10. O'Reilly, Slack, and Owen No. 1 University.

same over the whole area. If a suitable value of this mean conductivity is found, it is then possible to find the heat flow in a considerable number of wells penetrating this formation.

This study was greatly advanced by the use of a continuous temperature log from the Gulf No. 1 Northrup well in Reeves County, Texas. Analysis of this log shows clear changes of gradient at lithologic boundaries and establishes a useful ratio between the mean conductivities of salt and anhydrite. Older temperature measurements, made with mercury thermometers at isolated points without regard for lithologic boundaries, are, of course, inadequate for demonstrating sharp changes of gradient. Nevertheless, useful results were obtained from these old data.

ACKNOWLEDGMENTS

We are indebted to Mr. Charles L. Jones of the U. S. Geological Survey for supplying us with a number of samples from the Ochoa series near Carlsbad, New Mexico. Mr. McLain J. Forman of New Orleans kindly provided samples of anhydrite rock from the cap rock of a Gulf Coast salt dome. We are particularly indebted to Mr. George W. Leney and Dr. James T. Wilson of the University of Michigan for permission to include their unpublished measurements of the thermal conductivity of rock salt in our summary. The temperature log of the Gulf No. 1 Northrop well was provided through the courtesy of Mr. C. D. Cordry of the Gulf Oil Co. Finally, we wish to express our appreciation to Dr. Francis Birch for advice in all phases of the work and for critically reviewing the manuscript.

TEMPERATURE GRADIENTS

The temperature data available for this work can be divided into two categories. In the first there is only one well, the Gulf No. 1 Northrup. Mr. C. D. Cordry of the Gulf Oil Co. kindly supplied a continuous temperature log of this well. The remaining data were, with one exception, taken from Hawtof (1930). In this second category, the temperatures were read with thermometers at intervals of 250 or 500 feet. Hawtof's measurements only accidentally fall at formation contacts, and hence they usually show no evidence of abrupt changes in the slopes of the temperature-depth curves. Smooth, although somewhat wavy curves would also fit the data. Sharp changes in gradient are inferred from theoretical considerations and are strikingly displayed by the results obtained from the Gulf No. 1 Northrup well. Keeping these facts in mind, temperature-depth curves were reconstructed from Hawtof's measurements with the introduction of abrupt breaks in slope at contacts in the manner shown in Figure 2.

In some of the wells, the temperature was measured at only one point in the salt section. In this case the gradient in the salt was found by extrapolating the gradients in the underlying and overlying sections to the contacts of the salt, thus giving the temperatures at those points. The gradients found in this way are less reliable than those found from two or more temperatures measured in the salt section, and are distinguished in the tabulated results. Examples of a "reliable" and an "unreliable" gradient in the salt are shown in Figure 2.

The interpretation of discontinuous temperature data requires considerable judgment, and it is impossible to present either the details of our calculations or complete discussions of individual wells in a short paper. We have tried to select wells in which the relation between gradients and lithology is clear and susceptible of only one interpretation. In the interest of brevity and for easy reference, our calculated gradients are collected in table 3 in a later section.

Gulf No. 1 Northrup Well, Reeves County, Texas.

This well is located in southeast Reeves County a few miles west of the Pecos County line. The well was drilled by the rotary method, but was left undisturbed for one year before the temperature measurements were made. Schlumberger Well Surveying corporation made a continuous temperature log of the well from the surface to 8,076 feet; a radioactivity log was available for the cased part of the well from the surface to 5,200 feet and both radioactivity and electric logs were

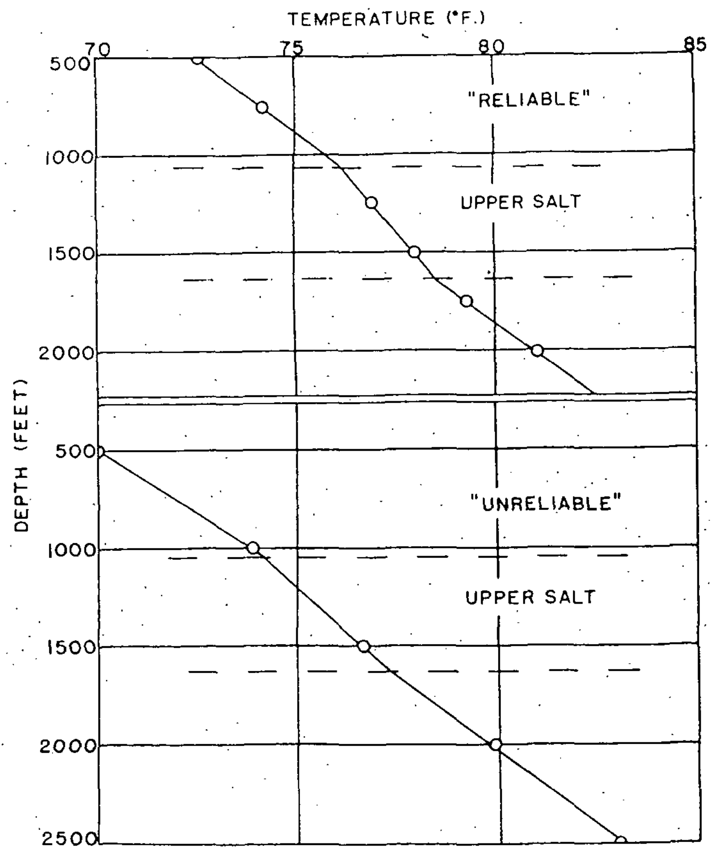

FIG. 2. Examples of "reliable" and "unreliable" Gradients in the Upper Salt, Big Lake Field. The "reliable" curve is from Big Lake-University Well No. 119, and the "unreliable" curve is from Big Lake-University Well No. 110.

available below this depth. The total depth of the well is now 18,609 feet.

A generalized stratigraphic section, compiled from several sources (Adams, 1944; Woods, 1940, Lang, 1935; Lang, 1939; and Carsey, 1935), was correlated with the well logs. Correlations with the radioactivity log above 5,200 feet were checked against the typical radioactivity log of the Ochoa series given by Russell (1941).

The temperature profile and gradients for this well are shown in Figure 3. The correlation between the gradient and the lithologies as determined from the well logs is striking, as is the sharpness of the change in gradient at several points. The value of a continuous temperature log is well-demonstrated by these results.

Big Lake Oil Field, Regan County, Texas.

There are three beds of salt in the Upper Castile formation in the Big Lake region, but only the uppermost one is thick enough to be detected on discontinuous temperature logs. Well logs given by Hennen (1929) and Sellards and Patton (1926) show that the thickness of the salt is uniformly 570 feet throughout the field. Hawtof (1930) gives the depth of the top of the salt section for all of the wells in which he measured temperatures.

Wells in Upton and Midland Counties, Texas.

Useful data were obtained from the Donnelly and Gerke No. 1 University well and from the Standard Potash No. 2 Test well in Upton and Midland Coun-

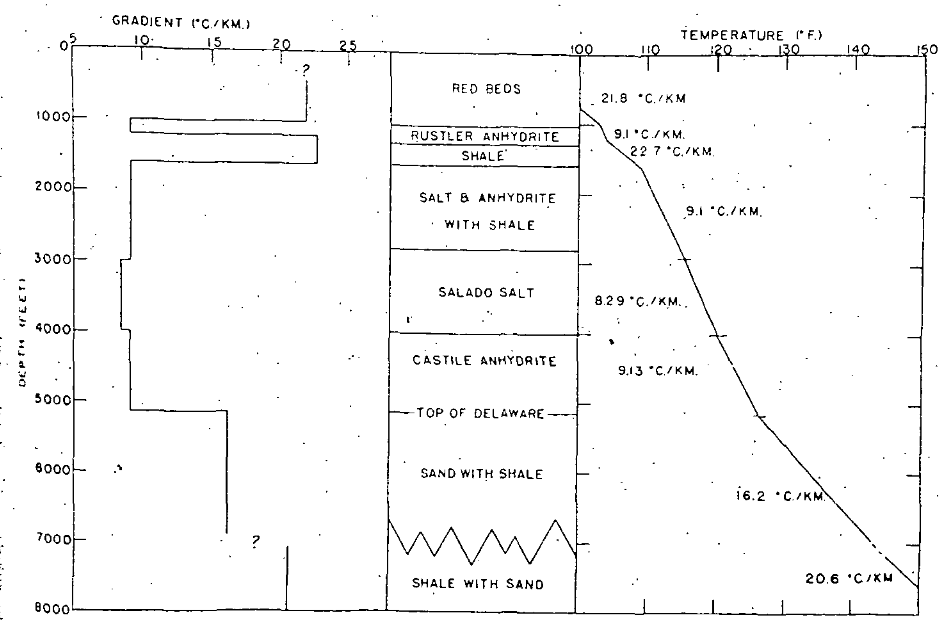

FIG. 3. Temperature, Geothermal Gradients, and Lithologies in the Gulf No. 1 Northrup Well, Reeves County, Texas. Lithology from electric and radioactivity logs.

ties respectively. Hawtof (1930) again gives the depth to the top of the salt in each well. The section in these wells was assumed to be the same as in the Big Lake field, since accurate knowledge of the thickness of the salt is unnecessary. In the former well the gradient is determined by two measurements of temperature in the salt section. In the latter, one measurement made in the salt is the deepest in the well.

Wells in Lea and Eddy Counties, New Mexico.

The stratigraphy in the northern part of the Delaware Basin is complicated by an unconformity at the base of the Rustler formation which cuts out most of the salt in this region. North-south and east-west cross sections by Kroenlein (1939) in the vicinity of Carlsbad show that over the Central Basin Platform a thick section of salt with little or no anhydrite is encountered. In the basin these relations are reversed, and anhydrite predominates over salt.

Reliable gradients were obtained in three of the six wells in New Mexico. In the Sandburg and Mills No. 1 well, the gradient was found in anhydrite; in the Marland-Ohio No. 1 Workman and the Getty No. 7 Dooley wells, data were obtained from a salt section with negligible amounts of anhydrite. In the latter well the temperatures were taken from Van Orstrand (1937); and Lang (1937) gives the section in the well. In the three remaining wells, the evaporite section is made up of both salt and anhydrite; without detailed sample logs it is impossible to determine the proportions of the two types of rock. Since the gradients are unreliable in all of these wells, highly accurate knowledge of lithology is unwarranted. We shall employ conductivities based on our best estimates of the lithologies in calculating the heat flow in these wells.

THERMAL CONDUCTIVITY

The geothermal gradients encountered in the salt section in the Permian Basin are rather uniform over the area examined (table 3). This suggests that the heat flow and the thermal conductivity in the salt are also nearly uniform. The alternative, to suppose that both of the latter quantities are changing in such a way as to leave the gradients unaffected, demands an improbably close balance between independent quantities. In order to calculate the heat flow in this region it is only necessary to estimate the conductivity of the salt section. Results of new measurements of thermal conductivity of other materials pertinent to this study will also be presented.

Conductivity of Rock Salt.

Because of the ease with which pure samples of salt can be obtained, one would expect to be dealing with a well-defined, uniform material; nevertheless, measurements of its thermal conductivity have not led to consistent results. Some of the discrepancies between the findings of various workers is doubtless due to real differences between the materials studied, but some must be due to experimental error. It is known that carefully prepared synthetic crystals have conductivities that are higher than natural ones (Birch and Clark, 1940), and consequently little weight can be given determinations made on such materials in estimating the conductivity of rock salt.

Measurements of the thermal conductivity of rock salt as a function of temperature are shown in Figure 4. The measurements by Ballard, McCarthy, and Davis (1950) are on synthetic crystals, the remainder are on natural material. There is a tendency for the results to be concentrated about the curve representing the measurements of Birch and Clark (1940). The two values that fall well below this curve are probably erroneous. Most of the points above the curve represent measurements on single crystals, and their greater purity and perfection may account for the higher conductivity.

If we ignore the measurements made on artificial crystals and those which appear to be affected by experimental error, the results shown in Figure 4 suggest that the conductivity of rock salt is about 13[1] at a temperature of 20 to

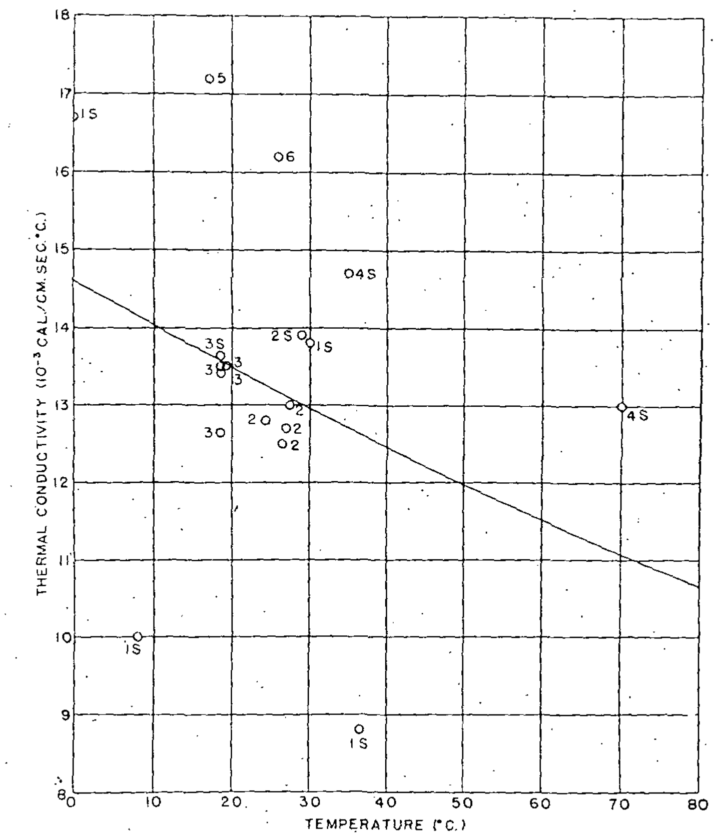

FIG. 4. Thermal conductivity of rock salt as a function of temperature. The curve is from Birch and Clark (1940). Other references: 1. Birch et al. (1942); 2. Present study (see table 2); 3. Unpublished measurements by George W. Leney; 4. Ballard, McCarthy, and Davis (1950); 5. Benfield (1939); 6. Coster (1947). Points marked with the letter *S* represent measurements on single crystals.

30°C. The only pertinent values that depart widely from this figure are those of Benfield (1939) and Coster (1947). Both of these measurements were made on natural rock salt with apparatus of proven reliability. It appears that rock salt may have a thermal conductivity considerably higher than 13, but on the basis of present data such values must be considered exceptional. We adopt 13 as the conductivity of rock salt, with an estimated uncertainty of ten percent.

Conductivity of Anhydrite.

Measurements of the conductivity of massive anhydrite rock are given in table 1. Specimens from the Loetschberg Tunnel in Switzerland and from the cap rock of a Gulf Coast salt dome gave fairly consistent results, but these samples were exceedingly pure, and their densities approached that of single crystals of the mineral. Specimens with porosity or containing small amounts of gypsum should have lower conductivities. This may account for the difference between Coster's (1947) results and the other values given in table 1. We adopt a value of 13.5 for the conductivity of pure anhydrite rock.

TABLE 1

THERMAL CONDUCTIVITY OF ANHYDRITE

Locality	Number of Samples	Mean Conductivity (cal/cm sec°C.)	Mean Density (gm/cm³)	Authority
Loetschberg Tunnel Switzerland	3	$13.4 \pm 0.3 \times 10^{-3}$	2.91	Clark & Niblett (in press)
Masjid-i-Sulaiman Iran	3	11.7 ± 1.2		Coster (1947)
Cap Rock Gulf Coast	3	13.7 ± 0.1	2.93	Present
Potash Mines Carlsbad, New Mex. (with minor halite inclusions)	3	12.9 ± 0.2	2.82	Present

New Conductivity Data.

The results of measurements of conductivity made for this study are collected in table 2. The rocks from New Mexico were kindly supplied by Mr. Charles L. Jones of the U. S. Geological Survey. These specimens were from the Rustler and Salado formations, and were chosen because of lithology rather than stratigraphic position. The measurements were made with the apparatus described by Birch (1950).

It appears from these data that the presence of small amounts of impurities has little effect on the conductivity of rock salt. Polyhalite is a poor conductor, and our single sample of shale has a rather low conductivity for this type of rock. One specimen of dolomite has a conductivity of 10.6 compared with a mean value of 8.1 found by Birch and Clark (1945) for three samples from Crane County, Texas.

[1] Values of conductivity will henceforth be written as numbers with units 10^{-3} cal/cm sec °C. understood.

Conductivity of Other Sediments.

Once the heat flow in a well is found by means of the gradient in the salt section and the adopted conductivity of rock salt, it is possible to find the mean conductivity of other rock units by dividing the heat flow by the gradients obtained in other parts of the well. This provides a rough test of the "reasonability" of the heat flow. Measured values of the conductivity of shale range from about 3.0 to 5.0, for sandstone from 4.8 to 8.1, limestone 5.0 to 7.3, and dolomite 8.1 to 13.2. (These data were taken from Birch et al., 1942; Mossop and Gafner, 1951; Bullard and Niblett, 1951; and Birch and Clark, 1945.)

TABLE 2

RESULTS OF NEW CONDUCTIVITY MEASUREMENTS

Locality and Description	Conductivity (cal/cm sec °C.)	Density (gm/cm³)
Samples from Core taken near Carlsbad, New Mexico		
Anhydrite with ca. 30 percent halite	13.4×10^{-3}	2.49
Anhydrite with ca. 5 percent halite	13.2	2.92
	12.8	2.81
	12.7	2.75
Halite with ca. 5 percent polyhalite	12.8	2.11
Halite with ca. 5 percent clay	12.7	2.08
Polyhalite	3.7	2.76
	3.7	2.76
Dolomite	10.6	2.65
Salt Samples from Oklahoma (?)		
Polycrystalline salt	13.0	2.19
	12.5	2.17
Single crystal of salt	13.9	2.17
Permian basin		
Black shale (lower Permian)	2.2	2.41
Cap Rock, Gulf Coast		
Anhydrite	13.9	2.93
	13.8	2.93
	13.5	2.92

We expect that the mean conductivity in an interval, as calculated from the gradients, should be in reasonable agreement with the figures given above. For heterogeneous sections a weighted mean conductivity must be used. For layered rocks the appropriate formula for the conductivity of a heterogeneous interval is $1/K = \sum_i w_i/K_i$, where K is the mean conductivity in the interval, K_i is the conductivity of the ith homogeneous bed, and w_i is the ratio of the thickness of the ith bed to the thickness of the entire interval. This formula is analogous to that used for calculating the resistance of electrical resistors in series.

Geothermal gradients, assumed conductivities in the evaporite section, and resultant values of the heat flow are collected in table 3. With 1.1×10^{-6} cal/cm²sec for the heat flow in the Gulf No. 1 Northrup well, the conductivities given in table 4 are found for other strata in the well. The values for the clastic rocks are in reasonable agreement with the measured values mentioned in the preceding section, but the Castile anhydrite has a lower conductivity than that found for pure anhydrite rock. This discrepancy is presumed to be due to laminae of calcite which occur throughout the Castile formation. According to Adams (1944) the anhydrite layers are characteristically two or three times as thick as the calcite layers, and there are also beds of pure anhydrite up to several feet in thickness scattered irregularly through the section. We assume the calcite layers to have a

TABLE 3

GRADIENTS, CONDUCTIVITY, AND HEAT FLOW IN WEST TEXAS, AND EASTERN NEW MEXICO

Well Name	Geothermal Gradient in Evaporites (°C./km)	Conductivity (cal/cm sec °C)	Heat Flow (cal/cm² sec)
Reeves Co., Tex.			
Gulf No. 1 Northrup	*8.29	13×10^{-3}	*1.1×10^{-6}
Regan Co., Tex.			
Big Lake-University			
103	*9.00	13	*1.2
106	8.80	13	1.1
110	9.84	13	1.3
112	9.15	13	1.2
115	*7.59	13	*1.0
118	*7.94	13	*1.0
119	*8.31	13	*1.1
124	8.5	13	1.1
125	8.3	13	1.1
126	*8.29	13	*1.1
127	*8.57	13	*1.1
O'Reilly-Slack-Owen-University No. 1	9.74	13	1.3
Upton Co., Tex.			
Donnelly and Gerke No. 1	*8.20	13	*1.1
Midland Co., Tex.			
Standard Potash No. 2 Test	9.4	13	1.2
Eddy Co., New Mexico			
Sandburg and Mills No. 1	*10.27	11.8[1]	*1.2
Superior No. 1 Community	10.12	11.8[1]	1.2
New Mexico Producers & Refiners No. 1 Bluebird	7.25	13	0.9
Marland-Ohio No. 1 Workman	*7.70	13	*1.0
Getty No. 7 Dooley	*8.02	13	*1.0
Lea Co., New Mexico			
Cap Rock Oil and Gas No. 1	9.2(?)	13	1.2(?)

* Reliable values.
[1] Anhydrite.

conductivity of 7 and the anhydrite 13.5. If the section consists of 30 perc calcite, its mean conductivity is 10.4; it is 11.4 if calcite layers make up 20 perc of the section. Agreement with the value of 11.8 calculated from the gradients obtained by assuming about 15 percent calcite in the anhydrite. We adopt a co ductivity of 11.8 for the Castile formation in order to estimate the heat flow some of the wells in New Mexico which encountered no thick salt section.

In the Big Lake field the conductivity of the beds above the salt was calculat from the gradients by taking the heat flow to be equal to the mean of the reliab values in the salt section (1.1×10^{-6} cal/cm²sec). The beds above the salt have mean conductivity of 7.4, which is reasonable for a sequence of clastic rocks.

TABLE 4

CONDUCTIVITIES IN THE GULF NO. 1. NORTHRUP WELL

Interval	Conductivity (cal/cm sec °C.)
Red Beds above the Rustler	4.9×10^{-3}
Shale above the salt	4.7
Anhydrite	11.8
Shaley sand (Delaware Mtn. Gp.)	6.7
Sandy shale (Delaware Mtn. Gp.)	5.2

The mean value of the heat flow in the reliable wells in New Mexico i 1.1×10^{-6} cal/cm²sec, but the heat flow in wells drilled through salt is systematically lower than that found in the anhydrite. Our value of the conductivity of the anhydrite may be too high, but until an opportunity for a detailed study of the conductivity of these rocks presents itself, the question must remain unsettled.

In all of the places examined the heat flow is found to be close to 1.1×10^{-6} cal/cm²sec. This value is lower than the value of 1.4×10^{-6} found by Richardson and Wells (1931) in New Mexico, and considerably lower than the value 2.0×10^{-6} found by Birch and Clark (1945). The former result is based on a conductivity of anhydrite of 12.3, and Richardson and Wells give no source of this value. The heat flow found by Birch and Clark was obtained from gradients in the Big Lake University 1-B well, and measured conductivities of rocks from wells in Upton and Crane Counties, Texas. They found a gradient of 24°C./km between 2,500 and 6,500 feet, which is below the evaporite section. They assumed that the rocks in this interval were represented by samples of dolomitic limestones from the wells further west. These samples are not representative of the lithologies encountered between 2,500 and 6,500 feet in the Big Lake field, although they are probably of the same age. From the driller's log of this well (Hennen, 1929), the rocks in this interval are estimated to be: 7 percent sand, 5 percent anhydrite, 46 percent shale and silt, and 42 percent limestone and dolomite. Assuming conductivities of 6 for the sand (which contains some shale), 3 for the shale, 13.5 for the anhydrite, and 8 for the carbonates, we find the mean conductivity in this interval to be 4.5. It is likely that in some cases limestone was mistaken for dolomite in the driller's log. If we assume that all of the rocks logged as carbonates are anhydrite with conductivity 13.5, the mean conductivity in the interval is found to be 5.0. The resulting heat flow is 1.1 or 1.2×10^{-6} cal/cm²sec depending on the assumed conductivity. The close agreement between this value and that obtained from the salt section is fortuitous, for driller's logs are not reliable indices of lithology and the values of conductivity that we have adopted are no more than guided guesses. Nevertheless the result shows that the heat flow of 2.0×10^{-6} found by Birch and Clark is improbably large, and that there is no serious disagreement between the heat flow in this part of the well and that in the salt section.

The gradient below 7,000 feet in this well is greater than 34°C./km (Birch and Clark, 1945). According to the driller's log the rocks below 7,000 feet are mainly carbonates, and such a high gradient is unexpected. We must conclude that either the temperatures are in error or the carbonates are extremely porous limestones of low conductivity (ca. 4). If the conductivity of the limestones were as high as 7, the heat flow would be about 2.4×10^{-6} cal/cm²sec. This requires that the conductivity of salt be about 29, which seems impossible.

CONCLUSIONS

On the basis of present data we conclude that the heat flow in West Texas and eastern New Mexico is $1.1 \pm 0.1 \times 10^{-6}$ cal/cm²sec. More accurate studies will be necessary if changes in heat flow from place to place within this region are to be established. The most serious error affecting our results arises from the lack of measured values of the thermal conductivity of the rocks in which the temperatures were measured. Our estimated uncertainty of ten percent should be sufficiently generous, but our results are subject to revision should future measurements prove our adopted value of the conductivity to be in error.

There is a definite correlation between geothermal gradient and lithology in regions in which formations of contrasting thermal conductivity are found. This correlation is best demonstrated by continuous temperature logs; measurements of temperature at isolated points cannot reveal abrupt changes of gradient. The low gradients in the salt sequence in the Permian basin persist over a large area; the "coolness" of the rocks in this region is due to the high conductivity of the evaporites.

It is fruitless to attempt to interpret temperature-depth curves without regard for lithology. In this connection we are faced with a paradoxical situation, for a preponderance of data on underground temperatures comes from wells for which there is no modern lithologic control. Our knowledge of heat flow could be greatly enhanced by modern data on both temperature and conductivity from a relatively small number of oil wells. It is to be hoped that opportunities for new measurements of these quantities will be recognized by geologists in charge of drilling, and that continuous temperature logs, as well as adequate cores from the logged section, will become available in the future.

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Basement Rocks in Far West Texas and South-Central New Mexico

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ABSTRACT

Far west Texas and south-central New Mexico contain eight areas of Precambrian exposure. Samples from twenty-five wells drilled to basement aid in the correlation of the outcropping units. Twenty-four new isotopic ages have been determined from outcrops and from subsurface samples. Four periods of activity can be defined on the basis of this and previous work. The oldest rocks exposed are in the San Andres Mountain trend. These largely granitic rocks are 1350 m.y. (million years) and older and represent the basic framework into or onto which younger rocks were intruded or deposited. The best age obtained for the Carrizo Mountain Group in the Van Horn area is 1240 m.y., based on a rather indistinct whole rock isochron from metarhyolites. These rocks were later metamorphosed at about 950 to 1000 m.y. The granite at Pajarito Peak, Otero County, New Mexico, yielded an age of 1170 m.y. and appears to be a restricted basement rock type. The Castner–Allamore carbonate rocks and the Hazel–Llanoria sandstones and shales, together with their subsurface equivalents, were deposited over a large area. This deposition was accompanied by basalts and diabase injection. Granite and rhyolite in the Franklin Mountain area and to the east were emplaced and injected essentially contemporaneously at 950 m.y. This igneous activity is the youngest recognized in the Precambrian of this area and caused the metamorphism of the slightly older clastic and carbonate sedimentary rocks where in contact.

INTRODUCTION

Far west Texas and south-central New Mexico contain eight areas of Precambrian exposure, ranging from the few acres at Bent Dome in Otero County, New Mexico, to more than one hundred square miles (260 square kilometers) around Van Horn, Texas. In addition, samples from twenty-five wells drilled in search of oil and gas are available for study in the area surrounding the outcrops. We have assembled information from the recent literature on these areas, determined an additional twenty-four isotopic ages both from surface and subsurface samples, and attempted to synthesize a workable geologic history and a basement geologic map of the area. Although certain parts of the history are imprecisely defined, a remarkably consistent evolution and correlation between outcrop and subsurface rocks can be made.

We first will describe each outcrop area and present the new isotopic ages; then we will examine the information from the subsurface, and finally we will use these data in formulating a geologic history.

FRANKLIN MOUNTAINS

The work of Harbour (1960) in the Franklin Mountains summarized previous studies as well as adding much significant original data. His work outlined four major stratigraphic units with an aggregated thickness in excess of 5000 feet (1520 meters). In addition, McAnulty (1967) studied the three lower units in considerable detail. Although the conclusions reached here do not wholly agree with McAnulty's his descriptions are the best to be found.

The lowermost unit is the Castner "Limestone." The base is not exposed, yet 1100 feet (335 meters) of marble, diabase, and related hornfels have been measured by Harbour in the Fusselman Canyon area. The term *limestone* does not seem appropriate for a rock characteristically carrying a variety of metamorphic minerals, including garnet, tremolite, diopside, and epidote. Therefore, we recommend changing the name to *Castner Marble*.

The lower part is characterized by white to gray or green carbonates showing delicately preserved structures including stromatozoan-like algal heads. These carbonates are interbedded with dark, fine-grained diabasic rocks and biotite argillites. The two are very difficult to distinguish in the field. The lower carbonate beds are dolomitic and in some instances almost pure dolomite. The basal unit must have contained only a little quartz; otherwise, the dolomite would have reacted with it to form more abundant diopside and tremolite.

The upper part was called a hornfels by Harbour. The carbonates were originally considerably less pure than in the lower intervals. The diversity of metamorphic minerals, including an abundance of garnet, is evidence of a substantial clay mineral content. Quartz grains as relicts are common, and the rock is considerably less dolomitic in general, as shown by analyses reported by Harbour. Edgewise conglomerates are common near the upper part, as are a wide variety of abundant microstructures. The uppermost part contains structures that are here interpreted as soft sediment deformation. The unit as a whole is lacking in any major schistose development. The sedimentary rock appears to have been converted to hornfels without attendant shearing.

The Mundy Breccia overlies the Castner Marble. It varies from 0 to 250 feet (76 meters) in thickness. Harbour interpreted this unit as basaltic fragments, in a "fine, dark-gray matrix resembling indurated mudstone." McAnulty interprets it as a basalt flow breccia. The petrography of this unit is not straightforward. The basaltic fragments are altered but only incipiently metamorphosed with a well-defined relict igneous texture. The matrix is not uniform but is composed mostly of altered feldspar, chlorite, actinolite, and lesser biotite and tourmaline. The suggestion is that the matrix is closely related to the basalt itself. Aside from blocks of Castner Marble in the lower part of the Mundy (reported by McAnulty), no material other than basalt has been found in the breccia. The matrix occupies only a small part of the total volume. We interpret the unit as a surface flow that extruded on a floor of soft Castner carbonates. Whether this was a surface or submarine flow breccia cannot be resolved with the available evidence. The soft sediment deformation in the Castner Marble is thus ascribed to differential loading by the basaltic debris. The appearance of the breccia has been altered by later metamorphism, by intrusive granite, and probably by trapped solutions from the Castner carbonates streaming along breccia zones.

Stratigraphically overlying the Mundy Breccia is the Llanoria Quartzite. The unit is composed of approximately 2600 feet (795 meters) of quartzite, siltstone, and shale. The lower part is mostly a rather pure quartzite containing only a minor amount of microcline. The upper part is separated from the lower by a granite sill. Harbour describes the upper part as "Sandstone, siltstone, and shale in thin beds which form brown-weathering slopes."

Overlying the Llanoria Quartzite is a sequence of as much as 1400 feet (425 meters) of rhyolite flows. This unit is here named the *Franklin Mountain Rhyolite* simply because this is what workers in the area call it.

The rhyolite generally carries sodic plagioclase and perthite phenocrysts in a groundmass of delicate devitrified quartz-feldspar. Quartz phenocrysts, where present, are abundant. Certain samples are poor in quartz and probably approach a trachytic composition. Locally, the rhyolite is converted to a hornfels by granite intrusion. This is particularly common in some areas on the western slopes.

Flow structures are difficult to find in place, although strongly banded types are easily found as boulders in stream beds. The general feeling, although difficult to demonstrate, is that the rhyolite is at least roughly conformable with the underlying sediments.

The Red Bluff Granite intrudes the entire Precambrian sequence. In addition, McAnulty reports an older micro-granite porphyry in the Fusselman Canyon area. The microgranite is intrusive into the Precambrian sedimentary sequence, mostly as sills. The microgranite is in turn intruded by Red Bluff-type granite. The granites examined in this study were mostly medium- to fine-grained, characteristically carrying only perthite as the feldspar. Some are quartz poor and contain a pyroxene, but most are highly quartzose with less than five percent femic minerals, common hornblende, biotite, and riebeckite. Textures vary from porphyritic and micrographic to even-grained and hypidiomorphic. The granites have petrographic characteristics of epizone instrusions and were probably emplaced at depths of less than one mile.

Wasserburg et al. (1962) report K/Ar and Rb/Sr ages of 880 to 1030 m.y.* on a variety of granitic samples. Two zircon ages were determined with 1095 and 1080 m.y. being the Pb207/Pb206 ages. A whole rock age of 990 ± 50 m.y. was reported on a sample of metarhyolite by Muehlberger et al. (1966, p. 5415). We have determined ten Rb/Sr ages on whole rocks and feldspars from granites and rhyolites (table 1). We did not find any systematic difference in the ages of the granite and rhyolite and have grouped the two to obtain an isochron or "best" age. The determinations fall very closely along an isochron of 953 ± 13 m.y. with an initial ratio of 0.7081 ± 0.0010 (fig. 1). Two of the whole rock rhyolites fall below the line, but the other whole rocks and feldspars are close to the isochron age. The apparent low ages from the whole rocks are probably caused by minor alterations in the groundmass, because feldspars separated from the same specimens give higher ages.

We believe the sedimentary units were deposited in quick succession, soon became covered by rhyolite, and in the same time interval were intruded and metamorphosed by Red Bluff Granite. The granitic igneous activity took place at about 953 ± 13 m.y. The association of synchronous rhyolite-granite is common throughout the southern United States. Muehlberger, Denison, and Lidiak (1967, p. 2372-2373) drew attention to this relationship.

A succession of lower Paleozoic sedimentary rocks overlies both the granite and rhyolite. Although the structure is disrupted, the Paleozoic sequence appears to be only disconformable with the layered Precambrian rocks.

HUECO MOUNTAINS

Several small hills of red granite are exposed beneath Bliss Sandstone (Cambrian) near the south end of the Hueco Mountains (King, 1935). Wasserburg et al. report an Rb/Sr age of 990 ± 60 on feldspar from the granite. The rock is a partly micrographic perthite granite, petrographically indistinguishable from the Red Bluff Granite of the

* The Rb/Sr ages reported by Wasserburg et al. have been recalculated using the 47 b.y. half-life, resulting in ages six percent lower than those using the 50 b.y. half-life.

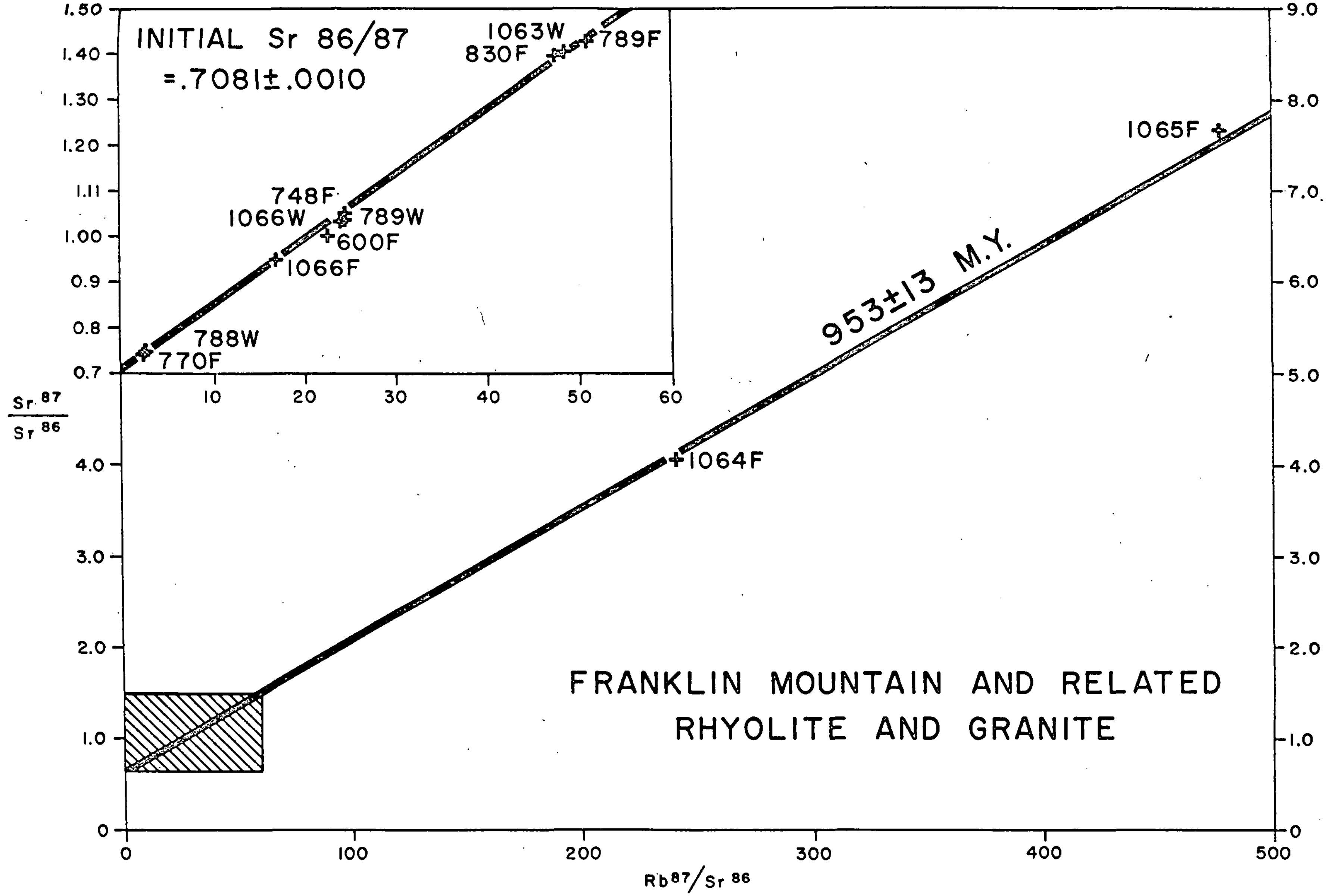


Figure 1

AN ISOCHRON PLOT OF FRANKLIN MOUNTAIN AND RELATED ROCK DETERMINATIONS

Franklin Mountains. The determined age is close to the isochron age of the Franklin Mountains and related rocks. We conclude that the granite exposed in the Hueco Mountains is related both in petrographic character and age to that exposed in the Franklin Mountains.

PUMP STATION HILLS

Masson (1956) described the igneous rocks exposed in a group of low-lying knolls, the Pump Station Hills, in some detail. The dominant rock type is rhyolite porphyry, but some fine micrographic granite porphyry and other rock types are also present. Wasserburg et al. determined an Rb/Sr whole rock age of 960 ± 60 m.y. and a feldspar age of 1000 ± 40 m.y. on a rhyolite sample. These ages and the general petrographic character clearly relate these rocks to those in the Franklin and Hueco mountains.

BENT DOME

At a locality near Bent, Otero County, the Permian Abo Formation rests upon rocks of Precambrian age. Bachman (1960) named the structure the *Bent Dome* and described it in some detail as part of the Pedernal landmass.

A light-gray quartzite is the principal rock type. In the sample examined in this study, the quartzite contained almost no lithic or feldspathic debris. No metamorphic minerals were seen and shearing is lacking. The quartzite is apparently intruded (exposures are poor) by a deep-red micrographic granite porphyry. No samples fresh enough for dating could be collected, even though there are prospect pits in the granite. The quartzite is considered equivalent to the Llanoria in the Franklin Mountains. The micrographic granite, by analogy, is part of the 950 m.y. igneous activity common to the south. This is the most northerly encounter of rocks considered equivalent to the granite-rhyolite sequence.

Bachman reported cobbles of rhyolite, granite, and quartzite in the overlying Abo. This suggests that, at least locally, the Franklin Mountain Rhyolite was deposited this far north and was subsequently removed by erosion. An alternate but less likely explanation is that the rhyolite was derived from the Panhandle Volcanic Terrane in the 1100 to 1200 m.y. range.

PAJARITO PEAK

The age of the granitic rocks at Pajarito Peak has been the subject of some disagreement. Thompson (1942) thought them Precambrian as part of the Pedernal landmass. Lloyd (1949) and Motts and Gaal (1960) argued for a Tertiary age, and the outcrop is so shown on the State Geologic Map (Dane and Bachman, 1965).

Kelley (1968) recently described the geology of Pajarito Peak in detail. His conclusion is for a definitely Precambrian age, based on field relations. Our laboratory performed the isotopic ages reported by Kelley, which demonstrate a Precambrian age. Kelley generally described the alkaline rocks and no résumé is needed here. The samples we examined and dated from Pajarito Peak are of a riebeckite granite and associated syenite-quartz syenite pegmatite. The granite is composed, in volume percent, of 38.0 perthite, 25.8 quartz, 24.7 riebeckite, 4.7 aegirine, and 6.8 iron oxides and alteration material. The latter appears to replace a former femic mineral. The quartz is mostly in large, discrete, single crystals with local poikilitic inclusions of perthite and riebecktite. This texture gives the rock a porphyritic-like appearance. The syenite is fine-grained, actually a microsyenite, and is gradational with a quartz-bearing pegmatitic phase. The rock is composed of perthite and common hornblende with lesser riebeckite, pyroxene (?) alteration material, rutile, apatite, and iron oxides. Quartz occurs only in the pegmatitic phase.

At the suggestion of Frank E. Kottlowski, ages were determined on two samples from the controversial outcrop. Riebeckite from the granite yielded a K/Ar age of 1170 ± 25 m.y. and common hornblende from the pegmatitic phase an age of 1190 ± 25 m.y. An Rb/Sr age of 1135 ± 15 m.y. was obtained from feldspar from the granite.

Similar ages are not found elsewhere in this area. However, to the east, a large volume of granite and rhyolite was injected and extruded during the period 1100 to 1200 m.y. (the Panhandle igneous activity of Muehlberger et al.). The rocks at Pajarito Peak are interpreted as a local extension of this igneous activity.

The crystalline rocks are overlain by sedimentary rocks equivalent to the Permian Yeso and San Andres Formations (Kelley). Significantly, all Precambrian sedimentary rocks are absent, although they are demonstrably thick nearby. Either by nondeposition or later erosion, the thick sandstones and diabase-basalt of the DeBaca Terrane are missing. This suggests that Pajarito Peak is and has been a structural high and is part of the Pedernal landmass.

SACRAMENTO MOUNTAINS

Three small outcrops of Precambrian rocks are found south of Alamogordo, Otero County, at the base of the Sacramento Mountains escarpment. Pray (1961) described 80 feet (24 meters) of sedimentary section composed of quartzite, siltstone, and shales. These clastic rocks are cut by diabasic rocks, mostly as sills. The Precambrian sedimentary rocks have an angular discordance of about 10 degrees with the overlying Bliss Sandstone.

These rocks are similar to others found in a large north-south band in south-central New Mexico (Muehlberger and Denison, 1964; Muehlberger, Denison, and Lidiak), the DeBaça Terrane.

SAN ANDRES MOUNTAINS

The San Andres Mountains expose Precambrian rocks along an 85-mile (137- kilometer) north-south length. The sequence is complex and diverse. Kottlowski (1959) reports

> Red to gray granites, including roof-pendants of various schists and gneisses, and cut by pegmatite and diabase dikes, occur in the northern and southern parts of the mountains. From Sulphur Canyon to south of Hembrillo Canyon a thick series of metamorphic rocks is exposed including mica and quartz-feldspar schists, quartzites, amphibolites, phyllites, talc schist, talc, and dolomite, intruded by diabase and aplite dikes and by small masses of granite. Foliation of the metamorphic rocks along Hembrillo Canyon strikes N. 30-45 °W. and dips steeply westward. In places, this metamorphic series is truncated by a light-gray quartzite with bedding almost parallel to that of the overlying Bliss sandstone; however, the quartzite is cut by pale-pink aplite dikes that are truncated by basal beds of the Bliss Sandstone.

Kottlowski also notes the similarity of the quartzite to the Precambrian sedimentary rocks in the Sacramento Mountains and to samples from a well near Cloudcroft, Otero County.

Four ages have been reported from the length of the San Andres Mountain trend (Muehlberger et al.). Potassium-argon ages from micas range from 1350 to 1400 m.y., and one Rb/Sr determination on a whole rock yielded an age of 1300 ± 70 m.y. In addition, two ages were determined on a core from the Sun No. 1 Bingham (Socorro County) oil test a few miles north of the north end of the Precambrian outcrops along the San Andres trend. This granite gneiss (described by Muehlberger and Denison) gave an Rb/Sr age of 1570 ± 100 m.y. on microcline and a K/Ar age of 1350 m.y. on biotite.

Clearly, this is a different type of Precambrian complex from that exposed to the south in the Franklin Mountains. It is older and composed of a massive igneous-metamorphic complex. The igneous rock composition is dioritic to granitic, considerably more diverse than the granite of the 950-m.y. activity.

VAN HORN AREA

The rocks in the Van Horn area have been the object of excellent studies by King and Flawn (1953) and King (1965). Our dating has substantiated their field interpretation and the following is taken largely from their work. We do differ in the interpretation of the origin of some of the metamorphic rocks. What Flawn called meta-arkose is interpreted here mainly as metarhyolite.

The area may be divided into two segments. The older is exposed in the Eagle, Wylie, Van Horn, and Carrizo mountains and the southern end of the Diablo platform. The Carrizo Mountain Group is composed of quartzite, schist, phyllite, and marble overlain and intruded by metarhyolite and amphibolite. The exposed thickness in the Carrizo Mountains is reported to be as much as 19,000 feet (5800 meters) and does not appear to be repeated. In the Van Horn Mountains, the entire sequence is intruded by abundant pegmatite and is a higher metamorphic grade than the rocks to the north. The rocks of the Carrizo Mountain Group are separated from the younger rocks cropping out on the Diablo platform by the Steeruwitz overthrust.

On the Diablo platform, the lowest unit is the Allamore Formation, composed of very thick marbles with interbedded phyllite, chert, and pyroclastic volcanic rocks. The Allamore is overlain by another thick but very different unit, the Hazel Formation, which is made up of coarse-grained conglomerate and sandstone. The Van Horn Sandstone rests with angular unconformity on these older metasedimentary units and is of probable Late Precambrian age. Bliss(?) Sandstone overlies parts of these units in the Diablo platform area, but the Carrizo Mountain Group is overlain by Hueco Limestone (Permian).

Wasserburg et al. determined a number of ages on rocks and minerals from the Van Horn area. There is considerable variation in the apparent ages, but the oldest center around 1000 m.y. We interpret this to be near the time of metamorphism. We have determined seven whole rock ages on the metarhyolites. Only one of these (No. 759) falls into the 1000-m.y. range; the others are distinctly older. The youngest sample is very muscovitic. The muscovite was formed during metamorphism and indicates that during the addition of water to form muscovite, a closed system was not maintained. A least-squares cubic fit of an isochron using the six older ages yields a best age of 1238 ± 65 m.y. with an initial ratio of 0.7002 ± 0.0058. The error is high and the scatter considerable (fig. 2). We are not confident that the determined age is actually the age of formation because of the scatter; however, it is clear the metarhyolites have an age of formation substantially older than similar rocks in the Franklin Mountains.

A feldspar was separated from a rhyolite dike (?) that cuts the Allamore. This rock is unmetamorphosed and distinctly different from other rhyolitic rocks in this area. The determined age is 950 ± 14 m.y., identical to the Franklin Mountain rhyolites.

Thus, the rhyolites of the Carrizo Mountain Group were formed at about 1250 m.y. and metamorphosed about 1000 m.y. The faulting and deformation that thrust the Carrizo Mountain Group over the Allamore–Hazel sequence is probably contemporaneous with the metamorphism. A postmetamorphic dike (?) rock yields an age of 950 m.y.

Granite and rhyolite boulders reported in the Hazel Formation (King *in* King and Flawn, p. 84) have not been dated. These cannot be derived from the Pump Station Hills–Hueco Mountains, as suggested by King, because this terrane is too young. However, these granitic rocks could be

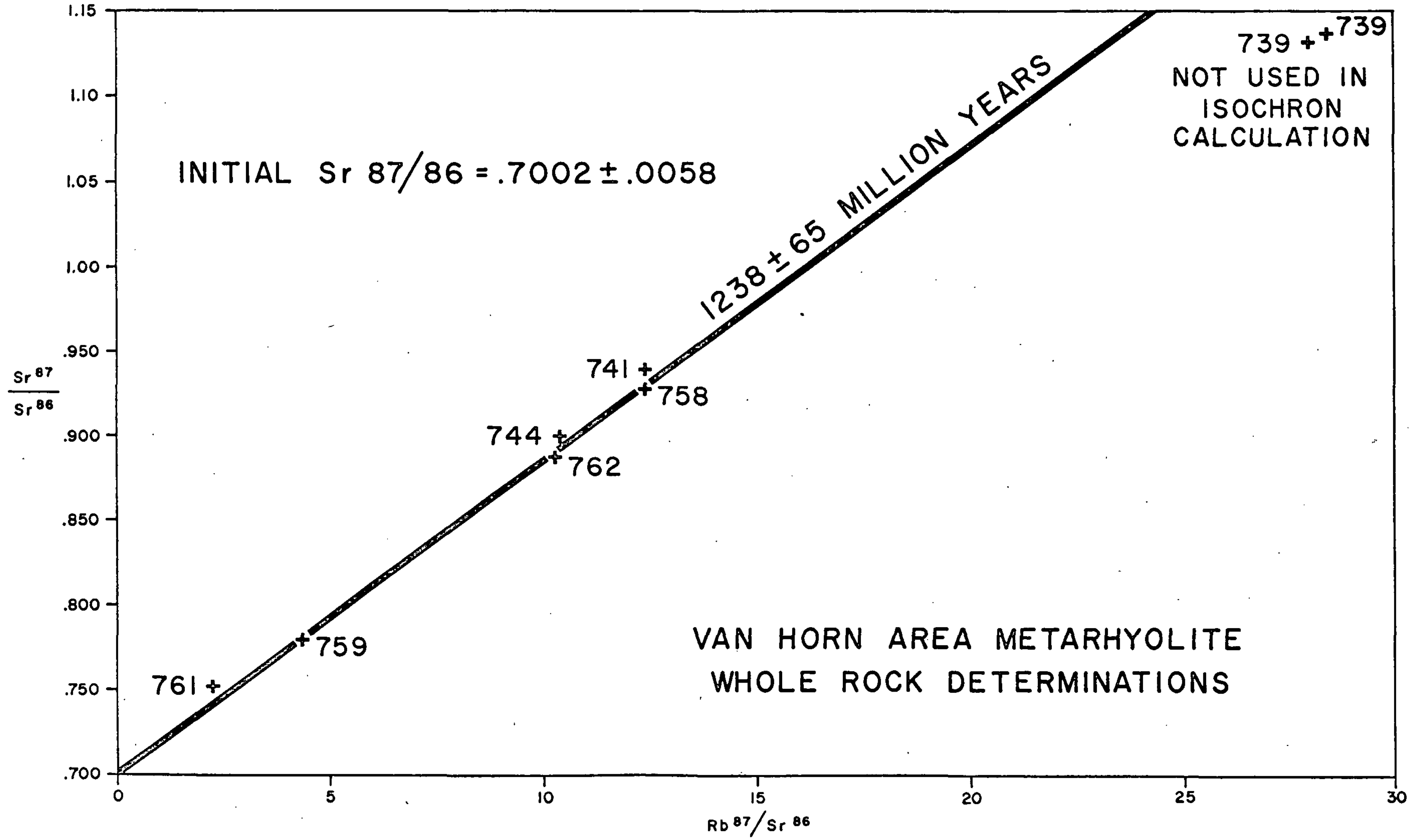


Figure 2

An Isochron Plot of whole rock determinations from the Metarhyolite in the Carrizo Mountain Group derived from the 1100 to 1200 m.y. terrane reported by Muehlberger et al. (p. 5422). The actual spread of ages in the volcanic rocks in this 1100 to 1200 m.y. terrane does not preclude the possibility that the Carrizo Mountain metarhyolite is related to some of those in the Panhandle area.

Unresolved problems remain in the Van Horn area. Perhaps the most puzzling is the difference in general strike of units in the Carrizo Mountain Group and those of the Hazel–Allamore sequence. This is best shown on King's (1965) map of the Sierra Diablo region. The dominant strike direction north of the Steeruwitz Fault is nearly east-west; south of the fault it is about N. 60° E. There is an interval covered by Van Horn and younger units, and there could be a general wrapping around of units beneath the two to three miles of cover. The lineations in the metarhyolite appear to be closer to the structural direction found to the north of the Steeruwitz Fault. In any event, the suggestion is that the Carrizo Mountain Group has undergone more than one period of major deformation. The area has been used as an example of major left lateral (Moody and Hill, 1956) and right lateral (Muehlberger, 1965) fault. The arguments are based on geometry, and specific support for the contentions is sparse.

SUBSURFACE

Scattered wells drilled to basement lie within the study area. Basement rocks from some of these wells have been described (Flawn, 1956; Foster, 1959; Muehlberger and Denison). Several basement rock units have been discussed and named by Muehlberger, Denison, and Lidiak. Much of the discussion to follow is taken from these works, particularly Muehlberger and Denison.

The oldest rocks in the subsurface are believed to be equivalent, in part, to those in the San Andres Mountains. Muehlberger, Denison, and Lidiak named these rocks the *Chaves Granitic Terrane.* The rocks penetrated are granitic in composition but diverse in petrography. Granites and granodiorites, some with a well-defined gneissic fabric, are the most common rock types. The only age determined on basement rocks of this terrane was from a biotite granite from the Humble No. 1 Huapache Unit oil test in sec. 35, T. 23 S., R. 22 E., Eddy County. The biotite yielded an age of 1310 ± 20 m.y. and the feldspar 1350 ±m, 20 m.y. This compares favorably with the outcrop ages from the San Andres Mountains. It is believed that some of the gneisses may be substantially older (possibly 1600 m.y.), becoming metamorphosed at about 1350 m.y. This unit is the basic framework rock, into which and onto which younger units were deposited or intruded, for much of southeast New Mexico.

The granite and related pegmatite dated at Pajarito Peak represent a basement rock unit that has not been drilled in the study area. However, numerous basement wells have penetrated petrologically related rock with the same ages in southeastern New Mexico, mainly in eastern Chaves and Eddy counties and Lea County. The unit is not yet named.

The vast majority of the map area shown in Figure 3 is underlain by rocks of the DeBaca Terrane. In the north, the rocks are argillites and feldspathic quartzites with interbedded basalts and are intruded by diabase. However, beginning with a line running east-west through central Otero County, carbonate rocks become a commonly drilled rock type.

The Turner No. 1 State in sec. 36, T. 25 S., R. 16 E., Otero County, drilled 2135 feet (651 meters) of altered diabase, talc-tremolite marble, quartz syenite, and micrographic granite porphyry. Nineteen intervals were examined petrographically in the drilled sequence. The similiarity between this and the section exposed in the Franklin Mountains is remarkable. In the LeFores No. 1 Federal oil test, sec. 22, T. 21 S., R. 16 E., wollastonite marble has been described by Muehlberger and Denison.

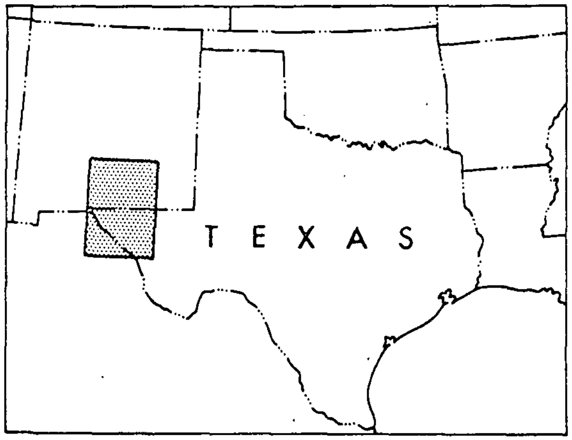
In southern Otero County and in Texas, the majority of wells penetrated rhyolite or micrographic granite. The only age determined from these rocks is on feldspar from the Gulf No. 1 Burner State in Hudspeth County. This fraction from a micrographic granite porphyry yielded an age of 890 ± 20 m.y. The age is younger than expected and may be due to alteration in the feldspar. In any event, we interpret these granites and rhyolites as equivalent to those cropping out in the Franklin and Hueco mountains and Pump Station Hills.

PRECAMBRIAN HISTORY

The oldest rocks exposed in this area are in the San Andres Mountains where micas from igneous rocks yield ages of 1350 to 1400 m.y. A suggestion of relict older ages of about 1600 m.y. is present, but how extensive these older rocks (later metamorphosed at 1350 to 1400 m.y.) are is not known. The metasedimentary rocks in this linear outcrop belt are not recognized in any of the wells penetrating basement in this area. These older layered rocks may be equivalent to the sequence found in the Los Pinos–Manzano mountains. The gneisses form the framework for all younger Precambrian units. These younger rocks are a veneer of sediments with locally significant intrusions.

To the south in Hudspeth and Culberson counties, the Carrizo Mountain Group was deposited and extruded. The exact time interval this took place is not so straightforward as might be hoped. Our best age of 1240 ± 65 m.y. on the age of extrusion of the rhyolite overlying sedimentary rocks shows they are significantly older than a comparable sequence in the Franklin Mountains. The former extent of this sedimentation and volcanic activity is not known, but it certainly extended considerably to the north of the present limited outcrop area. The inexactness of a best age for the rhyolite extrusion opens the door for speculation of its possible "real" age. The only other thick metasedimentary sequence fairly close at hand is that in the San Andres Mountains; this would require the rhyolite age to be lowered very significantly, probably ten or fifteen percent

BASEMENT GEOLOGIC MAP OF FAR WEST TEXAS AND SOUTH CENTRAL NEW MEXICO



INDEX MAP

EXPLANATION

- 950 M.Y. — FRANKLIN MTN. IGNEOUS ROCKS
- 950-1000 M.Y. — DEBACA TERRANE
- 1150 M.Y. — GRANITE AND SYENITE
- ~1250 M.Y. — CARRIZO MOUNTAIN GROUP
- 1350 M.Y. & OLDER — CHAVES GRANITIC TERRANE
- o² WELL REACHING BASEMENT SEE APPENDIX 2

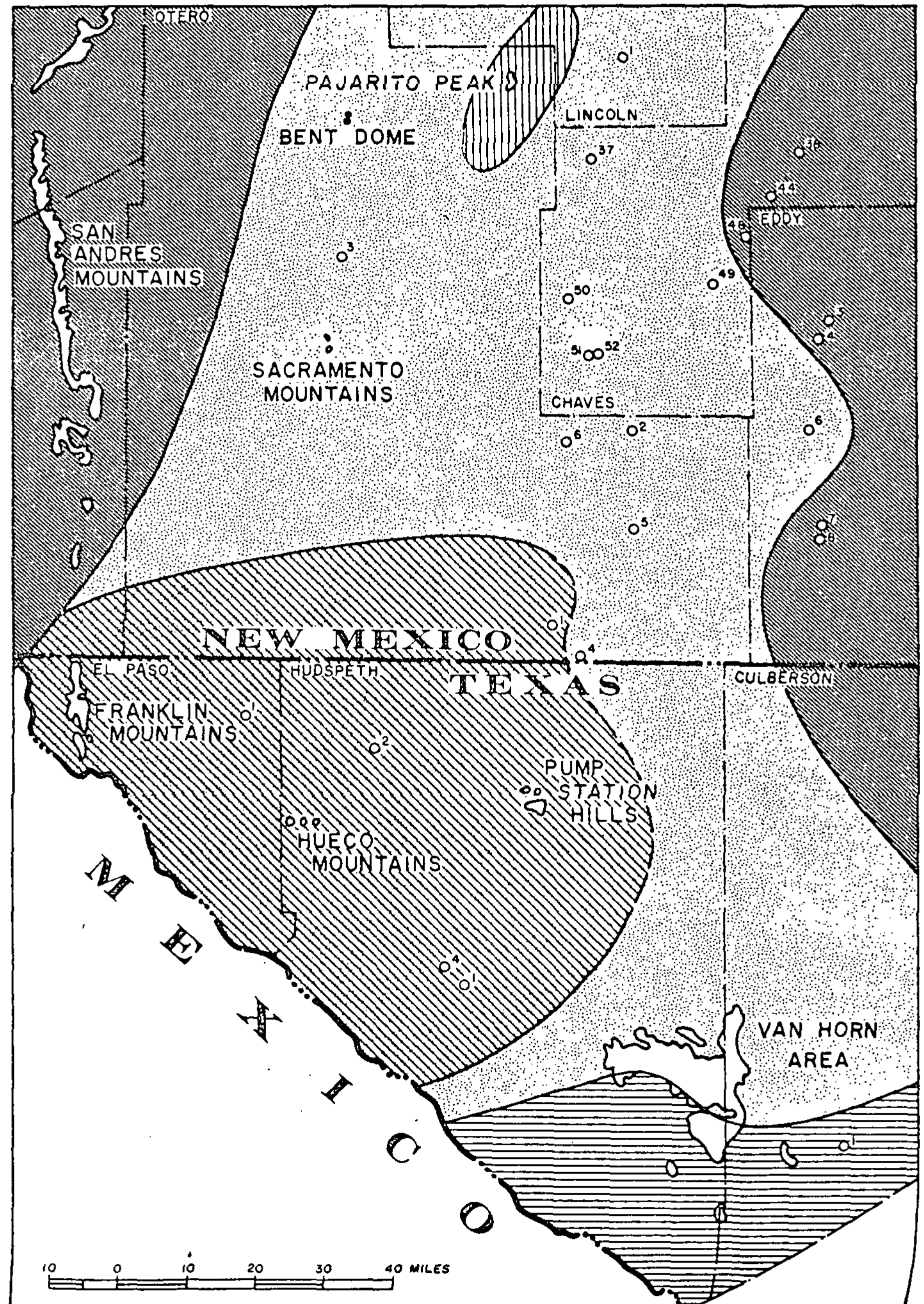


FIGURE 3

at the least. On the basis of our experience and considering the data, we believe this unlikely.

The isotopic ages determined on the rocks at Pajarito Peak in Otero County are interpreted to separate these rocks from those surrounding them. No trace of the 1140 to 1180 m.y. age or rock type can be found in the subsurface surrounding the Peak. The age is common to the east in eastern Eddy, Chaves, and Lea counties. We interpret this outcrop to be the westernmost known occurrence of this rock age in southern New Mexico. The outcrop is also significant because all the younger Precambrian sediments of the DeBaca Terrane are absent, whereas they are demonstrably thick nearby. Thus, by nondeposition or, more likely, by erosion during the lower Paleozoic, these sediments are no longer present from this structural high. Probably part of the Pedernal uplift affected sedimentation during Late Paleozoic time.

The period of 950 to 1000 m.y. saw the last major Precambrian activity. This is manifested in a variety of ways. The lowest stratigraphic unit that can be demonstrated is a carbonate rock sequence, the Castner–Allamore Marble. What these marbles rest upon or are underlain by is not known, for the base is nowhere exposed. This thick carbonate rock deposition was accompanied locally by diabase intrusions and basic volcanic rocks. The carbonate rocks were followed by a thick clastic sequence of variable composition. Pure sandstones, arkoses, shales, and conglomerates are found in the subsurface DeBaca Terrane, Hazel Formation, and Llanoria Quartzite. Diabases and basalts are common in the subsurface DeBaca Terrane but are not found on the outcrop in the Hazel–Llanoria. Movement had already begun in Hazel time, as evidenced by the abundant clasts of Allamore in the conglomerates of the Hazel Formation. This movement culminated with essentially synchronous igneous intrusions with pegmatite formation. The movement led to the Steeruwitz thrust with the older Carrizo Mountain Group rocks and associated younger intrusions being ramped over the Hazel–Allamore sequence.

To the west in the Franklin Mountains, activity was far less intense. Conglomerates present in the Llanoria are relatively minor. Widespread rhyolites were extruded, probably many of which were welded tuffs. The rhyolites provided a cover for the intrusion of comagmatic granites. This igneous activity was passive and relatively dry, as talc is sparse or absent in the Castner but diopside is common. A significant shearing component is not reflected in the metasedimentary sequence; the rocks are simply converted to hornfels.

To the north, the rocks of the DeBaca Terrane were being deposited. These were mostly impure sandstones and shales with abundant diabase and basalt. Limestones are not penetrated north of a line through central Otero County, probably through nondeposition. North of this arbitrary line, the rocks are characteristically unmetamorphosed. This reflects the absence of major igneous activity equivalent to that in the Franklin Mountains. The exception is at Bent Dome where a quartzite similar to the Llanoria is intruded by a finely micrographic granite. However, intrusions do not appear to be common, and the rocks of the DeBaca Terrane are only locally converted to hornfels but not regionally metamorphosed. The Franklin Mountain granite-rhyolite sequence is easily separated from the other rock units on the basis of petrography and age; however, it is difficult to define in terms of areal distribution. It is shown on the basement rock map as a distinct area, but one should recongize that this represents only that part of Texas and New Mexico where the granite-rhyolite sequence is most likely to occur. Areas outside that shown may be covered by rhyolite or have breached granite intrusions on the basement surface that are Franklin Mountain equivalents. Conversely, areas within the mapped area may have Van Horn Sandstone covering the rhyolite or granite, or the rhyolite may be removed by erosion to expose the underlying DeBaca Terrane.

The period between 950 m.y. and the Cambrian was marked by some differential movement and erosion that exposed the more deeply emplaced granites. The amount of uplift, folding, and faulting during this period is relatively small, as evidenced by the roughly conformable or mildly disconformable relationship between lower Paleozoic and the Precambrian layered sequences in the Franklin, Sacramento, and San Andres mountains.

CONCLUSION

This area, about 180 miles (290 kilometers) long and 130 miles (210 kilometers) wide, is one of the best in the United States to show very close correspondence between scattered Precambrian outcrops and intervening basement control from drill holes. The basement evolution can be developed using petrography and geochronology, though not so precisely as might be hoped in every instance. We believe any vagueness can be resolved by further, detailed work. The two main problems not resolved to our satisfaction are the possible "real" age of extrusion-deposition of the Carrizo Mountain Group and the complex San Andres Mountain Precambrian sequence, about which very little is known.

ACKNOWLEDGMENTS

We wish to thank Mobil Research and Development Corporation for allowing us to pursue these interesting problems and to publish the results. Many of the subsurface samples were obtained through William R. Muehlberger from The University of Texas basement-rock collection. Most of the surface samples were collected with the aid of David W. Greenlee of Mobil's Midland Division. William N. McAnulty and David V. LeMone generously conducted the senior author through the Fusselman Canyon area. Frank E. Kottlowski of the New Mexico Bureau of Mines and Mineral Resources collected the sample from Pajarito Peak and offered welcome advice on collecting in other parts of New Mexico.

TABLE 1. Rb/Sr AGES FOR SAMPLES IN FAR WEST TEXAS AND SOUTH-CENTRAL NEW MEXICO (cont)

NO. FRAC-TION	Rb (ppm)	Sr (ppm)	Rb/87 Sr 86	Sr87 Sr86	AGE	ROCK TYPE AND LOCATION
*770F	118.5	127.6	2.68	0.7475	990±50	Quartz syenite, pyroxene bearing. Dam spillway at base of Fusselman Canyon
788W	126.1	145.77	2.50	0.7420	915±50	Rhyolite porphyry. Middle part of the Franklin Mountain Rhyolite in Fusselman Canyon
789W	179.4	21.5	24.1	1.032	905±20	Rhyolite porphyry. Upper part of the Franklin Mountain Rhyolite on western dip slope opposite Fusselman Canyon
789F	375.7	21.2	51.2	1.430	950±15	
1064F	929.1	11.1	241.4	4.060	935±15	Granite. East of Tom Mayes Park at prospect pit in narrow part of Canyon
1063W	263.7	15.7	48.5	1.407	970±20	Metarhyolite porphyry. East of Tom Mayes Park east of sample 1064
1065F	442.3	2.67	477.5	7.378	980±15	Granite. McKelligon Canyon about 1000 m from end of road on southwest side of road
1066W	216.5	26.1	23.9	1.030	910±20	Metarhyolite porphyry. McKelligon Canyon near the end of the road at head of canyon
1066F	323.5	55.1	16.9	0.9452	940±15	
830F	446.5	27.1	47.6	1.394	970±15	Granite. Tin Mine locality about 2 miles north of North Franklin Mountain
					VAN HORN AREA	
739W	22.4	22.9	28.0	1.132	1040±40	Metarhyolite porphyry. Carrizo Mountains 3800′ N 30° 02′30″ N
	218.7	22.3	28.4	1.137	1040±40	5500′W of 105°55′W. The sample is highly muscovitic
741W	157.5	36.8	12.4	0.9381	1290±60	Metarhyolite porphyry. Carrizo Mountains, 4100′ N 31° 82′ 30″ N, 7200′W of 105° 55′ W
744W	178.1	49.7	10.4	0.8997	1290±80	Metarhyolite porphyry. Carrizo Mountains, Gifford-Hill Quarry 8500′N 30° 02′ 30″N, 1000′ W 105° 57′
748F	326.0	38.5	24.4	1.051	950±15	Rhyolite porphyry. Sierra Diablo, 10080′N 30° 5′, 3800′E 105° 2′30″ W. The sample is related to Franklin Mountain samples and is a dike in the Allamore Formation
758W	168.3	39.3	12.4	0.9275	1240±60	Metarhyolite porphyry. Carrizo Mountains, 900′N 31° 2′30″ 5300′ W 104° 57′ 30″
759W	122.3	80.8	4.36	0.7793	1220±200	Metarhyolite porphyry. Carrizo Mountains same location as 758

TABLE 1. Rb/Sr AGES FOR SAMPLES IN FAR WEST TEXAS AND SOUTH-CENTRAL NEW MEXICO (cont)

NO. FRAC-TION	Rb (ppm)	Sr (ppm)	Rb/87 Sr 86	Sr87 Sr86	AGE	ROCK TYPE AND LOCATION
761W	33.4	43.3	2.23	0.7520	1640±450	Metarhyolite porphyry. Wylie Mountains, location C-5 on the map of Flawn (in King and Flawn, 1953)
762W	137.7	38.6	10.3	0.8753	1140±100	Metarhyolite porphyry. Wylie Mountains, same as 761
				PAJARITO PEAK		
723F	1381.	9.96	400.3	7.472	1135±15	Riebeckite granite. Pajarito Peak, on boundary of sections 25 and 26 12S-15E, Otero County, New Mexico
				SUBSURFACE		
600F	372.7	44.3	24.3	1.008	840±15	Micrographic granite. Gulf No. 1 Burner State, Hudspeth County, Sec. 14. Blk. 19, PCL Sur., core at 9222′
607F	263.2	249.6	3.04	0.7674	1350±30	Granite. Humble No. 1 Huapache, Eddy
607B	634.8	11.7	156.7	3.767	1310±20	County, 35-235-22E. Core at 12616′

*F = feldspar

TABLE 2. K/Ar AGES FROM AMPHIBOLES AT PAJARITO PEAK, OTERO COUNTY, NEW MEXICO

SAMPLE NO.	SAMPLE WT (gms)	PERCENT K	Ar 40* MOLES X10-9	Ar 40* Ar 40 TOTAL	AGE	ROCK TYPE
723	0.158	1.391	0.631	0.97	11.70 25	Riebeckite granite
724	0.167	1.297	0.641	0.95	1190 25	Syenite pegmatite

TABLE 3. ROCKS OF THE FRANKLIN MOUNTAINS AND VAN HORN AREA

AGE (m.y.)	FRANKLIN MOUNTAINS	VAN HORN AREA	SUBSURFACE LITHOLOGY
–950	----	VAN HORN SANDSTONE	----
	GRANITE	GRANITE AND PEGMATITE	GRANITE
	RHYOLITE	RHYOLITE INTRUSIVES	RHYOLITE
	LLANORIA QUARTZITE	HAZEL FORMATION	QUARTZITE
950-1000		POSSIBLY REPRESENTED BY	
	MUNDY BRECCIA	BASIC VOLCANIC ROCK	DIABASE
		IN THE ALLAMORE	
	CASTNER MARBLE	ALLAMORE	MARBLE
1250	----	CARRIZO MOUNTAIN GROUP	SCHIST

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APPENDIX A

ANALYTICAL PROCEDURES

The strontium measurements were determined on a 13-inch radius, 60-degree magnetic sector, 15.8-inch radius, 91-degree electric sector, second order double-focusing mass spectrometer.

The rubidium measurements were made on a symmetric 6-inch, 60-degree, single-focusing Nier-type mass spectrometer. Separate strontium measurements were made on spiked and unspiked aliquots. The unspiked strontium 87/86 measurements were normalized to Nier's value of Sr^{86}/Sr^{88} = 0.1194. Separations were made on an ion-exchange column and identified by using Sr^{85} and Rb^{83} tracers. The analytical precision based on replicate analysis is estimated to be ± 0.2 percent for isotope ratio measurements and ± 1 percent for both Rb and Sr concentrations. Our results compare favorably with published standards (*see* Lanphere and Dalrymple, 1967).

The argon measurements were made on a 4.5-inch Reynolds-type mass spectrometer. The samples were fused by induction coil heating in tungsten or columbium crucibles and purified through (1) dry ice, (2) copper oxide at 600°C. (3) liquid nitrogen, and (4) calcium at 900°C and then absorbed on charcoal at liquid-nitrogen temperature in a break seal. A typical blank is about 10^{-11} moles of atmospheric argon; the best are about 4 x 10^{-12} moles.

The constants used to compute the ages are

$$Rb^{87}\ \lambda_{\beta} = 1.47 \times 10^{-11}/\text{yrs}$$
$$Rb^{87} = 0.283\ \text{gm/gm Rb}$$
$$K^{40}\ \lambda_{\varepsilon} = 0.585 \times 10^{-10}/\text{yrs}$$
$$\lambda_{\beta} = 4.72 \times 10^{-10}/\text{yrs}$$
$$K^{40} = 1.22 \times 10^{-4}\ \text{gm/gm K.}$$

APPENDIX B

The following are brief summaries of samples drilled to basement in the areas shown in Figure 1. The wells are numbered within each county. The numbers in New Mexico are the same as those used by Foster and Stipp (1961). The Texas numbers follow Flawn with additions for newer wells.

CULBERSON 1

Cosden No. 1 Cockrell, sec. 7, blk. 80, PSL Survey. Cuttings at 3210 to 3356 ft. The rock is fine-grained biotite granite gneiss, most of which is composed of microcline, plagioclase, and quartz in a granoblastic mosaic varying in grain size. Fresh olive-green biotite books show a high degree of preferred orientation parallel to grain size banding. It is interpreted as a metaigneous rock of granitic composition. Possibly, it is equivalent to the metarhyolites of the Carrizo Mountain Group, but petrographic evidence is unclear. In any event, the rock is interpreted as being related to the Carrizo Mountain sequence.

EL PASO 1*

Jones No. 1 Sorely, sec. 17, blk. 5, PSL Survey. Flawn (p. 155) reported a quartz diorite in cuttings from 2213-20 ft. The descriptions suggest a rock similar to some found as intrusions within the Castner Marble, but certain differences are apparent and no definite correlation can be made.

HUDSPETH 1*

American Land No. 1 Roseborough, sec. 7, blk. 21, Tws 6, PSL. Flawn (p.167) examined cuttings from two intervals, 1600-10 ft. and 1625-1787 ft., and described a rhyolite porphyry. The rhyolite is interpreted here as being equivalent to the Franklin Mountain Rhyolite.

HUDSPETH 2*

California No. 1 Theison, sec. 19, blk. E. Univ. Lands. Flawn (p. 169) described a micrographic granite in cuttings from 4844-48 ft. The well was drilled about 20 miles north of granite cropping out in the Hueco Mountains. The granite described in the well is interpreted as equivalent to that in the Hueco and Franklin mountains.

HUDSPETH 4

Gulf No. 1 Burner State, sec. 14, blk. 19, PSL. A core taken at 9222 ft. is a micrographic granite porphyry. The feldspar yielded an age of 840 ± 15 m.y., which is below the age of granites of the Red Bluff type. However, petrographic similarity prompts us to consider it equivalent to the granite in the Hueco and Franklin mountains. The age is possible too low because of alteration in the feldspar.

CHAVES 3‡

Humble No. 1 State N, 35-14S-17E. Muehlberger and Denison described five intervals from 2610 to 4010 ft. The well penetrated a sequence of quartzite, arkose, and olivine basalt, which comprise part of the DeBaca Terrane.

CHAVES 38‡

Magnolia No. 1 Turney, 23-14S-22E. Four intervals from 4920 to 5340 ft. were described by Muehlberger and Denison. The well penetrated diabase and a gneissic granitic rock. The petrography is not clear-cut, but the granitic rock is probably part of the Chaves Granitic Terrane and the diabase probably equivalent in age to those in the DeBaca Terrane.

CHAVES 44 ‡

Humble No. 1 Gorman, 30-15S-22E. An interval at 5805-25 ft. is in a banded granitic gneiss, part of the Chaves Granitic Terrane.

CHAVES 48 ‡

Black No. 1 Shildneck, 24-16S-20E. Four intervals from 6740 to 6990 ft. were examined. The upper interval penetrated a granite gneiss, the lower three were in diabase. The gneiss is part of the Chaves Granitic Terrane; the lower diabase is probably equivalent to those in the DeBaca Terrane.

CHAVES 49 ‡

Magnolia No. 1 Black Hills Unit, 31-17S-20E. Three intervals from 5915 to 6085 ft. penetrated quartzitic and arkosic sandstones and argillaceous siltstones of the DeBaca Terrane.

CHAVES 40‡

Gulf No. 1 Chaves "U", 10-18S-16E. One core interval at ±

* Described by Flawn, but the interpretation here does not necessarily agree.
† Described by Muehlberger and Denison.
‡ Described by Flawn and by Muehlberger and Denison. Those not marked are described here for the first time.

3100 ft. was interpreted as an enigmatic, slightly metamorphosed rock of clastic sedimentary origin by Muehlberger and Denison. In this interpretation, the rock would be related to those in the DeBaca Terrane.

CHAVES 51‡

Sun No. 1 Pinon Unit, 19-19S-17E. Four intervals from 1732 to 1911 ft. all penetrated altered albite andesite porphyry. The rock is probably related to those in the DeBaca Terrane.

CHAVES 52‡

Sun No. 2 Pinon Unit, 20-19S-17E. One interval at 1650-59 ft. was in a meta-albite andesite. The rock is similar to that in Chaves 51 and is related to those in the DeBaca Terrane.

EDDY 3*

Southern Union No. 1 Elliot, 24-18S-23E. One core interval at 9886-87 ft. was in a foliated granite. The rock may be simply a granite gneiss. The well penetrated part of the Chaves Granitic Terrane.

EDDY 4†

Magnolia No. 1, Tres Rancho Unit, 10-19S-23E. The only interval examined, 10,000 to 10,010 ft., was interpreted as a banded granite gneiss related to the Chaves Granitic Terrane.

EDDY 6‡

Magnolia No. 1, State "W", 16-21S-22E. Three intervals from 11230 to 11312 ft. were interpreted as a quartzite intruded by an albite diabase later metamorphosed to lower greenschist facies or hydrothermally altered. The rocks are part of the DeBaca Terrane.

EDDY 7

Humble No. 2, Huapache, 23-23S-22E. A biotite granodiorite was penetrated from 12570 to 12580 ft. The rock is petrographically very similar to Eddy 8, although somewhat different in bulk composition. The rock is part of the Chaves Granitic Terrane.

EDDY 8

Humble No. 1 Huapache, 35-23S-22E. A core taken at 12629 ft. was a biotite granite. The biotite yielded an Rb/Sr age of 1310 ± 20 m.y. and the feldspar an age of 1350 ± 30 m.y. The granite is part of the Chaves Granitic Terrane.

LINCOLN 1†

Stanolind No. 1 Picacho, 10-12S-18E. Two intervals from 2538 to 2759 ft. penetrated a feldspathic sandstone. The rock is part of the DeBaca Terrane.

OTERO 1*

Hunt No. 1 McMillan–Turner, 5-26S-[illegible]E. Two intervals from 1887 to 2060 ft. were diabase, two lower intervals from 2860 to 2170 ft. were in rhyolite porphyry. The rhyolite is probably related to the Franklin Mountain Rhyolite and the diabse to that in the DeBaca Terrane. The petrographic-geometric relationship suggests that the diabase is younger than the rhyolite, but this is not unequivocal.

OTERO 2‡

Standard of Texas No. 1 Scarp, 18-21S-1[illegible]E. Diabase was penetrated in two examined intervals from 2630-2660 ft. The rock is related to the DeBaca Terrane.

OTERO 3†

Southern Union No. 1 Cloudcroft, 5-17S-12E. Fourteen thinsections were examined in the interval from 4520 to 4702 ft. These showed a quartzite and argillaceous quartzite cut by diabase dikes. The rocks are part of the DeBaca Terrane.

OTERO 4

Turner No. 1 State, 36-25S-16E. Nineteen thinsections were examined from 3115 to 5195 ft. The sequence was diabase with alternate talc-tremolite marble intruded by a sill of granite. The well was abandoned in micrographic granite porphyry at 5195 ft. The sequence is a remarkable parallel to the lower part of the section in the Franklin Mountains.

OTERO 5

Coral No. 1 Warren, 19-23S-18E. Cuttings taken at 2300 to 2330 ft. show an olivine diabase. The rock is probably related to those of the DeBaca Terrane.

OTERO 6†

LeFores No. 1 Federal, 22-21S-16E. The well penetrated diverse metamorphic rocks. In the interval from 2230 to 2250 ft., four thinsections showed a marble with wollastonite, garnet, tremolite, and calcite. The origin of the rock is contact metamorphism of an impure limestone. The rock is probably related to the Allamore–Castner sequence.

NEW OBSERVATIONS ON THE STRATIGRAPHY OF KEY PERMIAN SECTIONS OF WEST TEXAS

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ABSTRACT

Key outcrop areas to an understanding of Permian stratigraphy of the Permian basin are the Eastern shelf, Guadalupe Mountains, Hueco Mountains, Apache Mountains, Sierra Diablo, and Glass Mountains. The basic stratigraphic framework for all these locations was established in the 1920's and 30's. Subsequent work has resulted primarily in a more detailed subdivision of the rock units, and some changes in age assignment.

Problems in the Permian still remaining are correlation between outcrop areas, shelf to basin correlation, and the position of the Permian chronostratigraphic boundaries. These problems are reviewed in the paper, and new evidence and suggestions are put forward concerning shelf to basin correlations of the Capitan Formation in the Guadalupe Mountains, the stratigraphic position and extent of the Powwow in the Hueco Mountains, and the Wolfcampian-Leonardian Series boundary in the Hueco Mountains.

INTRODUCTION

The Permian basin is an area of oil-rich Permian rocks located in southeastern New Mexico and west Texas. It is an area of some of the best exposed Permian rocks in North America. This fact led to the establishment in west Texas of the type sections of the North American Permian series by Adams, et al. (1939). For this reason and the fact they contain considerable hydrocarbons these Permian rocks have received considerable study. Much study has been of the Permian stratigraphy of the basin. This is desirable and understandable since a solid stratigraphic framework is a prerequisite to other studies such as paleotectonics. A good deal of the Permian stratigraphy of the area is known but problems still remain to be solved. One of the goals of this symposium is to review what is known and to look at some of the problems, especially those probelms relevant to correlation and position of the Permian chronostratigraphic boundaries.

The primary purpose of this paper is to summarize the basic Permian stratigraphic framework of the region that was established in the 1920's and 30's, and to update this stratigraphic framework on the basis of more recent work. Some discussion and personal observations on some of the remaining problems are also included.

The key outcrop areas (Fig. 1) to the Permian stratigraphy of the region are the Eastern shelf, Guadalupe Mountains, Sierra Diablo, Apache Mountains, Hueco Mountains, and Glass Mountains. These will be discussed in detail. For completeness less important areas, such as the Chinati Mountains, Finlay Mountains, Malone Mountains, and the Franklin Mountains, will also be mentioned. Because the majority of the Permian rocks are in the subsurface this aspect will also be discussed.

ACKNOWLEDGEMENTS

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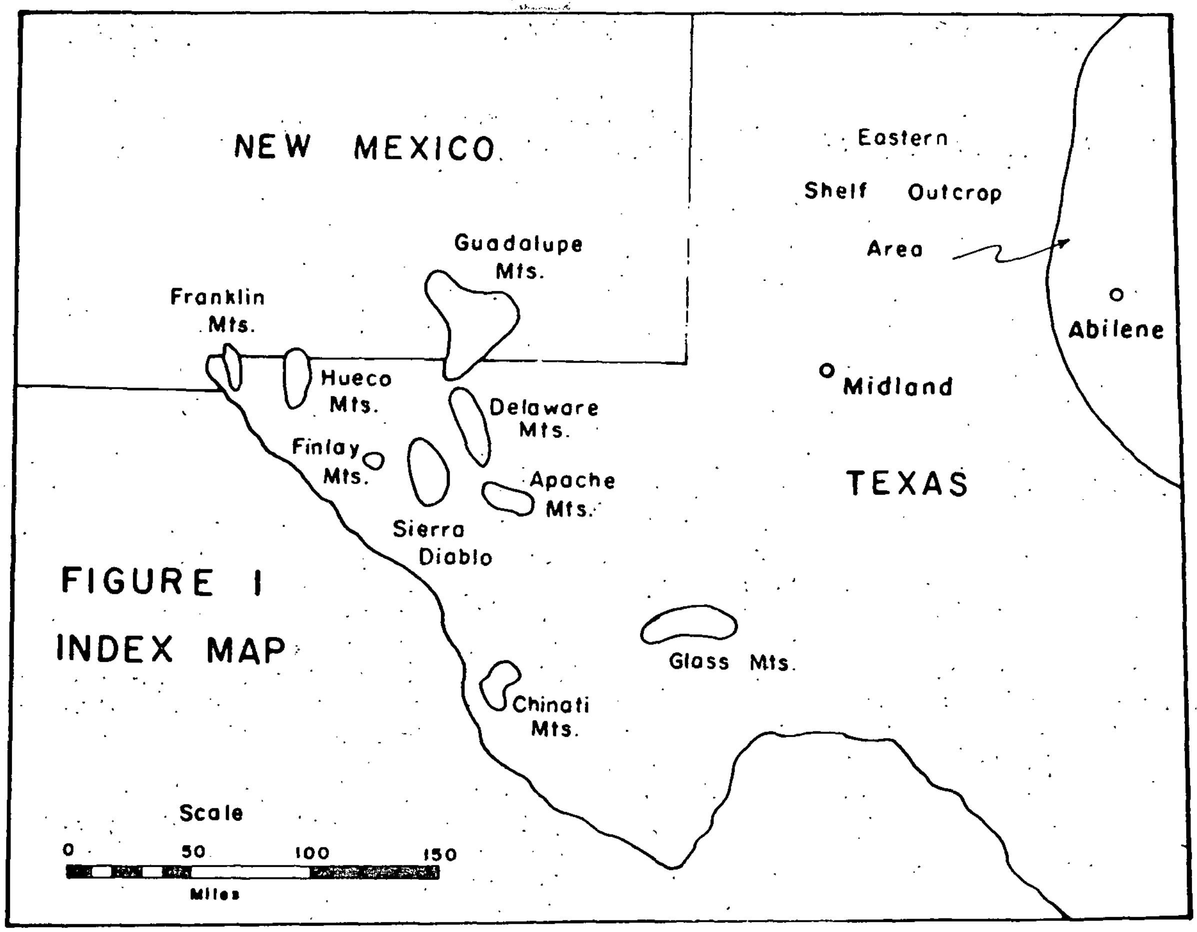
KEY STRATIGRAPHIC SECTIONS

Guadualupe Mountains. This fault block range of mountains located in Culberson County, Texas, and Eddy County, New Mexico, is most famous for its spectacular exposures (Fig. 2) of the Capitan reef complex. The stratigraphic framework of this interesting mountain range was established by King (1948) and is shown in figure 3a. Newell, et al. (1953) and Hayes (1964) made some modifications resulting in the framework shown in figure 3b. Since then, there



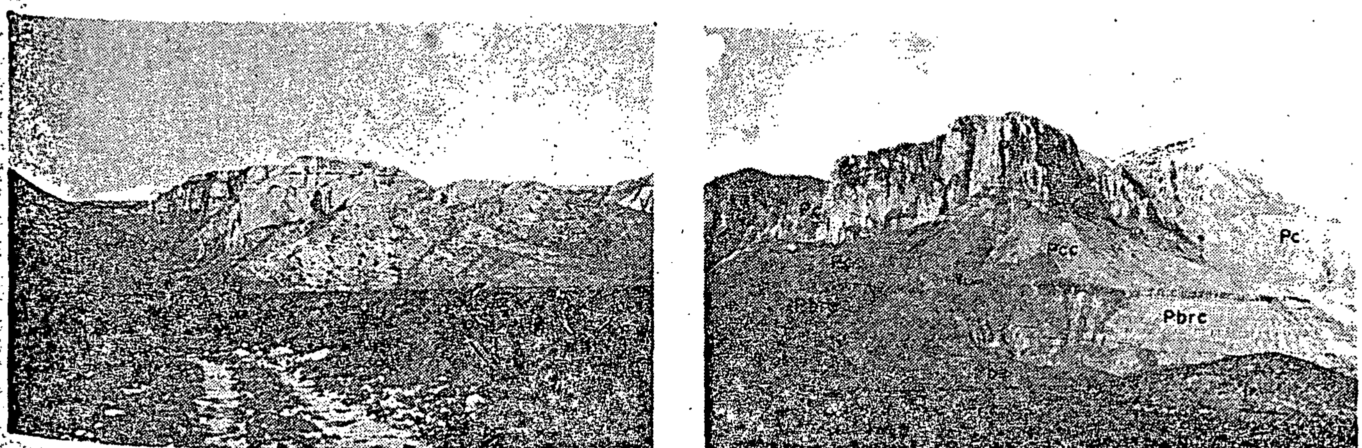


Figure 2.—Permian outcrops in the Guadalupe Mountains. The left photo shows the mouth of Big Canyon. Yates and Tansill grade into and overlie the big cliff of Capitan "massive" (reef) facies on the north side of the canyon mouth. Steep slopes below and in front of the "massive" are forereef talus. The right photo shows the spectacular El Capitan at the southern end of the range. The exposed stratigraphic units are marked on the photo as follows: Pc - Capitan, Pcc - Cherry Canyon, Pbrc - Brushy Canyon, Pbs - Bone Spring.

have been no nomenclatural changes in the basic framework.

Major stratigraphic problems existing in the Guadalupe Mountains are shelf to basin correlations. The most difficult one concerns the Cutoff Formation. Wilde and Todd (1968) Give a detailed discussion of the problem and their correlation of the Cutoff and

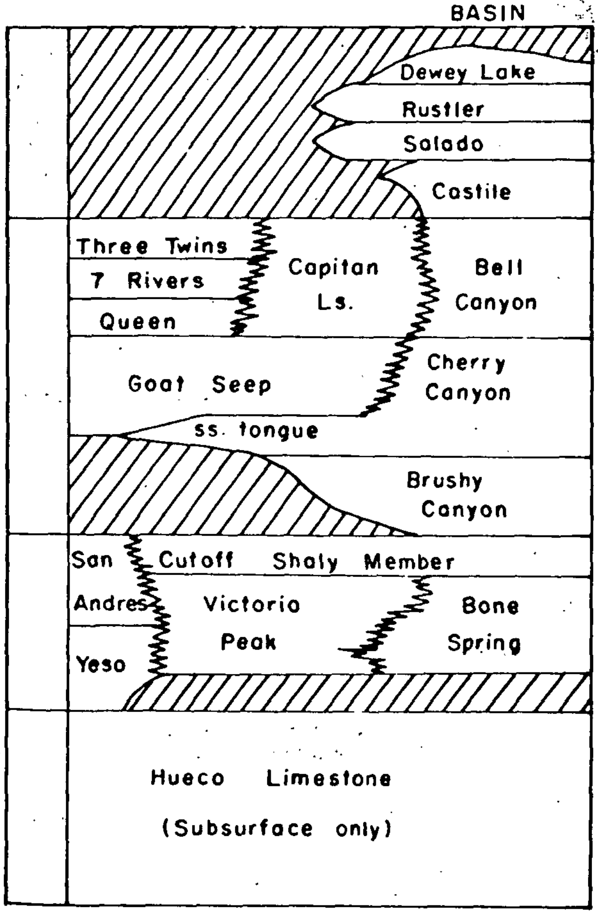


Figure 3a.—P.B. King's (1948) stratigraphic framework of the Guadalupe Mountains.

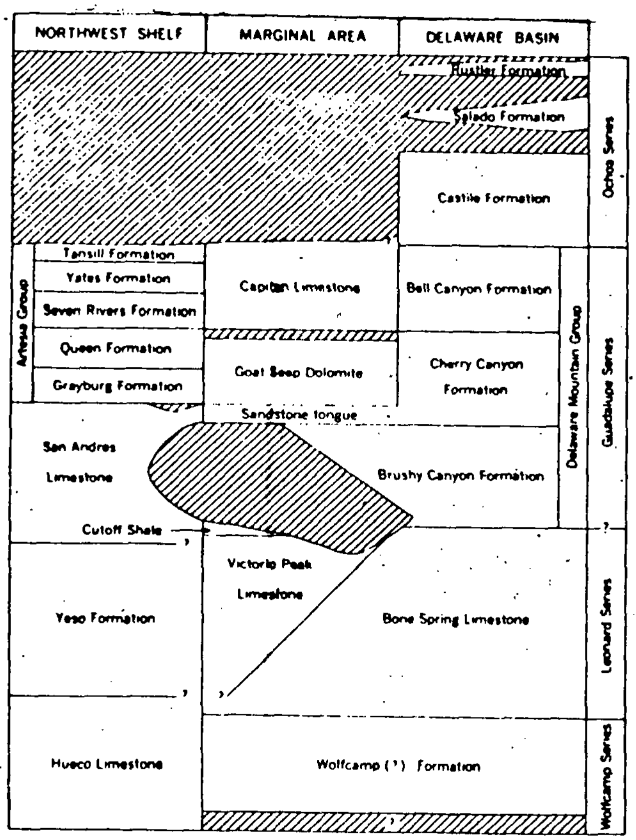


Figure 3b.—Guadalupe Mountains stratigraphic framework from Hayes (1964).

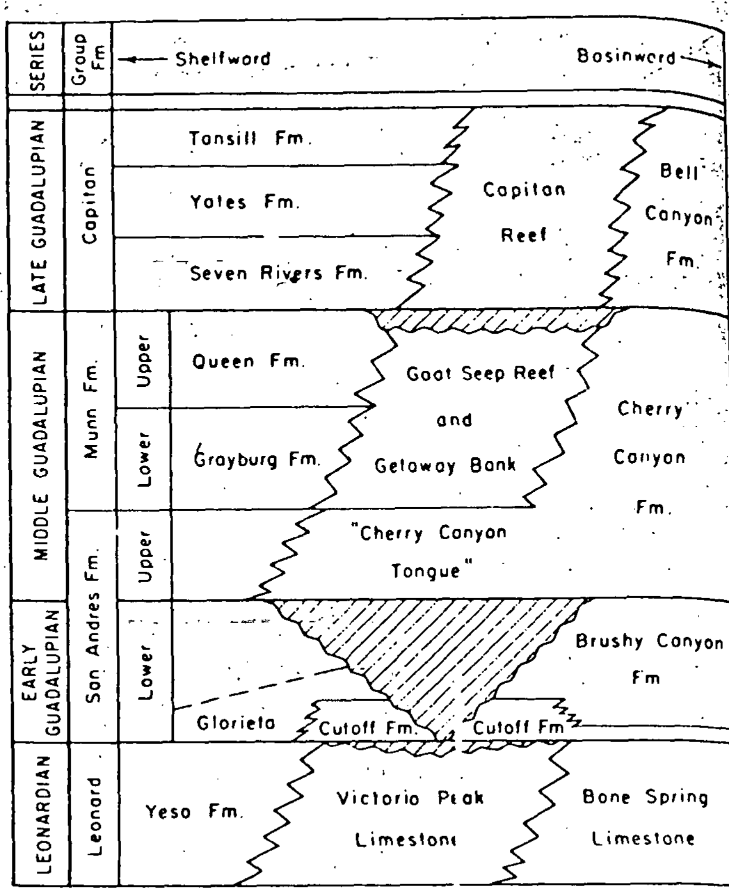


Figure 4.—Stratigraphic relationships of the Cutoff Formation (from Wilde and Todd, 1968).

related units is shown in figure 4.

Achauer (1969, figures 2 and 3) correlates the Lamar Limestone Member at the top of the Bell Canyon with the Seven Rivers Formation. This is highly questionable and results, as Cys (1971) has indicated, from the extreme difficulty in tracing beds across the big notch in the slope on the north side of the mouth of McKittrick Canyon. Tyrrell (1969, p. 83-84) presented the following fusulinid data which firmly establishes the correlation of the Lamar Member with the Tansill Formation: (1) the small Tethyan fusulinid Yabeina is present only in the basal Lamar and basal Tansill, (2) Reichelina is a common fossil in the middle and upper Lamar and middle Tansill, and (3) Paraboultonia is restricted to the upper parts of both units.

There is also strong nonpaleontological evidence to support a Tansill-Lamar correlation. On the scarp between McKittrick and Big Canyons there are exposed dip slopes of forereef talus that essentially represent a single bed or thin group of beds. One can start on the Lamar Member below the third spur north of McKittrick Canyon (Fig. 5) and trace it into the forereef beds. One can then trace these equivalent forereef beds into the reef "massive" without a break in their continuity. The interval where these beds grade into the reef is much above the upper contact of the Seven Rivers and at the approximate level of the Tansill. There are other localities (Fig. 6) in the Guadalupe Mountains where forereef dip slopes which represent a single bed or group of beds are found. In

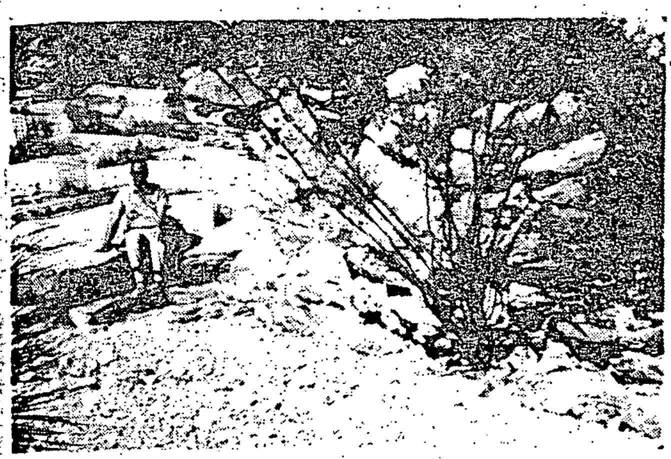


Figure 5—Stream bed below the third spur north of McKittrick Canyon. The author is sitting on thick-bedded Lamar Limestone approximately 30 yards from its transition into the forereef talus beds.

Figure 6.— The north side of the mouth of Rattlesnake Canyon. Looking down a forereef dip slope from the approximate reef-forereef contact. This slope surface follows what is essentially a single bed of forereef talus.

conclusion, a Tansill-Lamar correlation is established with both physical stratigraphic and biostratigraphic evidence.

To the east of the Guadalupe Mountains in the Rustler Hills and surrounding area of the Delaware basin is an evaporite and red bed sequence divided into the Castile, Salado, Rustler, and Dewey Lake Formations. Two major problems are associated with this sequence.

The first is the relationship of the Castile to adjacent stratigraphic units. Because the deposition of its evaporites represented a sharp break and radical change in sedimentation the Castile has been interpreted to have a disconformable onlap relationship to the underlying Bell Canyon and Capitan. However, Wilde (written communication, 1975) believes the Bell Canyon-Castile contact to be transitional; at least in the Seven Heart Gap area of the Apache Mountains where he has examined the contact. In addition, a recent core of the contact from a well in Winkler County, Texas, shows a definite transition zone of a few feet between the Bell Canyon and the Castile (Mary Louise Rhodes, oral communication, 1975). I have examined photographs and descriptions of the core and agree with the interpretation. Thus, it appears that the Bell Canyon-Castile contact is transitional with the very important implication that the Castile evaporites may be of deep water origin.

The Castile has no shelf equivalents and onlap to a zero edge against the Capitan reef. Newell, et al. (1953, p. 47) did suggest the basal calcareous beds of the Castile were equivalent to the uppermost Tansill Formation. However, Tyrrell (1969, p. 84) has shown that the uppermost (post-Ocotillo) Tansill beds are equivalent to unnamed post-Lamar forereef limestone tongues present at the basin margin immediately underlying the Castile. These tongues grade basinward into a thin post-Lamar siltstone at the top of the Bell Canyon.

The second problem involves the Ochoan Series. Adams, et al. (1939) defined this series using the Castile-Salado-Rustler-Dewey Lake sequence as its type section. The problem is in the fact that the type Ochoan section does not contain a diagnostic fauna that is usable for correlation. The only fossils that have been described from this section are some undiagnostic Upper Paleozoic invertebrates present in a thin dolomite in the Rustler (Walter, 1953). The top of the Ochoan Series is also marked by an unconformity. In North America, because the Ochoan is the only post-Guadalupian series, it is possible to assign beds outside its type area to it on the basis of stratigraphic position. That is, in a stratigraphic sequence beds that occur above the highest definite Guadalupian can be assigned to the Ochoan. In Europe and Asia the post-Guadalupian is assigned to the Dzhulfian Series (stage of some authors) which is additionally subdivided into two or three stages (substages), depending upon which invertebrate group is used as the basis for correlation. It is evident that the Ochoan and Dzhulfian are at least partially equivalent. How much of the Dzhulfian and to which of its stages is the Ochoan equivalent? No one knows positively because of the lack of diagnostic fossils in the type Ochoan. Because of the fairly rapid deposition of its strata and the pre-Triassic unconformity at its top, the Ochoan is not equivalent to the entire Dzhulfian. Obviously, what is needed is the discovery of an undoubted Ochoan section in North America containing a diagnostic fauna. This could then be delineated as a reference section and utilized for regional and worldwide correlations. Perhaps, palynological studies of the type Ochoan would yield some meaningful biostratigraphic data.

Sierra Diablo-Apache Mountains. The Sierra Diablo is a block-faulted mountain range that contains excellent Wolfcampian and Leonardian exposures (Fig. 7). The Apache Mountains is across the valley to the east of the southern Sierra Diablo and is composed chiefly of Guadalupian rocks. Thus, the two ranges are complementary to one another and form a single "study

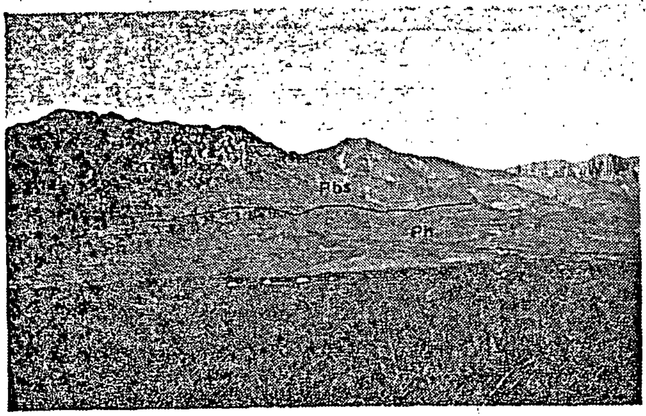


Figure 7—Victorio Peak in the Sierra Diablo. Corn Ranch is in the foreground with the massive Kriz Lens behind it. These excellent outcrops are typical of those found in the range. Stratigraphic units are marked on the photo as follows: Pvp - Victorio Peak, Pbs - Bone Spring, and Ph - Hueco.

unit". For this reason they are discussed as a single entity.

The stratigraphic framework of the Sierra Diablo was established by P.B. King in the 1930's, but not published in detail until 1965. That of the previously little known Apache Mountains was not fully established until the detailed work of Wood (1968). The stratigraphic framework of both ranges is shown in figure 8. Because the strata in both ranges are continuations of those to the north in the Guadalupe Mountains the problems pertinent to both ranges are similar. There are no major Permian stratigraphic probelms unique to these two ranges. However, three features should be mentioned. First, the Queen and Grayburg Formations have changed facies to a single carbonate unit in the Apache Mountains which Wood (1968) named the Munn Formation. Second, the Hueco-Bone Spring contact in the Sierra Diablo region is conformable except on the Victorio flexure (Fig. 9). Here, there is local wedging-out and thinning of basal Bone Spring beds, slight angularity between the two units, and limestone pebble beds in the basal Bone Spring containing reworked Hueco fusulinids. It is thought that this local unconformity represents a shelf-edge scour surface, and in terms of magnitude and time represented might possibly be termed a diastem instead of an unconformity. The third feature is the exact locality on Victorio Peak of Robustoschwagerina stanislavi. This species is very unusual and the only presently known North American representative of the genus. It was first found in float approximately 45 to 50 feet. (stratigraphic) directly above Kriz Lens on Victorio Peak (Dunbar, 1953). Despite repeated efforts by many workers the in situ beds were not found until 1955 when they were located by Wilde and Hull. They (Wilde, written communication, 1974) found on the north side of the spur two thin beds containing R. stanislavi between 80 and 100 feet below the knob Fig. 10) of Bone Spring "massive" that caps the spur above the Kriz Lens. Since that time many workers (including myself) have been unable to relocate the beds. This important location needs careful published documentation, and Wilde (written communication, 1974) informs me that he intends to do this in the near future.

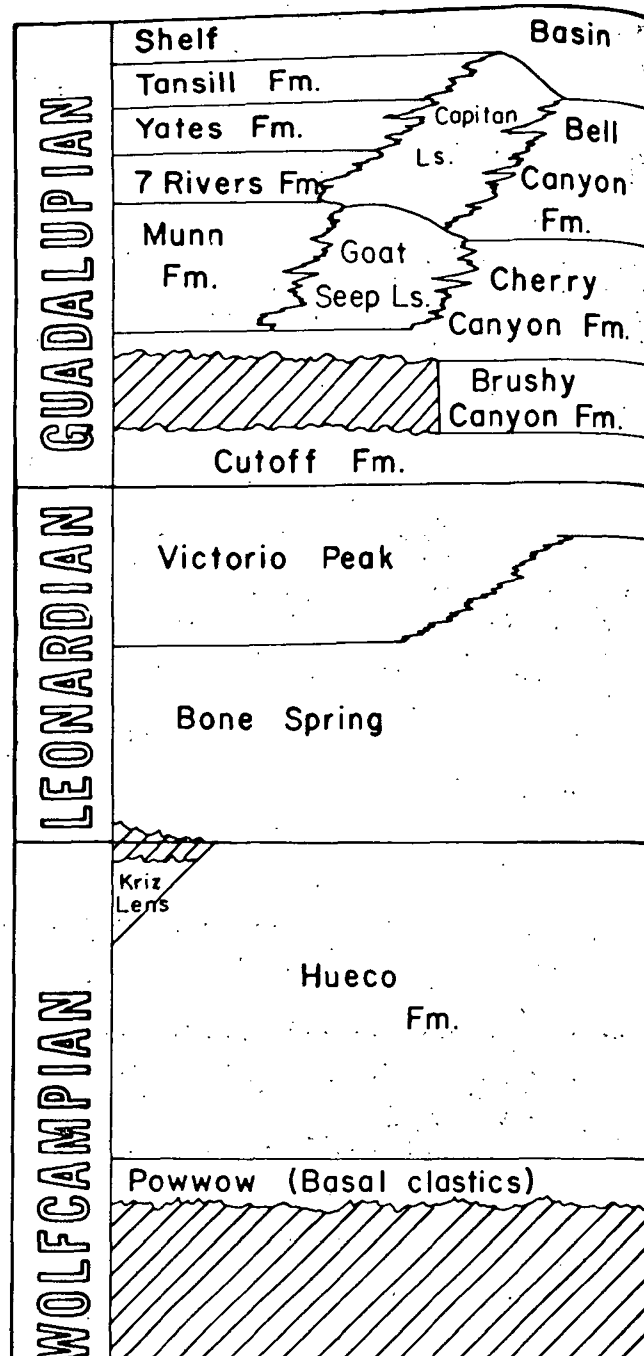


Figure 8.—Pre-Ochoan Permian stratigraphic framework of the Sierra Diablo and Apache Mountains (after King, 1965; and Wood, 1968).

Finlay and Malone Mountains. The Finlay Mountains and the Malone Mountains, seven miles to the south, each contain enigmatic Permian exposures. Both are

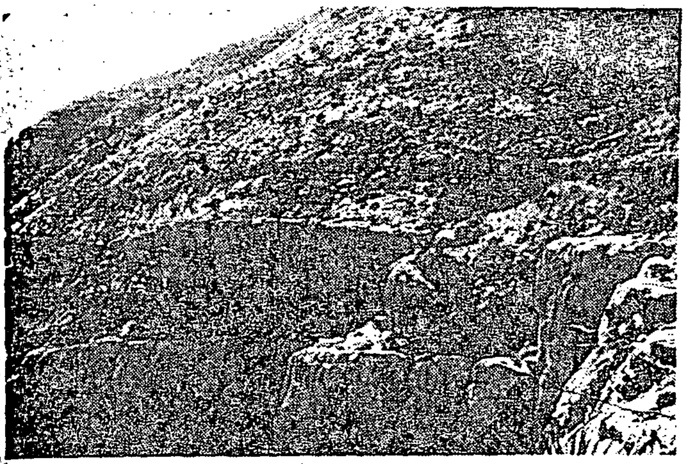


Figure 9.—Photo showing wedging-out, thinning, and arching of basal Bone Spring beds across the crest of the Kriz Lens at the top of the Hueco on the east side of Victorio Peak in the Sierra Diablo. The basal Bone Spring beds that wedge out against and immediately overlie the Kriz Lens contain reworked Hueco fusulinids and lithoclasts.

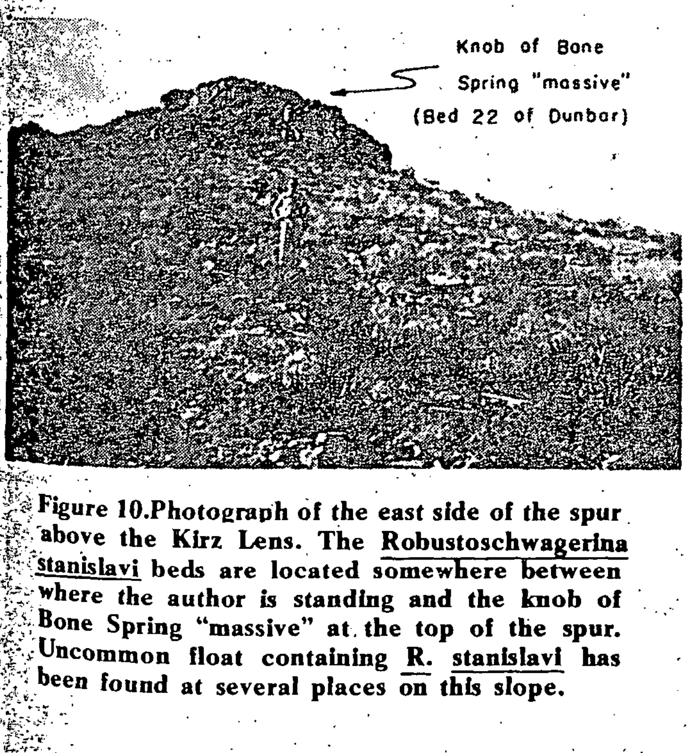


Figure 10.Photograph of the east side of the spur above the Kirz Lens. The <u>Robustoschwagerina stanislavi</u> beds are located somewhere between where the author is standing and the knob of Bone Spring "massive" at the top of the spur. Uncommon float containing <u>R. stanislavi</u> has been found at several places on this slope.

truncated by the Cretaceous and neither have their bases exposed. Figure 11 shows the recognized Permian strata present in each range. The current stratigraphic framework was established by Albritton and Smith (1965). Later Myers (1972) discussed Permian patch reefs present in the Finlay Mountains, and gave a complete thickness of the Wilke Ranch Formation based on a recent well in the range that penetrated the unexposed portion of the formation.

The sequence in the Finlay Mountains is interbedded limestone conglomerate, thin-bedded lime marlstone, and bioclastic limestone. Albritton and Smith (1965) did not formally name the sequence but called it "Leonard Series (undivided)". This sequence is a very distinctive, mappable lithologic unit in the Finlay Mountains with great importance in the interpretation of the regional stratigraphy and Permian history of the region. For this reason, I herein informally designate this sequence the Wilke Ranch Formation (named after a well-known ranch in the western Finlay Mountains) and designate the type section as Albritton and Smith's (1965, p. 8-9) measured section 1. A formal proposal of this new formational name will be published elsewhere in the near future. The exposed thickness if 1650 feet and the total thickness is 1856 feet (Myers, 1972). Fusulinids and brachiopods date it as Leonardian.

The 630 feet of exposed gypsum and interbedded carbonates in the Malone Mountains is the Briggs Formation. Diagnostic brachiopods that date it as Leonardian are found only in the basal limestone (Albritton and Smith, 1965). The upper part is essentially unfossiliferous. No fusulinids have been reported from the Briggs Formation.

The basic stratigraphic problem is their mutual relationship to each other. Albritton and Smith (1965, p. 22-23) discussed this problem and concluded that the two formations are partially equivalent. There is no direct evidence for this, and their conclusion is from inductive reasoning based on two rather weak assumptions. The first assumption is that the basal limestone section of the Briggs is equivalent to the limestone unit below the calcirudite at the top of the Wilkie Ranch Formation (see Fig. 11). This assumption is based on the occurrence of the brachiopod <u>Composita mexicana</u> in both limestones, each of which is the <u>only prominent</u> limestone unit in their respective formations. Both limestones have abundant fossils and it seems strange that a brachiopod that is uncommon in each of them is the only fossil that is found in two limestones that are supposedly the same one. The second assumption is that the pisolitic dolomite in the upper part of the Briggs represents an algal bioherm. A detailed petrographic study of the pisolites has not been done, but similar pisolites in the Tansill and Yates Formations of the Apache and Guadalupe Mountains are now known to be of inorganic vadose origin. Thus, there is a distinct possibility the pisolites in the Briggs have the same origin. These observations and the fact that both formations are very different in lithology suggest that these formations are not stratigraphic equivalents. More detailed work on this facies aspect needs to be done. However, the problem is additionally complicated by the fact that the Malone Mountains are part of a thrust sheet that rests on Cretaceous shales (Albritton and Smith, 1965).

Brachiopods date both formations as Leonardian (Albritton and Smith, 1965). However, their precise position within it or their precise correlation to the Sierra Diablo and Glass Mountains is open to question because the fossils are not that diagnostic. A more detailed search for a diagnostic fauna should be undertaken.

Still pertinent to this is the paleogeography of the

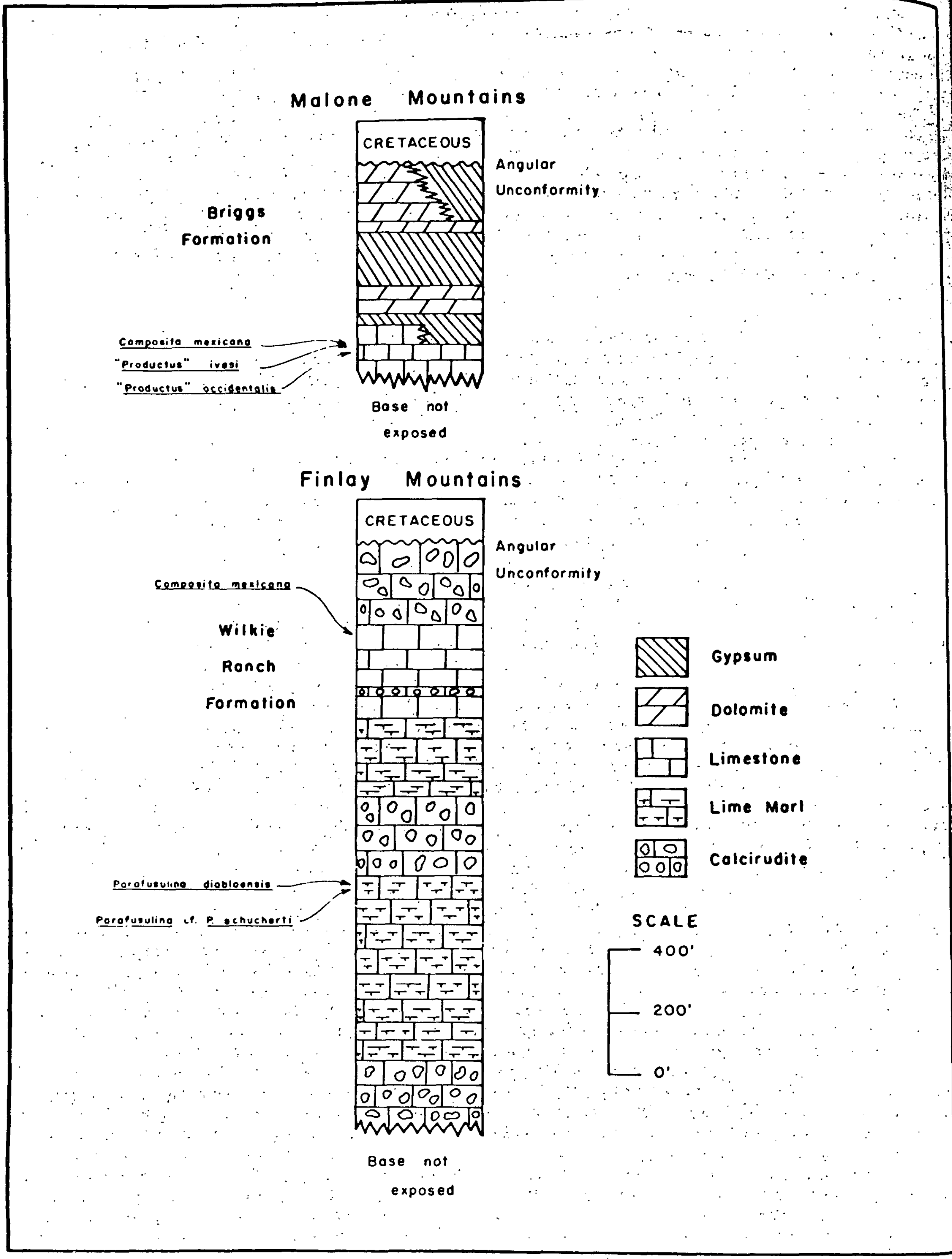


Figure 11.—Stratigraphic section of exposed Permian strata in the Finlay Mountains (after Myers, 1972) and the Malone Mountains (from Albritton and Smith, 1965).

Diablo platform, which is a shallow, open marine "shelf" bordered by two deeper basins (Marfa and Delaware). Both basins did not have evaporites deposited in them during Leonardian time. Therefore, the thick gypsum in the Briggs is very anomalous and difficult to reconcile with the present picture of Leonardian paleogeography of the Permian basin. The interfingering of the basal limestone of the Briggs and the overlying gypsum cannot be directly observed, and was only postulated by Albritton and Smith (1965) in constructing a composite section of the Briggs from six separate incomplete sections. Thus, it is possible that the unfossiliferous upper dolomite-gypsum section simply overlies the basal limestone and its contained Leonardian fossils. This distinct possibility, coupled with the presence of Jurassic evaporites in the general region to the south, and the Malone Mountains being part of a thrust plate "pushed up" from the south, have prompted many workers to informally suggest that the gypsum in the Briggs is Jurassic in age and rests unconformably on the definitely Permian basal limestone. This is an admittedly attractive solution to the problem, but is it the right one? It does pose less problems than a Permian age for the gypsum does, but additional field work is needed before this question can be answered with certainty.

Hueco Mountains. This mountain range in far west Texas and southcentral New Mexico has a well-exposed Lower Permian section. The basic stratigraphic framework was established by King, King, and Knight (1945). Williams (1963) gave formation names to the units established by these authors as the informal lower, middle, and upper divisions of the Hueco Limestone to give the present framework shown in figure 12. In addition, Williams (1963) informally designated "Pseudoschwagerina beds" and "Bursum beds" in the upper division of the Magdalena and placed the lower boundary of the Permian at the base of the so-called "Bursum beds". As a result of William's work there are two major perplexing stratigraphic problems in the Hueco Mountains. The first concerns the base of the Wolfcamp and the definition of the Powwow Member, and the second concerns the position of the Wolfcampian-Leonardian Series boundary.

The Powwow at its type section was originally defined as a conglomeratic red shale interval at the base of the Hueco, resting with marked angular unconformity on the Magdalena Limestone. Where it is present the Powwow was interpreted, until William's work, as a detrital interval at the base of the Permian and always found unconformably on underlying Pennsylvanian beds. Williams (1963) reported early Wolfcampian fusulinids from below the Powwow in the Magdalena and subsequently lowered the base of the Permian into the Magdalena. This is open to question. The critical area is "Reef" Hill where King, King, and Knight's (1945) measured section "J" is located. This hill (Fig. 13) is a Virgilian algal mound complex that is overlain unconformably by a detrital sequence that fills a channel cut in the mound complex. This sequence

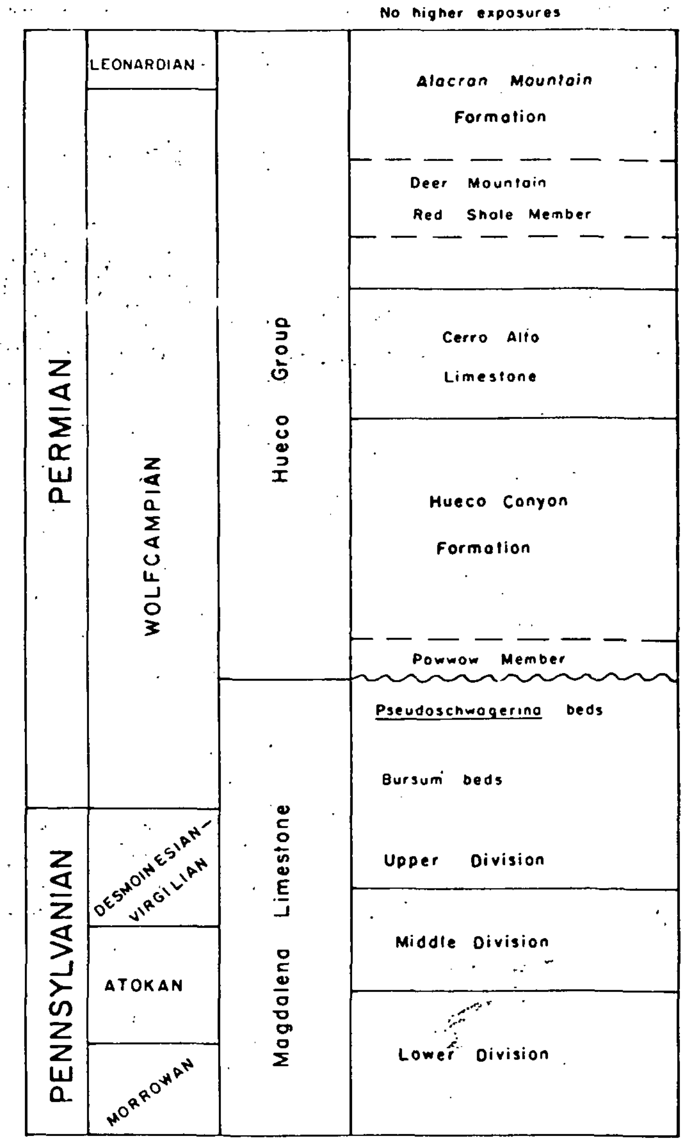


Figure 12.—Williams' (1963) Permian stratigraphic framework of the Hueco Mountains.

consists of lime and chert pebble conglomerates and some thin interbedded red shale and marine limestones (algal in part). The hill is capped by a 4 feet thick fusulinid biocalcarenite. The fusulinids in this upper part are early Wolfcampian representatives of the genera Triticites and Schwagerina. On the basis of the age dating, lithologic similarity, and the disconformable relationship to underlying Virgilian sediments, this sequence is assigned to the Powwow and regarded as early Wolfcampian age. King, King, and Knight (1945) mapped the entire hill as Magdalena; this is obviously in error. On the scarp (Fig. 13) to the east of "Reef" Hill is undoubted Powwow which has Pseudoschwagerina associated with it and rests unconformably on Magdalena. What is the relationship of the Powwow on "Reef" Hill to that in the scarp and canyons to the east and southeast? The answer will hopefully be given by work in progress by Wendell Stewart and myself. We also hope to verify or disprove William's report of early Wolfcampian fusulinids in the Magdalena immediately northeast of "Reef" Hill at his

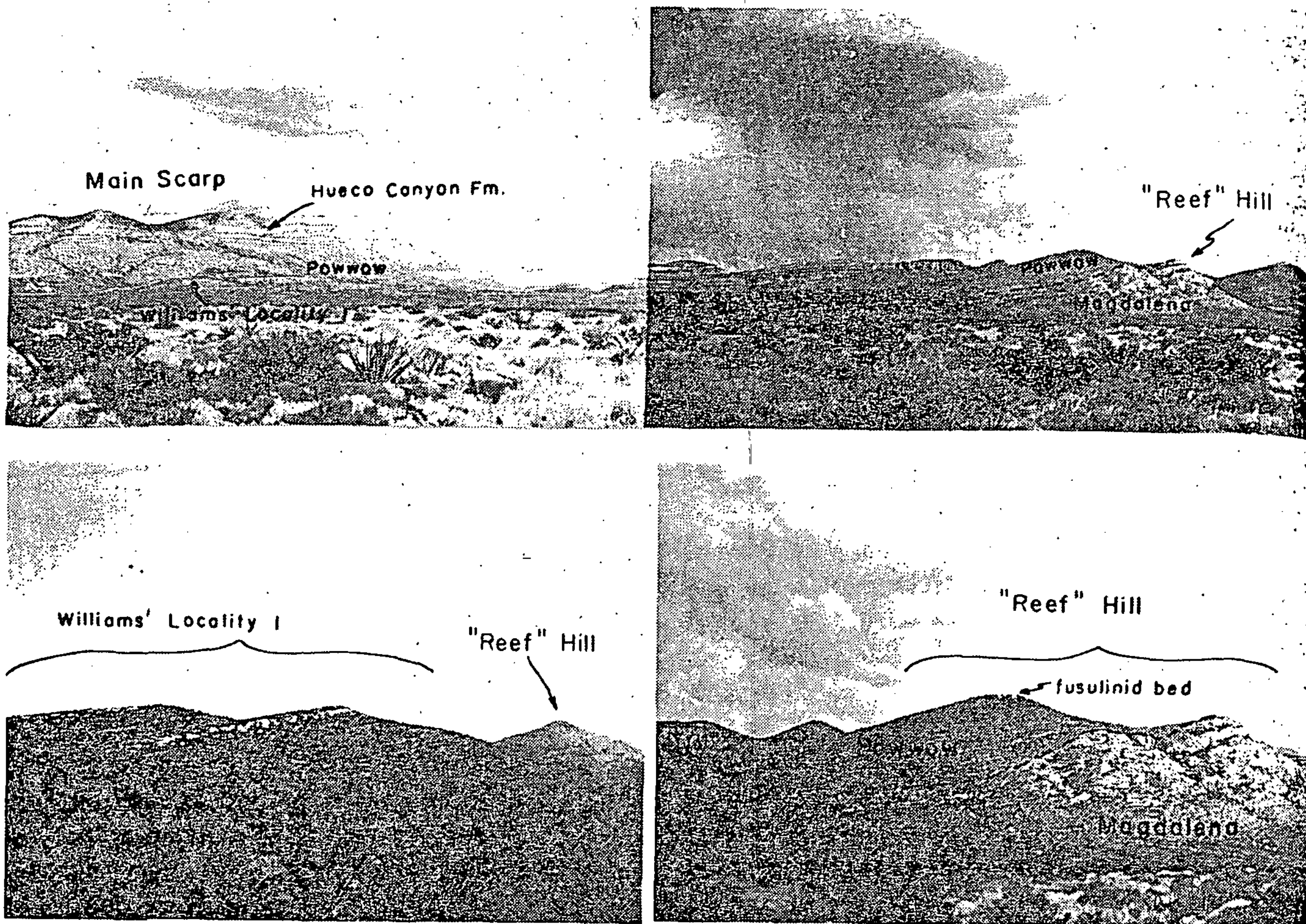


Figure 13.—Photographs of "Reef" Hill and adjacent area south of Hueco tanks in the Hueco Mountains. See text for explanation.

locality 1 (Fig. 13). The significance of "Reef" Hill is that there is now verifiable non-Magdalena early Wolfcampian pre-Pseudoschwagerina sediments in the Hueco Mountains which makes the Permian section in this range one of the most complete Wolfcampian surface sections and appropriate as a standard reference shelf section for the Wolfcampian Series. Documentation of the early Wolfcampian fusulinids will be given in the aforementioned work of Stewart and myself.

On the north side of the mouth of Hueco Canyon Williams (1963) at his locality 3 (Fig. 14) reported Pseudoschwagerina from beds he considered as Magdalena below a conglomeratic red shale interval he considered as Powwow. I believe this interpretation is open to question. In the Robledo and Sacramento Mountains in New Mexico there is interfingering of Abo red beds and marine limestones of the Hueco. Two of the Abo red bed tongues extend southward into the Hueco Mountains where they are termed the Powwow and Deer Mountain Red Shale Members of the Hueco Canyon Formation and Alacran Mountain Formation respectively. On the north side of the mouth of Hueco Canyon there are two previously unreported conglomeratic red shale intervals in the Hueco Canyon Formation well above the one Williams called Powwow

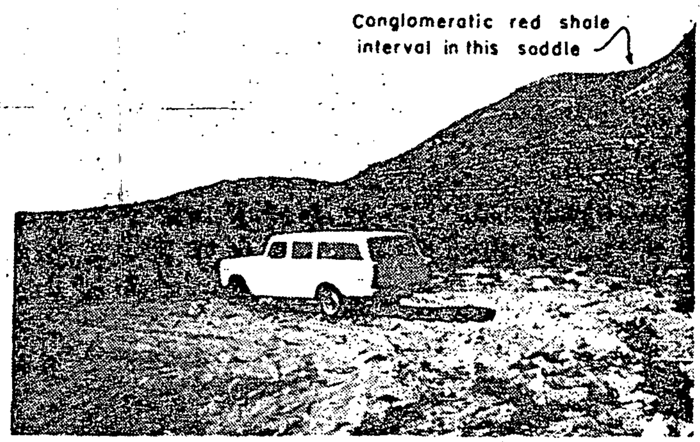


Figure 14.—Photograph of the area of Williams' locality 3 on the north side of the mouth of Hueco Canyon. Abbreviations are as follows: Psch.—Williams' Pseudoschwagerina beds, Phcp - Williams' Powwow Member, and Phc - Hueco Canyon Formation.

(Fig. 14). They may be represented by one or more of the covered intervals in Williams' measured section 8 near Juan Peak to the north of Hueco Canyon. The significant point to keep in mind is that in the Hueco Canyon Formation there are several conglomeratic red shale intervals which cannot be differentiated solely on lithology. To reiterate, the Powwow at its type section was defined as a conglomeratic red shale unit at the base of the Hueco resting with angular unconformity on the Magdalena. As shown in figure 14 there is no obvious angular unconformity between Williams' Pseudoschwagerina beds and the overlying Hueco Canyon Formation. Also the Pseudoschwagerina beds are lithologically distinct from the Magdalena exposed in the rest of the Hueco Mountains. Immediately to the south of Hueco Canyon, especially in the "Reef" Hill area, the Magdalena consists of a series of lime and chert conglomerates interbedded with marine limestones and infrequent reddish brown shales. North of Hueco Canyon near the Texas-New Mexico state line Hardie (1958) describes the Magdalena lithology as an alternating series of shale, limestone, and lime and chert pebble conglomerate. The Pseudoschwagerina beds are medium to thick bedded, light gray limestones. On the basis of the above reasons I would assign the Pseudoschwagerina beds to the Hueco Canyon Formation and interpret the Powwow as being present below these beds in unconformable relationshp with typical Magdalena, but not presently exposed because of its position below the valley floor. What Williams termed Powwow, I would interpret as an unnamed Abo red bed tongue similar to the two unnamed units that occur above it on the north side of the mouth of Hueco Canyon.

The second problem concerns the Leonardian-Wolfcampian Series boundary in the Hueco Mountains. Williams (1963) in a fault block to the north of Alacran Mountain found the fusulinid Schwagerina crassitectoria, which is though to be diagnostic of Leonardian age. On the basis of this occurrence Williams (1963, p. 32) placed the Leonardian-Wolfcampian boundary in the Alacran Mountain Formation approximately 280 feet above the Deer Mountain Red Shale Member. From his Leonardian beds Williams also reported Schwagerina franklinensis which he stated C.A. Ross found in the lower Leonard Formation in the Glass Mountains. However,, C.A. Ross (written communication, 1970) informs me that he does not recognize S. franklinensis in the Glass Mountains. After detailed study, and prior to formal publication of his work in 1963, Ross defined what he first thought was S. franklinensis as a new species, S. allisonensis. For the following reasons I would suggest that there are no Leonardian rocks present in the Hueco Mountains. First, on the Diablo Plateau to the east of the Hueco Mountains is a sequence King, King, and Knight (1945) mapped as their "eastern dolomite facies" (actually the lithology is dominantly limestone). In the lower part of this section the same suite of fusulinids is present that is found in the upper carbonate units on Alacran Mountain, including definite Pseudoschwagerina (Wendell Stewart, oral communication, 1975), marking a good correlation horizon between the two sections. In the upper part of the eastern section Stewart (oral communication, 1975), has found late Wolfcampian fusulinids which are advanced species of the genus Chaleroschwagerina. Thus, in close proximity of the Hueco Mountains there is a continuous Wolfcamp section younger than anything found in the general area. Second, in the fault block north of Alacran Mountain Schwagerina crassitectoria is found 20 feet above a limestone that contains Schwagerina menziesi, a form characteristic of the lower Pseudoschwagerina zone as exposed in the Hueco Mountains. Where are the missing late Wolfcamp beds? I have examined Williams' measured section 6 (where he found Schwagerina crassitectoria) in detail and found no evidence of an unconformity. Third, in Williams' measured section 6, S. crassitectoria is found approximately 280 feet above the Deer Mountain Red Shale Member. On Alacran Mountain definite Pseudoschwagerina has been found by Wendell Stewart (oral communication, 1971) at the top of Alacran Mountain approximately 300 feet above the top of the Deer Mountain Red Shale Member (Williams' figure of 214 feet of section from this member to the top of Alacran Mountain is thought to be in error). Hence, Pseudoschwagerina occurs stratigraphically above Schwagerina crassitectoria in the Hueco Mountains. Fourth, Wendell Stewart (oral communication, 1975) states that he has some doubt that S. crassitectoria is absolutely restricted to the Leonardian Series. On the basis of the above reasons I would interpret the occurrence of S. crassitectoria (if, indeed, the fusulinid is that species) in the Hueco Mountains as the first Wolfcamp record of the species, with the corollary that there is no Leonardian exposed in the Hueco Mountains. It is also important that the "eastern dolomite facies" is one of the youngest marine Wolfcamp sections exposed in the west Texas area and indicates the appropriateness of a Wolfcamp standard reference shelf section being established in the Hueco Mountains. A summary of my current stratigraphic interpretation is given in figure 15.

Franklin Mountains. These mountains in far west Texas are a fault block range composed primarily of older Paleozoic rocks. However, there are Permian outliers on the west side of the range. The detailed stratigraphic framework of these Permian rocks was established by Williams (1966). The basal 1080 feet of limestone he assigned to the Hueco Canyon Formation, the middle 545 feet of limestone and some interbedded siltstone to the Cerro Alto Limestone, and the upper 500 feet of limestone to the Alacran Mountain Formation. All three formations constitute the Hueco Group.

There is no basal detrital interval as exists in the Hueco Mountains, nor are there any unnamed red bed tongues in the Hueco Canyon Formation. Williams (1966) assigned 110 feet of limestone with several covered intervals in the Alacran Mountain Formation to the Deer Mountain Red Shale Member. I fail to recognize the Deer Mountain Red Shale Member in the Franklin Mountains and believe Williams' assignment to be questionable. The Deer Mountain Red Shale Member in the Hueco Mountains is a thick, poorly exposed reddish brown shale with scattered, thin, discontinuous, fossiliferous limestones. In contrast, Williams' assigned interval in the Franklin Mountains

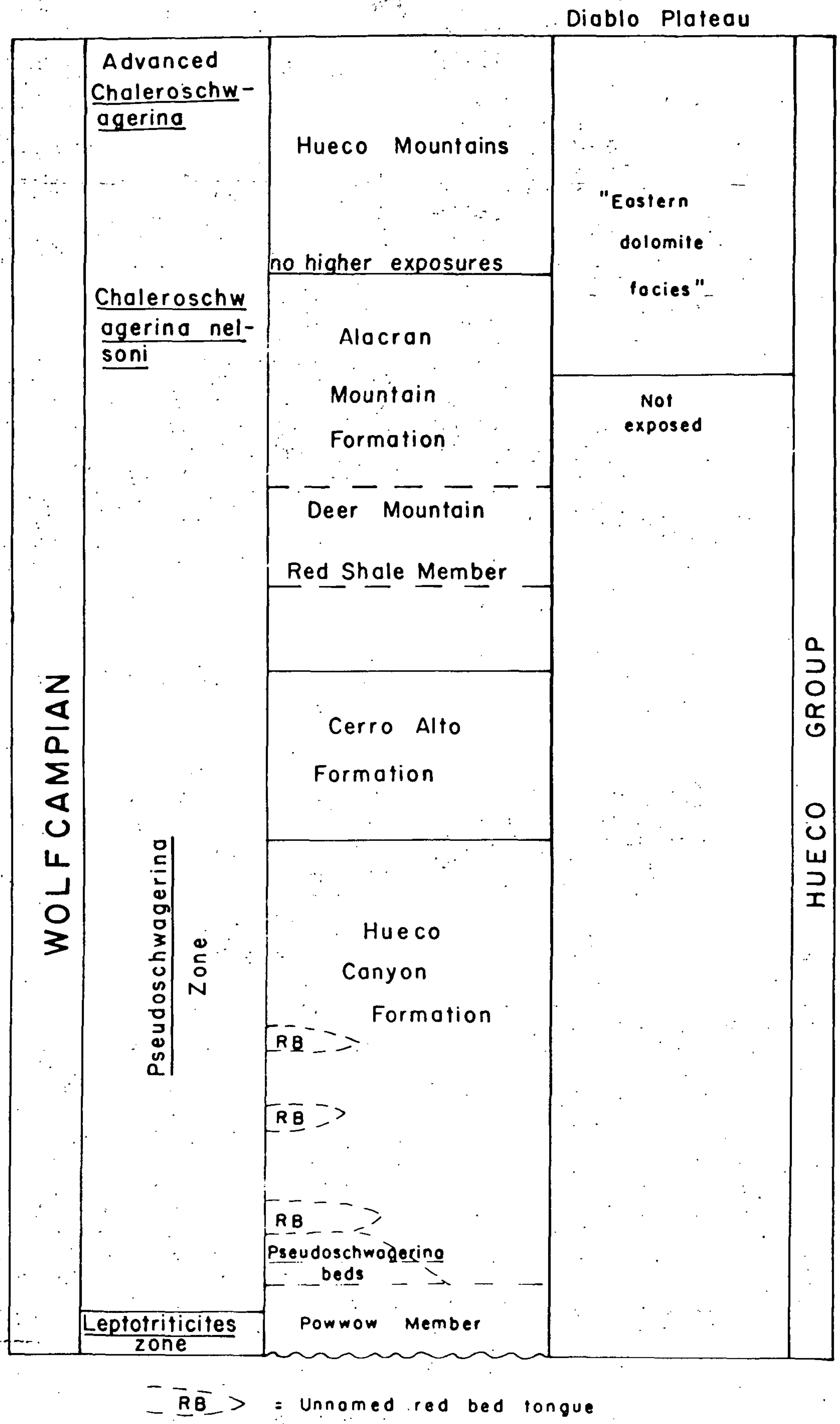


Figure 15.—Revised Permian stratigraphic framework of the Hueco Mountains.

has thick (8 to 23 feet), continuous limestones and there is no indication that the covered intervals consist of reddish brown shale.

Williams (1966) reports the Hueco Group in the Franklin Mountains rests conformably on thin argillaceous limestones of the Pennsylvanian. However, Stewart (1968) believes the contact to be unconformable. I am inclined to agree with Stewart's interpretation. Williams (1966) reported definite Pseudoschwagerina 66 feet above the base of the Hueco Canyon Formation. Unless this unfossiliferous basal 66 feet represents the entire early Wolfcampian Leptotriticites zone, which is doubtful, there must be an unconformity.

The top of the section is eroded and there is less Alacran Mountain Formation preserved than in the Hueco Mountains. All of the Hueco Group in the Franklin Mountains is within the Pseudoschwagerina zone (Williams, 1966).

Chinati Mountains. These mountains have a Permian section that is important to the understanding of regional Permian stratigraphy and geologic history, yet little detailed work has been published. The basic Permian stratigraphic framework was established by Udden (1904). The present framework (Fig. 16) is the result of modifications by Rix (1953a, 1953b) and Amsbury (1958). Skinner (1940) established the basic age assignments on the basis of fusulinids. Cooper and Grant (1972, p. 125-126) briefly discuss the brachiopods and, on the basis of correlations with the Glass Mountains, place (1972, fig. 28 on p. 106) an unconformity representing all of middle Leonardian time within the Cibolo Formation. This unconformity has not been identified by physical criteria on the outcrop or by fusulinid biostratigraphic data. Its existence needs additional, well-documented fusulinid verification.

Most of the Pinto Canyon Formation represents deep water turbidity current and submarines slide block deposits (Amsbury, 1958). Where and at what distance is the shelf edge that was the source for these deposits? No one knows. Detailed depositional environment studies need to be undertaken at the critical Shafter section, especially within the "lower brecciated zone" of the Cibolo Formation. This "zone" consists of biohermal masses with boulder and cobble sized intraclasts between them. Is this an allochthonous slide deposit (similar to the Radar slide in the Guadalupe Mountains), or an in situ biohermal accumulation with the interbioherm rubble being derived from the bioherms themselves by strong current action? There is disagreement on which is the correct interpretation and the need for additional detailed work is obvious.

Glass Mountains. This interesting mountain range with its well-exposed Permian section (Fig. 17) is critical to our interpretation of both regional and North American Permian stratigraphy. The type sections of the Wolfcampian and Leonardian Series are in these mountains. The basic stratigraphic framework (Fig. 18) was established by P.B. King (1930) and R.E. King

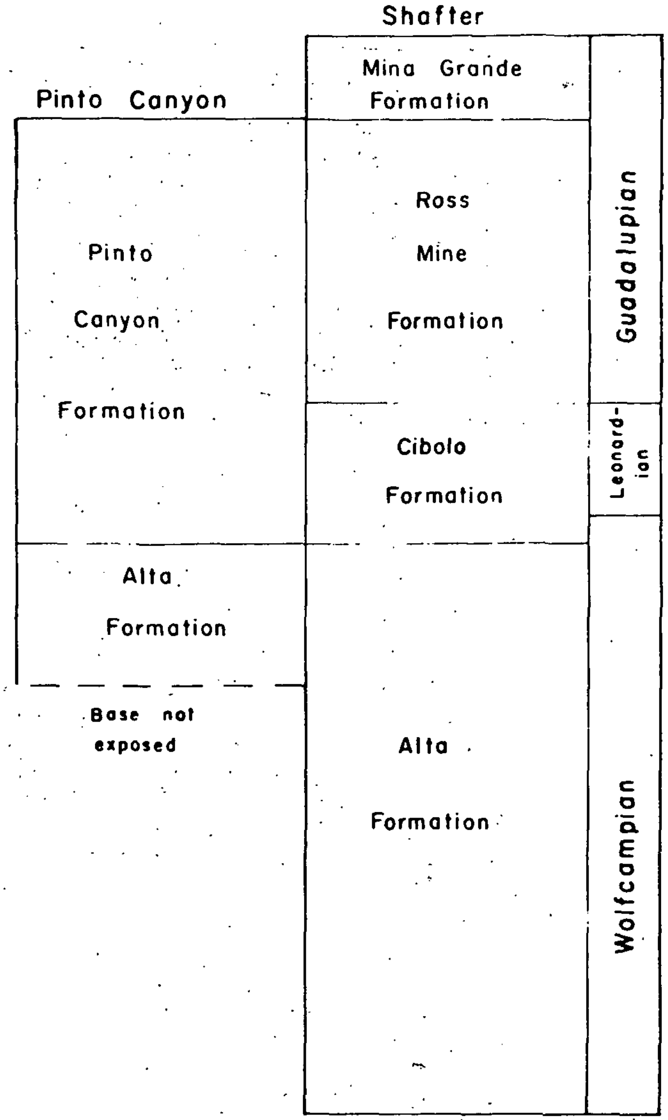
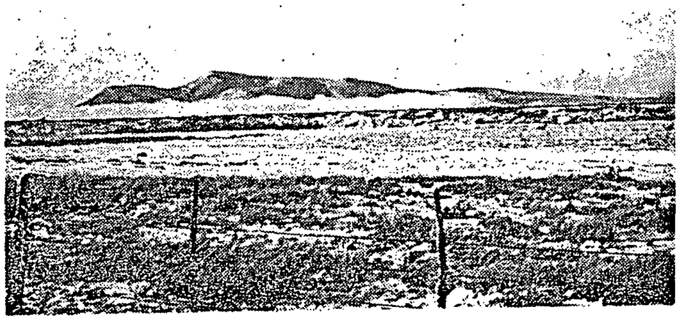


Figure 16.—Permian stratigraphic framework of the Chinati Mountains.

(1930) and later modified by the more detailed fusulinid work of Ross (1963) and brachiopod work of Cooper and Grant (1964, 1966, 1972). The Glass Mountains have received more detailed study than most other areas because of their complicated Permian stratigraphy and the location of the Wolfcampian and Leonardian type sections in them.

Ross (1963) did a detailed study of the Lower Permian. Because "Wolfcamp" was a chronostratigraphic term and to avoid confusion, he eliminated the term "Wolfcamp Formation" and erected the Neal Ranch and Lenox Hills Formations in its place. The Neal Ranch Formation is essentially the "Upper Member" of P.B. King's (1930) Wolfcamp Formation. On the basis of lithologic similarity and their contained fauna Ross (1963) reassigned the Uddenites-bearing Shale Member and bed 2 of the Gray Limestone Member to the Pennsylvanian Gaptank Formation. The Lenox Hills



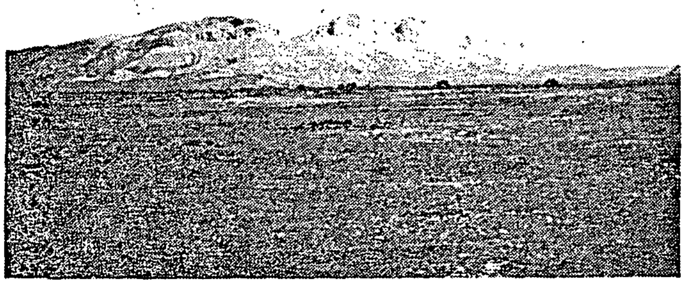


Figure 17.—Top photo: A winter view from the north of Dugout Mountain at the southwestern end of the Glass Mountains. This mountain consists of Wolfcampian and Leonardian rocks. It is the type locality of the Dugout Mountain Member of the Skinner Ranch Formation. Bottom photo: A view from the south of Cathedral Mountain in the southwestern Glass Mountains. The massive cliffs are the Capitan Formation and the underlying slopes are the Word Formation.

Formation is a sequence of interbedded conglomerate, limestone, and shale approximately 200 to 300 feet thick that P.B. King (1930) assigned to the lower part of the Hess Formation. At the same time, Ross (1963) recognized major unconformities at the base of the Wolfcampian Series, in the middle of the Wolfcampian Series (between the Neal Ranch and Lenox Hills Formations), and at the top of the Wolfcampian Series.

Cooper and Grant (1964, 1966, 1972) in their long detailed study of the Permian brachiopods of the Glass Mountains recognized the need for smaller stratigraphic subdivisions in order to better relate brachiopod distribution to the lithic sequence. Therefore, they named some of P.B. King's (1930) numbered limestone members of his Leonard, Hess, and Word Formations, erected other new members, and divided the Leonard Formation into two new formations in order to restrict the term "Leonard" to its chronostratigraphic use as a series name. Some of their stratigraphic interpretations are in direct conflict with those of Ross (1963) and are as follows:

1. Cooper and Grant (1966) reassigned the upper part of the Lenox Hills Formation to the Hess Formation eastward from a point one mile east of the Hess Ranch house on the basis of lithologic similarity. In addition, they also lowered the top of the Lenox Hills Formation in the eastern Glass Mountains to the highest bed of conglomerate or calcirudite. In doing this Cooper and Grant ignore Ross' (1963) major unconformity at the top of his Lenox Hills Formation and give the Hess Formation both a Wolfcampian and Leonardian age.

2. Cooper and Grant (1972, p. 37, 110) believe that the Neal Ranch and Lenox Hills Formations interfinger at the southwestern end of the Lenox Hills. They also suggest that the biohermal limestones at the top of the Neal Ranch Formation at this locality may actually be basal Lenox Hills Formation, although they contain typical Neal Ranch brachiopods. Ross (1963) interprets a regional unconformity between the two formations.

3. Cooper and Grant (1972, p. 43-44, 53-55) in the Wolf Camp Hills and eastern Glass Mountains assigned all of the Lenox Hills Formation to the Hess Formation. Their reason is that, in their opinion, the Lenox Hills Formation of this area is lithologically different from the Lenox Hills Formation in its type area and quite similar to the overlying Hess Formation. Thus, the Lenox Hills Formation is restricted to the western and central Glass Mountains and the Hess Formation extends from the top of the Neal Ranch Formation to the base of the Cathedral Mountain Formation in the eastern Glass Mountains. No major unconformities are shown within or at the base of the Hess Formation.

4. Cooper and Grant (1972, fig. 28 on p. 106) show no major regional unconformity between the Skinner Ranch and Lenox Hills Formations.

5. Cooper and Grant (1972, p. 32) restricted the term "Gray Limestone Member" to P.B. King's bed 2 and excluded beds 3 and 4 from the member on the basis of the distinctive fauna of bed 4. In addition, Cooper and Grant (1972, p. 30, 109) strictly on a faunal basis removed the Gray Limestone Member (bed 2) from the Gaptank Formation and, assigned it to the base of the Neal Ranch Formation. I will discuss these proposed changes in more detail below.

As figure 18 shows, the above interpretations of Cooper and Grant are in direct conflict with those of Ross. These conflicts need to be resolved by detailed field work and additional paleontological collecting and study.

A major problem in the Glass Mountains is the exact position of the base of the Permian. This is especially critical because the type section of the Wolfcampian Series is in the Wolf Camp Hills. This problem will be discussed in detail elsewhere in this volume by C.A. Ross. Hence, I will only briefly review where the base has been placed by various workers and offer my opinion as to where I would place the boundary.

R.E. King (1930) placed the base of the Permian at the base of the Uddenites-bearing Shale Member of the Gaptank Formation primarily on the basis of

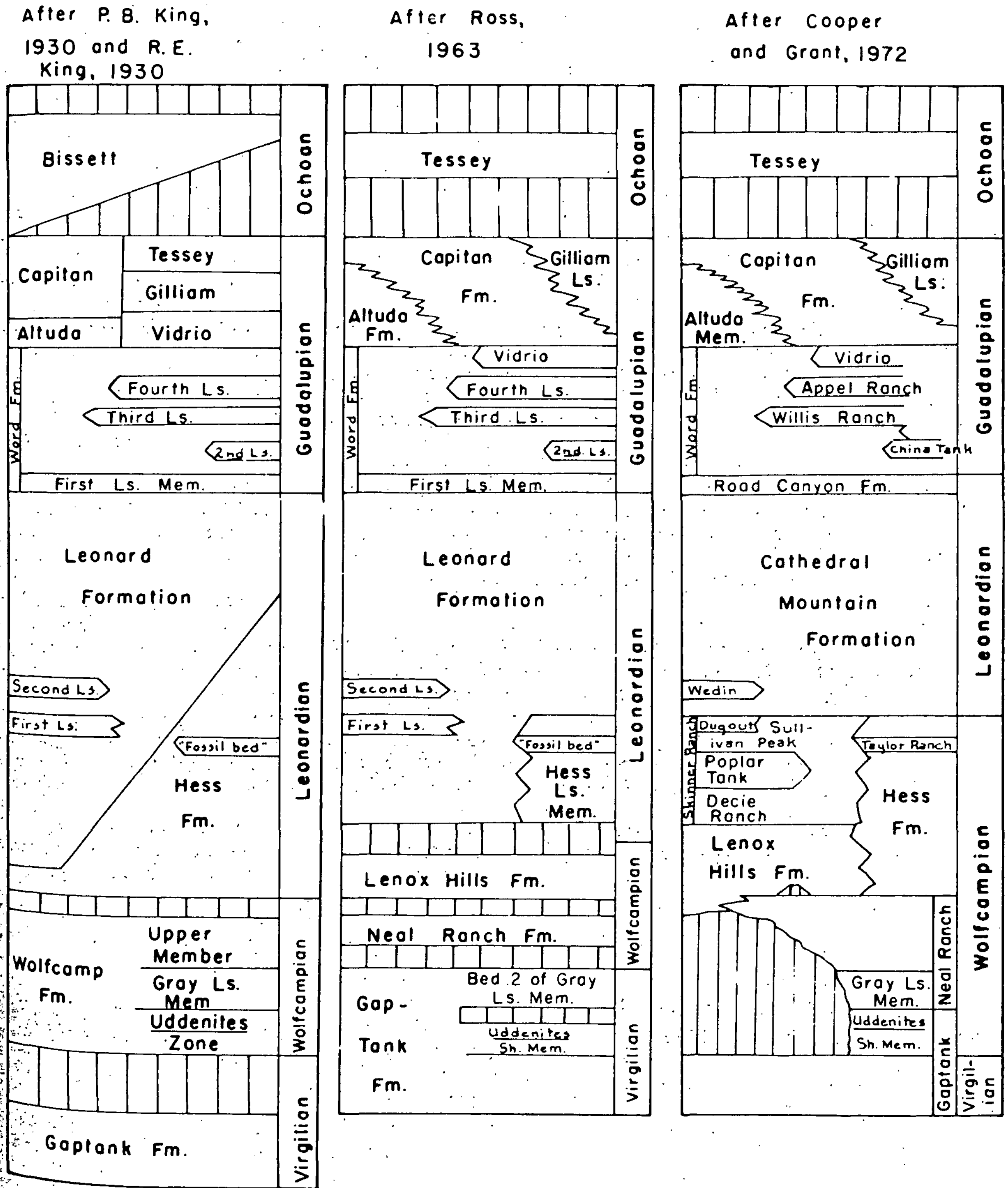


Figure 18.—Permian stratigraphic framework of the Glass Mountains.

brachiopods. Bostwick (1962) reported Schwagerina from this same member and placed the Pennsylvanian-Permian boundary at its base. Ross (1963), seemingly unaware of Bostwick's work, placed the base of the Permian at the base of the Neal Ranch Formation, although he indicated the Gray Limestone Member (bed 2) possibly in part could be Permian. Wilde (1971) reported Permian species of Triticites and Schwagerina from the Gray Limestone Member (bed 2) and placed the base of the Permian at its base. Still, for no apparent reason, Wilde disregarded Bostwick's report (1962) of Permian Schwagerina in the underlying Uddenites-bearing Shale Member, although he reported finding Pseudofusulinella in this member. Assuming Bostwick's (1962) work is valid and, considering the Cooper and Grant brachiopod faunal evidence (1972), I would place the base of the Permian at the base of the Uddenites-bearing Shale Member.*

Pertinent to this problem is the proper formational assignment of the upper two members of the Gaptank Formation. Ross (1963) on the basis of lithology assigned the Gray Limestone Member (bed 2) and Uddenites-bearing Shale Member to the Gaptank Formation. As mentioned above, Cooper and Grant (1972, p. 30, 109) reassigned the former to the Neal Ranch Formation strictly on a faunal basis. According to modern stratigraphic practice, members are usually defined and assigned to formations on the basis of lithology, not solely on a faunal basis. Primarily for this reason, I would suggest that the Gray Limestone Member (bed 2) be retained in the Gaptank Formation until Cooper and Grant can present compelling lithologic criteria for their reassignment. Ross (1963, p. 13) on a lithologic basis placed beds 3 and 4 of P.B. King's (1930) Gray Limestone Member in the Neal Ranch Formation and, placed the upper contact of the Gaptank Formation at the top of bed 2 of the Gray Limestone Member. On this basis I believe Cooper and Grant's (1972, p. 32) restriction of the Gray Limestone Member to bed 2 is valid, although this too was done primarily on a faunal basis.

The age of the Road Canyon Formation is a major problem in the Glass Mountains, and this involves the position of the boundary between the Leonardian and Guadalupian Series at the type locality of the former. Paramount to this question is that age assignment depends on the particular age-dating invertebrate group used. Fusulinids date it as Guadalupian whereas brachiopods, sponges, and ammonites date it as Leonardian. It is obvious that both age assignments cannot be correct. However, on the basis of the total fauna I would agree with Cooper and Grant's (1972) Leonardian age assigment.

Cooper and Grant (1972, p. 115) on the basis of brachiopods revised the type section of the Leonardian Series, restricting it to the Cathedral Mountain and Road Canyon Formations. They expanded the type section of the Wolfcampian Series to include the Skinner Ranch and Hess Formations (not in the expanded sense of Cooper and Grant, 1972). However, on the basis of fusulinids both these formations are assigned to the Leonardian Series. This is a most difficult interpretational conflict that needs to be resolved. Wilde (1971, p. 372) has partially resolved this problem by his assignment, on the basis of fusulinids, of the Decie Ranch Member of the Skinner Ranch Formation to the Wolfcampian Series.

However, Wilde's (1971, p. 372) above assignment has in itself created the following subsidiary problem that will require additional detailed field work and paleontological collecting. The key fusulinid Schwagerina crassitectoria, and other characteristic Leonardian fusulinids, have been reported from the basal beds in the undivided Skinner Ranch Formation. These basal beds, according to Cooper and Grant (1972, p. 45, 113), are equivalent to the Decie Ranch Member mainly on the basis of their contained brachiopods, and stratigraphic and facies relationships. S. crassitectoria has not been collected from the Decie Ranch Member nor have Wolfcampian fusulinids been collected from the basal beds of the undivided Skinner Ranch Formation. Cooper and Grant (1973, p. 371-372) believe the absence of S. crassitectoria in the Decie Ranch Member is because of improper environment. Lithologic evidence (the presence of boulder and cobble sized intraclasts) suggest that this member was probably deposited in a very turbulent environment in which S. crassitectoria evidently could not live.

Cooper and Grant (1972, p. 71, 119) state that a detailed search for fossils in the post-Word Guadalupian sequence in the Glass Mountains needs to be done. The fauna of this sequence is poorly known. The major task will be to find undolomitized parts of the sequence containing well-preserved fossils.

Eastern Shelf. This area consists of most of the hilly country of north-central Texas, from Brownwood to Abilene to Wichita Falls. The Pennsylvanian and Lower Permian sections consist of interfingering sequences of open marine carbonates, marginal marine deltaic clastics, and fluvial red beds. The Upper Permian is an evaporite-red bed sequence in this area. Accordingly, the stratigraphy is complex. Only the general stratigraphic framework is given in figure 19. The facies and depositional model relationships and problems of this sequence are discussed by W.E. Galloway elsewhere in this volume.

The major unresolved stratigraphic problem of this area is the position of the base of the Permian. Through the years its placement has ranged from the base of the Thrifty Formation to the top of the Belle Plains Formation. An excellent summary of the problem is given in a publication of the San Angelo Geological Society (1958). A more recent published article dealing with the placement of the Permian boundary, and one with which the majority of current workers agree, is by Kauffman and Roth (1966). They place the base of the Permian immediately below Waldrip Limestone Number One at the base of the Pueblo Formation in the

* See addenda at end of paper.

Colorado River valley and, immediately above the top of the Crystal Falls Limestone in the Brazos River valley. An important point to keep in mind is that the Eastern shelf is one of the few outcrop areas in the Permian basin region where continuous sedimentation across the Pennsylvanian-Permian boundary took place without other major erosional and depositional breaks that exist in other areas such as the Glass Mountains.

Fusulinids of the Eastern shelf have been studied in moderate detail and do provide a good basic stratigraphic framework. The brachiopods and ammonites are still in need of such study.

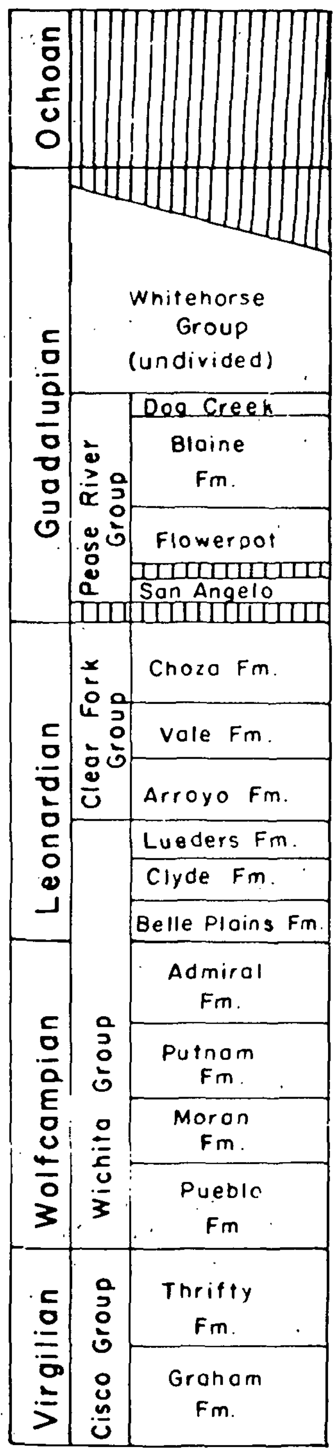


Figure 19.—Permian stratigraphic framework of the Eastern shelf.

SUBSURFACE OF THE PERMIAN BASIN

Most of the Permian rocks of the Permian basin region are in the subsurface. Thus, for a comprehensive understanding of the Permian geologic history and stratigraphy of west Texas and southeastern New Mexico, detailed subsurface stratigraphic studies are an essential prerequisite. Such studies have been done; however, because of the strongly competitive nature of the oil industry almost all of them remain unpublished in the locked confidential files of oil companies. I urge the publication of these studies as soon as their competitive advantage has passed.

Figure 20 shows the subsurface provinces of the region and figure 21 shows the subsurface Permian stratigraphic framework of these provinces. One major problem is the position of the base of the Permian in the subsurface. T.S. Jones discusses this problem in detail as it exists in the Midland and Delaware basins elsewhere in this volume. The biggest problem in the subsurface is shelf to basin correlations. The Permian shelf-edge deposits are thick, extensive carbonate bank and reef complexes. As a result shelf strata cannot be directly traced into basin equivalents because there are no key beds or markers that extend through the shelf-edge banks and reefs from the shelf to the basin. Fossils are of very limited use because shelf, shelf-edge, and basin faunas are quite different with very few forms common to all three. One prominent exception is in the Guadalupe Mountains where, as discussed previously in this paper, the same restricted fusulinid fauna is found in the shelf Tansill Formation and basinal Lamar Member of the Bell Canyon Formation and firmly establishes the correlation of these two units. Also, fossils are difficult to find in significant quantity in the subsurface. The steep depositional topography of the region also complicates the problem. Therefore, shelf to basin correlations are very difficult to establish. Most of the effort has been directed toward the correlation of the "Glorieta" and Tubb (Drinkard) sands of the Northwest shelf and Central Basin platform to the three Bone Spring sands of the Delaware basin and to the Spraberry and Dean Formations of the Midland basin. The most recent published attempt at shelf to basin correlations of these units is that of Silver and Todd (1969). Using unconformity-bounded sequences in a cyclic sedimentation model, they correlate the Tubb (Drinkard) with the lower Spraberry sand and the Second Bone Spring sand. Most workers, however, would disagree with these correlations and correlate the Tubb (Drinkard) with the Dean Formation and the Third Bone Spring sand. For additional discussion of shelf to basin correlations and one approach to the problem the reader is referred to Silver and Todd (1969).

For many years subsurface geologists have debated the age of the Dean Formation. Some placed the top of the Wolfcampian Series at the upper contact of the

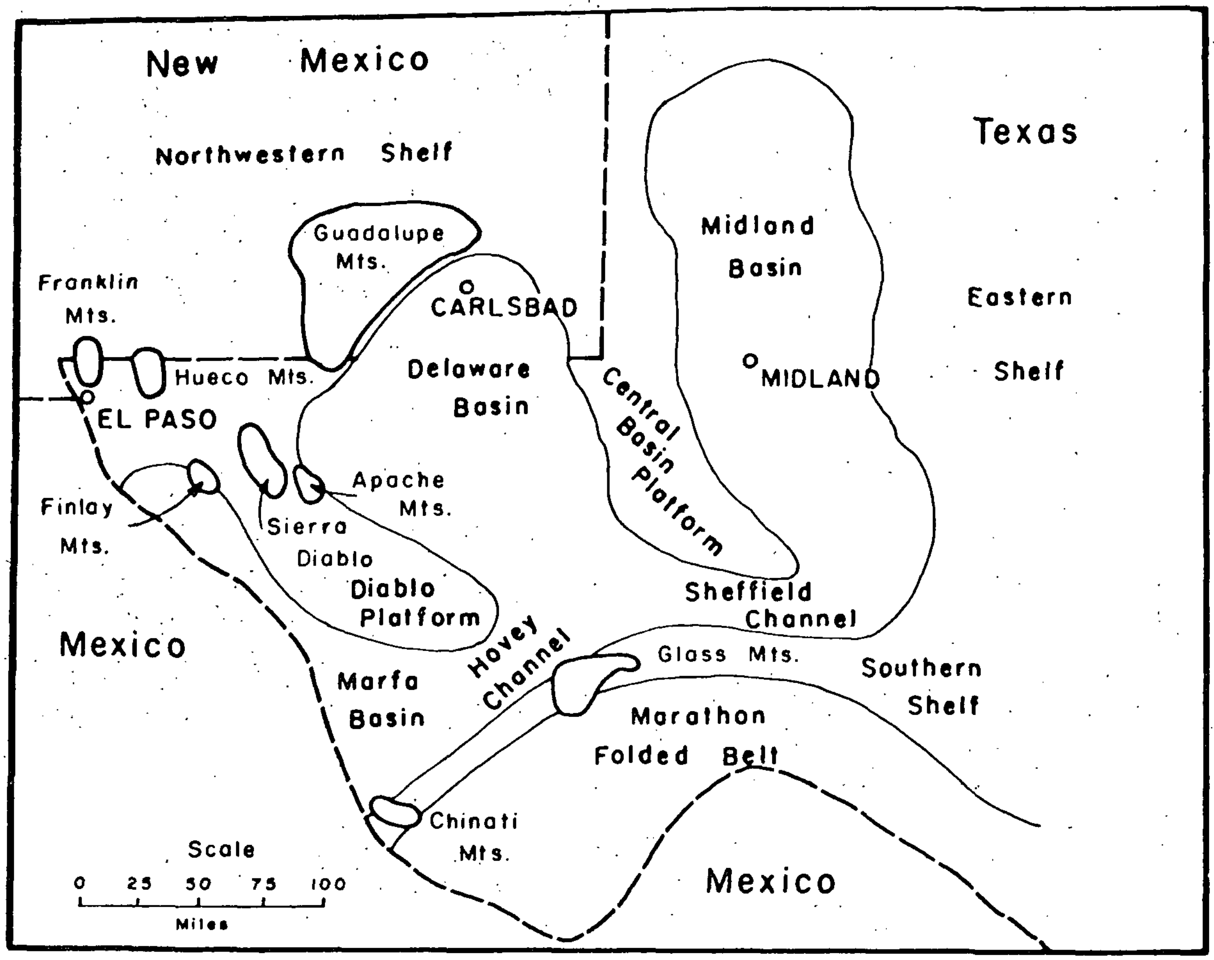


Figure 20.—Subsurface provinces of the Permian basin. The key Permian outcrop areas are also shown in order to illustrate their geographic relationship to the subsurface provinces.

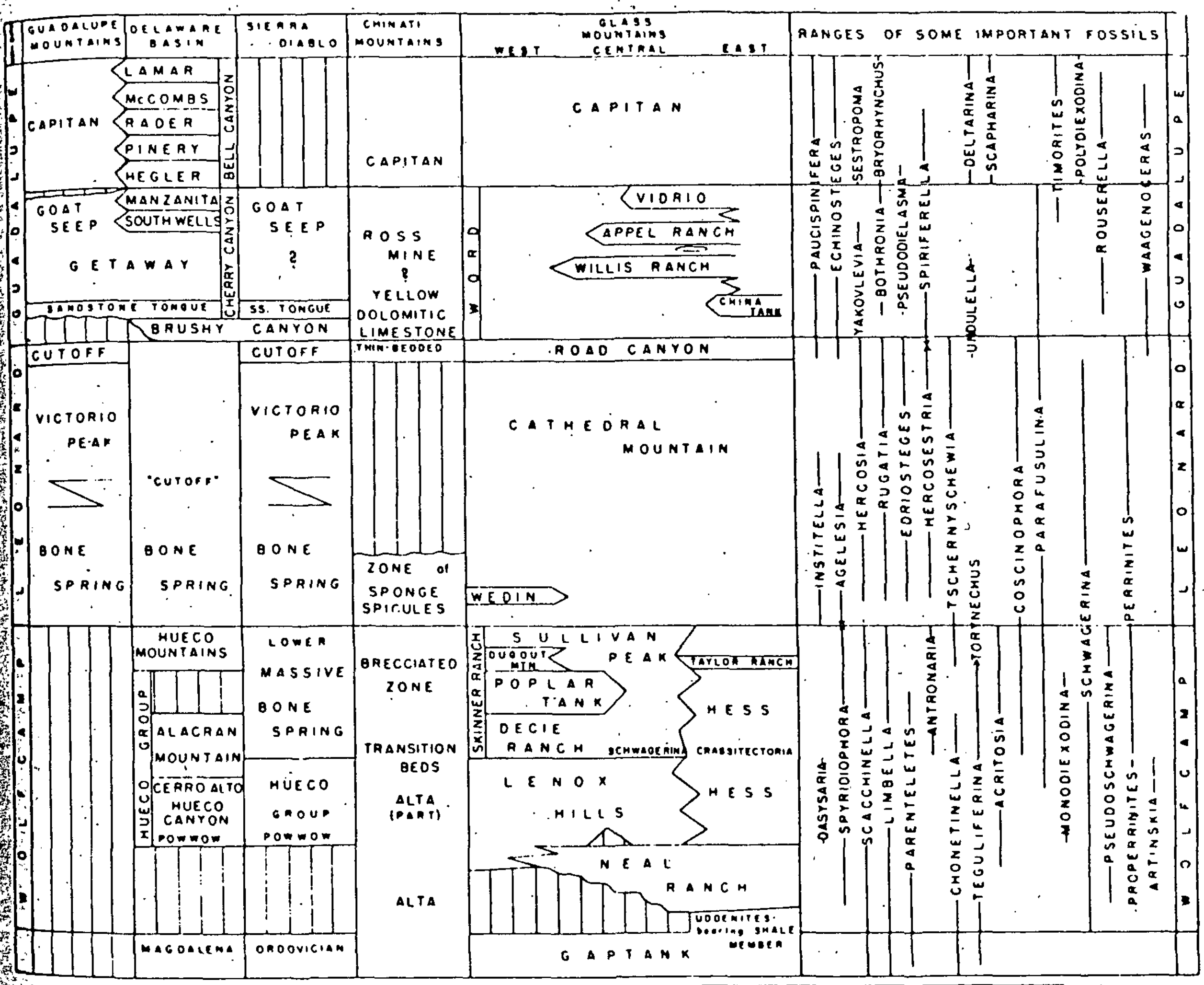
Series	Delaware Basin		Central Basin Platform and Northwest Shelf	Midland Basin
Ochoan	Dewey Lake		Dewey Lake	Dewey Lake
	Rustler		Rustler	Rustler
	Salado		Salado	Salado
	Castile			
Guadalupian	Bell Canyon	Delaware Mtn. Gp.	Tansill	Tansill
			Yates	Yates
	Cherry Canyon		Seven Rivers	Seven Rivers
			Queen	Queen
	Brushy Canyon		Grayburg	Grayburg
			San Andres	San Andres
Leonardian	Bone Spring	1st Sd.	Glorieta	Clear Fork
		2nd Sd.	Clearfork (Yeso)	Spraberry
		3rd Sd.	Tubb-Drinkard	Dean
Wolfcampian	Wolfcamp		Abo (Wichita-Albany)	Wolfcamp
			Hueco	
			"Bursum"	

Figure 21.—Generalized Permian stratigraphic framework of the subsurface of the Permian basin.

Dean while others assigned the Dean a Leonardian age. Recently the debate was settled. Silver and Todd (1969, p. 2243) reported definite Leonardian fusulinids below the Dean and Third Bone Spring sand. There are also additional unpublished subsurface data that support a Leonardian age for the Dean.

Shelf-edge and shelf carbonates of early Leonardian age on the Northwest shelf and Central Basin platform are currently termed "Abo", "Wichita", and "Wichita-Albany". This is a nomenclatural conflict that needs to be formally resolved in print. One positive step in this direction is Meyer's (1966, p. 71) recommendation that on the Northwest shelf the early Leonardian carbonates be designated the Wichita Formation and the term "Abo Formation" be restricted to the red beds to the west in central and south-central New Mexico. Silver and Todd (1969, p. 2243) propose a new name be given these carbonates and the terms "Abo" and "Wichita" be restricted to shelf clastic facies. Neither proposal has as yet been widely accepted. Still, the proper nomenclature of these carbonates is a conflict that needs to be resolved.

The San Andres Formation is one of the most prolific Permian oil-producing horizons of the region. It is a thick, widespread unit found in the subsurface of west Texas and both the subsurface and surface of New



McCLOUD Ls FUSULINID ZONES	GLASS MTNS., WEST TEXAS	DIABLO PLATFORM, WEST TEXAS	NORTH-CENTRAL TEXAS	KANSAS	SERIES
H	SKINNER RANCH Fm (Ros)	ALACRAN MTN Fm (Upper)	CLYDE Fm	NIPPEWALLA Gr STONE CORRAL Fm	LEONARDIAN
(hatched)	Schwagerina crassitectoria	S. crassitectoria	S. crassitectoria	(hatched)	
G	DECIE RANCH Mbr. SKINNER RANCH Fm	(hatched) ?	BELLE PLAINS Fm	SUMNER GROUP	
F	LENOX HILLS Fm.	ALACRAN MTN Fm (Lower)	ADMIRAL Fm		
E	Basal Lenox Hills Congl	Deer Mtn Shale Mbr	(hatched)	(hatched)	WOLFCAMPIAN
D	NEAL RANCH Fm	CERRO ALTO-HUECO CANYON Fms	MORAN-PUTNAM Fms	CHASE-COUNCIL GROVE GROUPS	
B-C	King's Bed 3 ?	Powwow Conglomerate	Salt Creek Bend Shale (see text)	Eskridge Shale	
A	KING'S BED 2 of "GRAY LIMESTONE"	BURSUM Fm	PUEBLO Fm	ADMIRE GROUP	

Figure 22.—Top: Regional correlation of the Permian of west Texas using brachiopods (from Cooper and Grant, 1972). Bottom: Regional correlation of the Permian of west Texas using fusulinids (from Wilde, 1971). Note the great conflict between the two charts.

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ADDENDA

While this paper was in press, I received new information (Garner Wilde, oral communication) that Bostwick's report (1962) of Schwagerina from the Uddenites-bearing Shale Member is invalid and that the total fusulinid fauna of this member is definitely Virgilian. Therefore, on the basis of its ammonites and this new information, I would now regard the age of the Uddenites-bearing Shale Member as Virgilian and place the base of the Permian at the base of the Gray Limestone Member from which Wilde (1971) has reported definite Permian fusulinids.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 19, NO. 2 (FEBRUARY, 1935), PP. 221-261, 7 FIGS.

OUTLINE OF STRUCTURAL DEVELOPMENT OF TRANS-PECOS TEXAS[1]

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ABSTRACT

The mountain area of trans-Pecos Texas is divisible into a northern part, which has been more or less stable, and a southern part, which has shown considerable mobility from Paleozoic down to Cenozoic time. Strong folds and overthrusts of late Pennsylvanian age, raised from a geosyncline, are found in the Marathon and Solitario uplifts in the southern part of the province. Northwest of them, in the stable area, Permian rocks later than the deformation lie unconformably on broadly folded older Paleozoic foreland rocks, and were deposited in broad basins.

In some mountain ranges of western trans-Pecos Texas, and extending southward into Mexico, are close folds and overthrusts raised from a Mesozoic geosynclinal area. East of them are broad folds, domes, and basins of marginal type. These structural features were produced during two movements, one older and the other younger than the extensive Tertiary lavas of central trans-Pecos Texas. These may be classed as the northern ends of the Sierra Madre Oriental of Mexico. After the last folding, trans-Pecos Texas was extensively broken by normal faults, some of the movements being of late Tertiary age, and some of relatively recent date. In the northern stable part of the province, features of Basin and Range type were produced. Here, thick intermontane deposits were laid down in the areas depressed by faulting. The present surface features of trans-Pecos Texas result in part directly from the various later tectonic movements, and to a greater degree from the modification of the structural features by stream erosion.

INTRODUCTION

For a number of years, during the course of other work, the writer has collected information on the structural features of trans-Pecos Texas. Other duties prevent the writing of a long paper on the subject, but some of the interpretations seem to be of sufficient interest to warrant publication. This paper is a brief outline of the subject, in which most of the discussion consists of suggestions rather than well ordered conclusions.

The writer has done considerable field work in parts of trans-Pecos Texas, especially in the Marathon region in the southeast and the Diablo Plateau on the northwest. Notes and maps of N. H. Darton for other parts of trans-Pecos Texas were also available. Darton's observations were made during the preparation of the new

[1] Manuscript received, September 1, 1934. Outgrowth of papers presented by title before the Association at the Oklahoma City meeting, March 24, 1932, and the Houston meeting, March 24, 1933. Published by permission of the director, United States Geological Survey.

[2] United States Geological Survey.

geologic map of Texas. Maps sent in by other geologists for use in compiling the map were also consulted, particularly an interesting set of field sheets made by C. L. Baker in southwestern trans-Pecos Texas.

ACKNOWLEDGMENTS

Through the kindness of E. H. Sellards and C. L. Baker, the writer has been permitted to read their unpublished manuscript on the geologic structure of Texas, soon to be published as Bulletin 3401 of the Bureau of Economic Geology, University of Texas. The writer has avoided as far as possible duplicating any part of this work, and particularly the extensive descriptive matter which it contains. In places Baker's interpretations on trans-Pecos Texas in this manuscript coincide with, and have to a certain extent influenced those of the writer.

The writer is also indebted to W. S. Adkins, formerly of the Bureau of Economic Geology, for many interesting discussions on the Cretaceous strata of the region, and has made extensive use of Adkin's recent valuable summary of the Mesozoic of Texas.[3] Finally, the writer wishes to acknowledge the receipt of numerous suggestions, and of much useful information on adjacent parts of Mexico, from his brother, Robert E. King.

RELATION OF GEOGRAPHIC TO STRUCTURAL FEATURES

In broader topographic features trans-Pecos Texas consists of two parts. On the west side of Pecos River is a belt of plains and low plateaus 50–100 miles in width. Beyond that is a region of mountains and intermontane basins. The mountains rise above the plains on the east along an irregular boundary, trending approximately northwestward, and the eastern mountains might empirically be considered as a front range. Actually, a true front range of continuous structural and topographic character does not exist, for the origin of the land forms and the underlying rock structure in different places is most diverse.

The northern part of trans-Pecos Texas, north of the Texas and Pacific Railway, is a part of the Basin and Range province. The mountains here are broad blocks of flat-lying or gently tilted Paleozoic rocks which rest on a pre-Cambrian basement. Their outlines are largely determined by faults which bound their bases, and the intermontane areas are deeply filled by detritus washed down from the adjacent highlands (Fig. 5).

[3] W. S. Adkins, "Mesozoic Systems," in "The Geology of Texas," Vol. I, "Stratigraphy," *Univ. Texas Bull. 3232*, (1933), pp. 239–517.

South of the Texas and Pacific Railway, normal faulting has a
conspicuous effect on the topography in only a few areas. The region
has been one of greater mobility than that farther north, and the
sedimentary and volcanic rocks which form the mountains have been
tilted, flexed, and in places strongly folded by post-Mesozoic move-
ments older than the last faulting (Fig. 5). In many places there are
masses of intrusive igneous rock. The rocks of this region, of diverse
composition and structure, possess a varied resistance to erosion, and
impart distinctive features to the different mountain masses and low-
land areas. The topography in most of the district is thus not pro-
duced directly by the uplift or depression of blocks of the earth's
crust. The southern part of trans-Pecos Texas, in which these features
are displayed, is most closely allied to the mountains and highlands
of northeastern Mexico, such as the Sierra Madre Oriental, and it
forms their northern end (Fig. 6).[4]

PRE-CAMBRIAN STRUCTURAL FEATURES

Depth of pre-Cambrian floor.—Pre-Cambrian rocks are not widely
exposed in trans-Pecos Texas. The most extensive outcrops are along
the edges of the uplifted blocks of the Basin and Range province
where the sedimentary cover is thin. The largest area of outcrop here
is at the margin of the southeastern angle of the Diablo Plateau (Fig.
2) near Van Horn; this is the highest point structurally in trans-
Pecos Texas.[5] Its present height is caused largely by block-faulting,
but west of Van Horn, Permian rocks overlap the older Paleozoic and
rest on the pre-Cambrian over a wide area, and in one part of the dis-
trict (near Eagle Flat station), the Permian is in turn overlapped by
the Cretaceous. The area has, therefore, had a long positive history.
Farther east, near Fort Stockton, pre-Cambrian granites have been
penetrated by a boring at a depth of 4,750 feet;[6] here they are over-
lain by the Permian, and probably lie on the crest of a similar positive
area of basement rocks (Fig. 2).

[4] The relation between the physical features of trans-Pecos Texas and those of im-
mediately adjacent parts of northern Mexico is shown on Sheet North H-13 (Chi-
huahua) of the American Geographical Society's millionth map of Hispanic America,
published in 1934.

[5] C. L. Baker, "Exploratory Geology of a Part of Southwestern Trans-Pecos
Texas," *Univ. Texas Bull. 2745* (1927), p. 41. In this and some other writings Baker
refers to the district as the "Van Horn dome." To the writer the term "dome" does not
well express the complexity of the uplift: some of the older movements have been dome-
like, but its present altitude has been produced largely by normal faulting.

[6] E. H. Sellards, "Pre-Paleozoic and Paleozoic Systems," in "The Geology of
Texas," Vol. I, "Stratigraphy," *Univ. Texas Bull. 3232* (1933), p. 52.

Southeast of Van Horn, in a belt extending through Marathon, the pre-Cambrian rocks probably lie far below the surface, for this was a region of geosynclinal deposition during Paleozoic time. Southwest of Van Horn also, the pre-Cambrian is probably deeply covered, for a great thickness of Mesozoic sediments was laid down there. Southeast of the Paleozoic geosyncline, the pre-Cambrian floor apparently rises again; schists probably of this age have been found by Baker near the axis of the Sierra del Carmen on the Mexican side of the Rio Grande, 80 miles south of Marathon (Fig. 2).[7] These may lie not far beneath the Cretaceous in a wide area in this part of Coahuila.

Pre-Cambrian structural features in Diablo Plateau.—The character of the pre-Cambrian basement may best be observed near Van Horn. In the southern part of the area the country rock is schist, which strikes predominantly northeast,[8] but locally with northwest, east-west, and even north-south strikes.[9] In the northern part, the country rocks are the little metamorphosed, later pre-Cambrian sediments of the Millican formation (Fig. 1).

Richardson, during his work in the area for the Van Horn folio,[10] did not find the two units in contact, but a few years ago, in the course of field work a little farther west, north of the Texas and Pacific Railway between Allamore and Eagle Flat stations, the writer was able to demonstrate that the contact was one of overthrust (Fig. 1),[11] in which the schists on the south had moved northward across the Millican. The fault trace is exposed at various scattered localities and trends west-northwest; the plane dips about 30° S. and is intruded by diabase sills. In places the faulted rocks are overlain by Permian rocks which are not disturbed. Recently the writer discovered some small outlying masses of schistose rocks resting on limestones of the

[7] Emil Böse, "Vestiges of an Ancient Continent in Northeast Mexico," *Amer Jour. Sci.*, 5th Ser., Vol. 6 (1923), p. 133.
C. L. Baker, "Desert Range Tectonics of Trans-Pecos Texas," *Pan-Amer. Geol.*, Vol. 50, (1928), p. 358.

[8] G. B. Richardson, *U. S. Geol. Survey, Van Horn Folio 194* (1914), p. 7.

[9] C. L. Baker, *op. cit.*, pp. 7–8.

[10] G. B. Richardson, *op. cit.*, p. 4.

[11] The writer's interpretation is shown in the structure section of figure 25 in N. H. Darton, "Guidebook of the Western United States, Part F, Southern Pacific Lines." *U. S. Geol. Survey Bull. 845* (1933), p. 125. It is interesting to compare this with the descriptions and structure section of W. H. von Streeruwitz, "Report on the Geology and Mineral Resources of Trans-Pecos Texas," *Texas Geol. Survey 2nd Ann. Rept.* (1891), p. 682 and section *OP*, Pl. 26, which, excepting the age assignments of some of the rocks, is remarkably accurate.

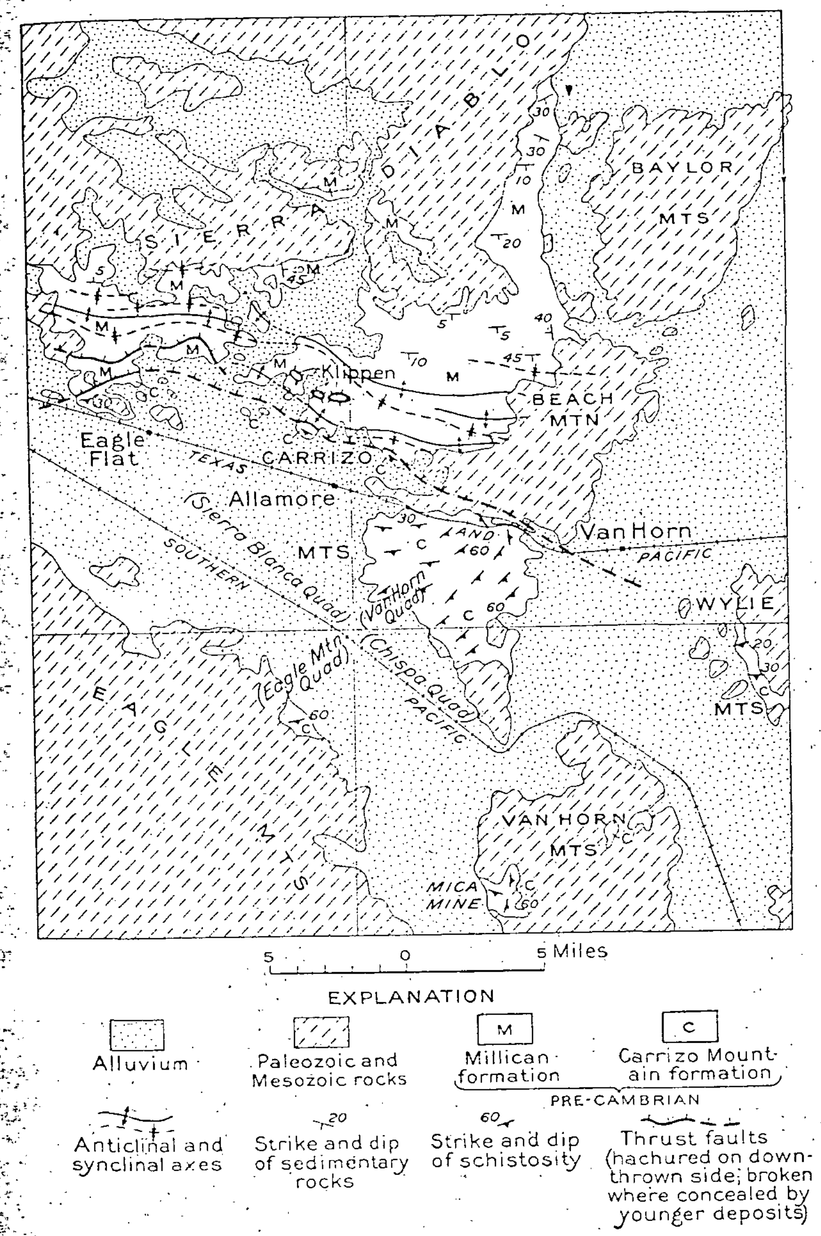


Fig. 1.—Map of Van Horn region to show pre-Cambrian structural features. Area south of Texas and Pacific Railway mainly after G. B. Richardson and C. L. Baker. Area on north by P. B. King.

formation about 4 miles due north of Allamore (Fig. 1). They are probably *klippen* of the overthrust.

North of the fault the limestones of the Millican are sheared and marmorized. For a distance of 3 or 4 miles they and the associated conglomerates and red sandstones are intensely folded with west-northwest strike, but beyond, the metamorphism is no greater than in the overlying Paleozoic, and the formation passes beneath the younger rocks of the Sierra Diablo to the north with dips of only a few degrees.[12] The coarse angular conglomerates of the Millican formation in this region consist in small part of fragments of schist and igneous rock, but predominantly of limestone, presumably derived from a lower member of the formation. Another limestone member is also present at the top of the succession at such places as Tumbledown Mountain west of Beach Mountain (Fig. 1). The conglomerate apparently thins and intergrades with sandstone toward the north, as though derived from an area of uplift near the site of the observed overthrust. The northward thrusting of pre-Cambrian rocks toward a seemingly stable area in the plateau is similar to the structural relations in post-Cretaceous time described later in the paper. Both the schists and unaltered sedimentary rocks are penetrated by numerous small masses of diabase of pre-Cambrian age. The Van Horn sandstone (Cambrian) rests unconformably on them in places, and contains their reworked fragments.

Farther northwest, in the Diablo Plateau, the pre-Cambrian basement apparently consists largely of red granite and rhyolite porphyry. At the base of the Sierra Diablo escarpment northwest of Van Horn the Cambrian (Van Horn sandstone) is a great mass of red arkose with numerous layers of coarse bouldery conglomerate. Surprisingly enough, few of the fragments come from the underlying schistose and sedimentary rocks, but are instead largely of granite and rhyolite. Some of the rounded boulders reach 3 feet across. These coarse clastics must have come from high lands farther northwest, now largely buried by Paleozoic strata. About 35 miles north of Sierra Blanca, within the plateau, are some low hills of rhyolite porphyry like that in the Cambrian conglomerates on the south (Fig. 2); near by are exposures of Permian and Cretaceous limestones. N. H. Darton has suggested to the writer that these are a projecting summit of the pre-Cambrian floor.[13] Farther west, at the south end of the Hueco... -brian (Bliss sandstone).[14] These igneous rocks may be younger than the Millican formation, for in the Franklin Mountains west of the Huecos, the Llanoria quartzite is overlain by thick rhyolite flows, and

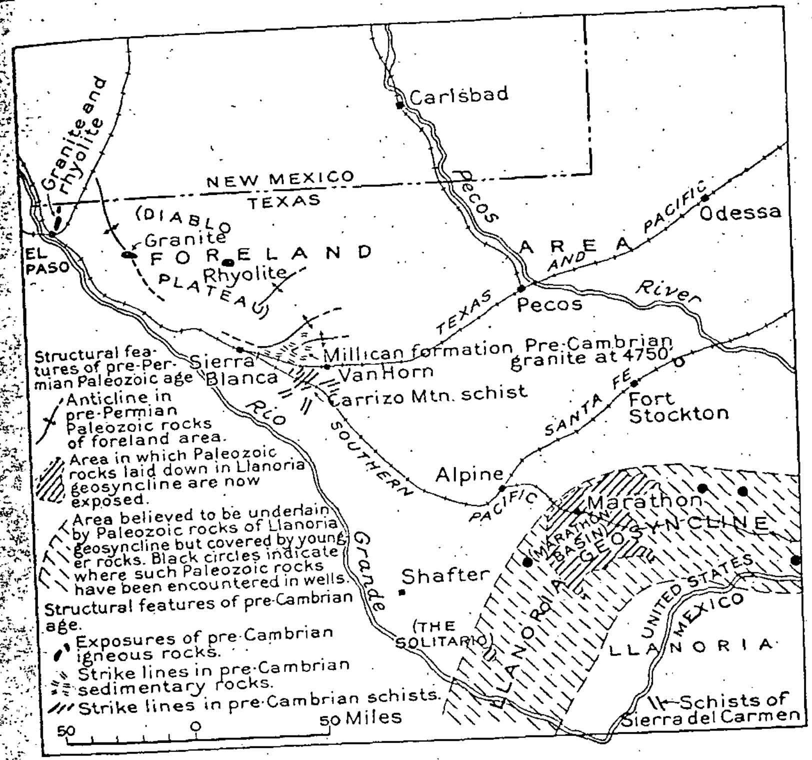


FIG. 2.—Map of trans-Pecos Texas to show pre-Cambrian and pre-Permian Paleozoic structural features.

both in turn are intruded by red granites.[15] This quartzite, like the Millican formation, consists of little metamorphosed or folded rocks, probably of late pre-Cambrian age.

[12] N. H. Darton, *op. cit.*, Fig. 25, p. 125.

[13] N. H. Darton, personal communication, 1930.

[14] P. B. King, "Permian Stratigraphy of Trans-Pecos Texas," *Bull. Geol. Soc. Amer.*, Vol. 45 (1934), Fig. 2 D, p. 714.

[15] G. B. Richardson, *U. S. Geol. Survey El Paso Folio 166* (1909), p. 6. The rhyolites here were correctly interpreted by Richardson, but all the granites were mapped by him as post-Carboniferous. According to J. G. Barry of El Paso, they are of this age in the northern part of the range only. In the southern part, the writer was, in 1933, shown exposures by Barry in which the Cambrian (Bliss) lay on an eroded surface of red granite.

... deformed Paleozoic basin of southeastern trans-
... feet are exposed. These consist of shaly lime-
... bedded chert, and novaculite of Ordovician and Devonian (?) age below[17] and of a vast succession of shales and arkosic sandstone of Pennsylvanian age above.[18] The upper few thousand feet of the Pennsylvanian is more coarsely clastic than the lower part, and includes the remarkable boulder bed of the Haymond formation,[19] whose fragments reach gigantic proportions, and numerous limestone and chert cobble beds in the Gaptank formation above.

These rocks are thrown into northeast-trending folds, overturned toward the northwest, broken by numerous thrust faults, and fractured transversely by many tear faults. The faulting culminates on the northwest in the nearly flat-lying Dugout Creek overthrust, with a known displacement of over 6 miles.[20] Farther southeast are other great thrusts, also with miles of displacement, some of which are folded and therefore younger than that on Dugout Creek. Careful estimates of the amount of crustal shortening in the area suggest that each present mile across the strike of the folds was originally $1\frac{1}{2}$–3 miles wide; moreover, the total displacement of all the overthrusts which would be encountered in a single cross section across the strike would amount to nearly 15 miles.

It is the writer's belief that the movements which produced this great compression were pulsatory. Evidently they culminated toward the end of the Pennsylvanian, for the rocks on the northwest, with *Schwagerina* and other early Permian fossils, are gently tilted rather than folded, and in places overlie the older rocks with great unconformity. The folding began earlier, for lower down in the section, in the Gaptank and Haymond formations, are conglomerates and boulder beds. These contain fragments of rocks of the geosyncline that would have been deeply buried if there had been no movements to

[16] The stratigraphy and structure of this region are described in more detail in a manuscript dealing with the geology of the Monument Spring and Marathon quadrangles, which the writer has submitted to the United States Geological Survey for publication.

[17] P. B. King, "Pre-Carboniferous Stratigraphy of the Marathon Uplift, West Texas," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 15, No. 9 (September, 1931), pp. 1059–86.

[18] P. B. King, "Geology of the Glass Mountains," Part 1, "Descriptive Geology," *Univ. Texas Bull. 3038* (1931), pp. 31–49.

[19] C. L. Baker, "Erratics and Arkoses in the Middle Pennsylvanian Haymond Formation of the Marathon area," *Jour. Geol.*, Vol. 40 (1932), pp. 581–92.

[20] P. B. King, *op. cit.*, pp. 108–10.

bring them to the surface. ...
rocks are crumpled and brecciated. The writer has seen such ...
tion in the cherts in their parent ledges only near faults and close folds.

In brief, then, the structural history of the Marathon basin in Paleozoic time was: first, during the early Paleozoic a great thickness of limy, cherty, and fine clastic sediments accumulated in an area of subsidence, the Llanoria geosyncline.[21] Next, in early Pennsylvanian time the sediments became coarser, probably as a result of strong uplift of lands on the southeast; the sediments filled the geosyncline more rapidly than before, since they exceed in thickness the underlying deposits. The fine fragments are, however, of granitic and metamorphic rocks which are foreign to the region. Then, in later Pennsylvanian time, conditions radically changed and coarse conglomerates appear which have a near-by source. The presumption is strong that they were derived from folds rising from the geosyncline. Finally, near the end of Pennsylvanian time, the whole folded mass was driven forward on the Dugout Creek overthrust. This fault has not since been folded and Permian rocks overlie it unconformably, so that these late Pennsylvanian events probably mark the last phase of the intense deformation.

Extensions of Marathon folds southwest and northeast.—The Llanoria geosyncline did not have the same form as the modern, nearly circular Marathon basin, but had a much greater extent toward the southwest and northeast (Fig. 2). At the edges of the Marathon basin, rocks of geosynclinal facies strike in these directions beneath the Cretaceous cover. On the southwest a small patch of the folded rocks comes up in the Solitario dome, 35 miles southwest of the edge of the basin (Fig. 2).[22] Here Sellards reports the existence of folded overthrusts like those southeast of the Dugout Creek thrust in the Marathon basin. The further extension of the folds toward the southwest is not known, since in this direction they pass beneath a thick cover of Cretaceous strata and Tertiary lava flows.

A few miles east of the Marathon basin, water wells several hundred feet deep penetrate Pennsylvanian rocks of Marathon facies,[23] and deep wells in the southeast part of Terrell County and in Val

[21] E. H. Sellards, *op. cit.*, p. 129.

[22] *Ibid.*, Fig. 9, p. 119.
"Overthrusting in the Solitario Region" (abstract), *Bull. Geol. Soc. Amer.*, Vol. 43 (1932), pp. 145–46.

[23] D. D. Christner and O. C. Wheeler, "The Geology of Terrell County," *Univ. Texas Bull. 1819* (1918), pp. 11–12.

Verde County have entered sheared and talcose (and therefore probably deformed) shales, possibly of Pennsylvanian age, after passing through a thick Cretaceous section.[24] The position of these wells suggests that the strike of the folded belt bends to an east-southeast course east of the Marathon basin (Fig. 2), but farther east, according to the work of Sellards, Miser,[25] and others, it again bends toward the north and emerges from the Cretaceous cover in the Ouachita Mountains of Oklahoma.

Paleozoic land area of Llanoria.—On the southeast, the Llanoria geosyncline was probably bounded by an area of highlands underlain by crystalline rocks. This has been called Llanoria by analogy with the land mass of that name which is supposed to have lain south of the Ouachita Mountains.[26] The existence of such a land is suggested in the Paleozoic sediments in the Marathon basin by the thickening of clastic and cherty sediments southeastward; by the replacement of limestones by shales, and of shales by sandstones in this direction; and by the occurrence in the clastic sediments of pebbles of vein quartz, grains of schistose and granitic rocks, and (in the Haymond boulder bed) of cobbles of igneous rocks.

A positive area which existed in northeastern Mexico in early Mesozoic time may have been a remnant of the older land, Llanoria[27] (Fig. 7). In this region, which occupied part of northern Coahuila, Jurassic and early Cretaceous rocks are either absent or are represented by a marginal clastic facies.[28] Within the area, in the Sierra del Carmen, the schists reported by Baker are overlain by Lower Cretaceous rocks approximately of Glen Rose age, and at Las Delicias, Coahuila (Fig. 7), rocks of the same age rest directly on the Permian.[29] South and southwest of a line extending westward from Saltillo to

[24] E. H. Sellards, "Pre-Paleozoic and Paleozoic Systems," in "The Geology of Texas," Vol. 1, "Stratigraphy," *Univ. Texas Bull. 3232* (1933), pp. 190–91 and Fig. 10, p. 128.

[25] H. D. Miser and E. H. Sellards, "Pre-Cretaceous Rocks Found in Wells in the Gulf Coastal Plain South of the Ouachita Mountains," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 15, No. 7 (July, 1931), pp. 807–08.

E. H. Sellards, "Rocks Underlying Cretacous in Balcones Fault Zone of Central Texas," *ibid.*, pp. 819–20.

[26] H. D. Miser, "Llanoria, the Paleozoic Land Area in Louisiana and Eastern Texas," *Amer. Jour. Sci.*, 5th Ser., Vol. 2 (1921), pp. 61–89.

[27] P. B. King, "An Outline of the Structural Geology of the United States," *Guidebook 28 International Geol. Cong. XVI Session, 1933*, p. 41.

[28] Emil Böse, "Vestiges of an Ancient Continent in Northeast Mexico," *Amer. Jour. Sci.*, 5th Ser., Vol. 6 (1923), pp. 130–136.

[29] R. E. King, "The Permian of Southwestern Coahuila," *Amer. Jour. Sci.*, 5th Ser., Vol. 27 (1934), p. 109.

Torreon in southern Coahuila, and thence [illegible] Chihuahua to western trans-Pecos Texas, Jurassic and early Cretaceous rocks are developed to a great thickness. Strong post-Mesozoic folding took place in this area of thick sedimentation and the general northwestward Cordilleran trend is deflected around the positive area.[30]

Foreland areas northwest of Llanoria geosyncline.—The northwest edge of the Llanoria geosyncline may have lain near the northwest margin of the present Marathon basin. In this district, near the front of the Dugout Creek overthrust, the lowest formation of the Pennsylvanian (Tesnus), a typical geosynclinal deposit of sandstones and shales, is only a few hundred feet thick, although a few miles farther southeast it is several thousand feet in thickness.[31] A few miles south of the outcrop of the overthrust, a shale formation in the Ordovician contains large limestone boulders of Cambrian and Ordovician age, of foreland facies.[32] Whether these reached their present positions by normal processes of transportation and deposition, or by some process of tectonic intercalation, they suggest that the foreland area lay not far on the northwest. The Dugout Creek overthrust may form the boundary between geosynclinal and foreland rocks in this part of the basin, but nothing is known of the older rocks overridden by the fault. In the northeast part of the basin, the disturbance in the Paleozoic rocks appears to die out northwestward by diminution of the folds, so that the highest Pennsylvanian passes beneath tilted Permian of not greatly younger age beyond, without evident difference in dip or strike.

Northwest of the Llanoria geosyncline the nearest exposures of the pre-Permian Paleozoic rocks lie at a distance of a hundred miles or more and are of very different facies. As exposed along the edges of the Diablo Plateau and Franklin Mountains in the Basin and Range province, the section is largely limestone. At the base are Upper Cambrian sandstones resting on the pre-Cambrian basement and followed by several thousand feet of Ordovician and Silurian limestones.[33] A number of stages of the Middle Ordovician found at Mara-

[30] Emil Böse, *op. cit.*, Fig. 1, p. 128.

L. B. Kellum, "Reconnaissance Studies in the Sierra de Jimulco," *Bull. Geol. Soc. Amer.*, Vol. 43, (1932) pp. 541–64.

[31] P. B. King, "The Geology of the Glass Mountains," Part I, "Descriptive Geology," *Univ. Texas Bull. 3038*, pp. 31–32.

[32] P. B. King, "Pre-Carboniferous Stratigraphy of the Marathon Uplift," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 15, No. 9 (September, 1931), pp. 1063–64.

[33] G. B. Richardson, *U. S. Geol. Survey El Paso Folio 166*, pp. 3–4; *U. S. Geol. Survey Van Horn Folio 194*, pp. 4–5.

tion are absent here, although the Silurian has no representative at Marathon. The Mississippian and Pennsylvanian together are but 2,000 feet thick and nearly all limestone. Beds at Marathon equivalent to part of the section are clastic. The highest Pennsylvanian beds of the Hueco Mountains are of about the same age as the highest ones at Marathon, but in the Sierra Diablo, no strata higher than the lower Pennsylvanian remain.[34] The Pennsylvanian and older rocks were gently folded and deeply eroded before Permian time, so that the basal Permian strata, containing *Schwagerina*, rest in the northern Hueco Mountains on the Pennsylvanian, in the southern Hueco Mountains on rocks as old as the Ordovician, and in the southern Sierra Diablo on the pre-Cambrian. In the Pennsylvanian section of the Hueco Mountains there is no evidence of movements before the close of the period of deposition, and it is probable that the deformation in this foreland area corresponds with the culmination of the movements at Marathon.

The late Pennsylvanian uplift in the Hueco Mountains follows the general northwest trend of the present range (Fig. 2), with the older rocks dipping more steeply than does the Permian off each side of the axis. In the Sierra Diablo a reconstruction of the late Pennsylvanian folds which are truncated by the Permian indicates that they had a northeast trend (Fig. 2). A particularly well marked broad syncline extends northeastward from the southeast corner of the Sierra Diablo under the Baylor Mountains (Fig. 1). The folds in the Hueco Mountains and the Sierra Diablo apparently follow the west and southeast edges of the Diablo Plateau area.

East of the Sierra Diablo the Paleozoic foreland rocks are deeply covered by younger strata. Near Fort Stockton, as previously noted, pre-Cambrian granites have been penetrated by the drill beneath the Permian. Still farther east, Pennsylvanian limestones and Middle Ordovician shales have been penetrated by deep wells in Reagan County,[35] and beneath them are limestones probably to be correlated with the Ellenburger farther east. The latter has also been reached by deep borings in Crockett and eastern Pecos counties on the south,[36] within 100 miles of the Marathon basin. These rocks, like those in northwestern trans-Pecos Texas, are of foreland facies.

[34] P. B. King, "Permian Stratigraphy of Trans-Pecos Texas," *Bull. Geol. Soc. Amer.*, Vol. 45, pp. 697–798.

[35] E. H. Sellards, H. P. Bybee, and H. A. Hemphill, "Producing Horizons in the Big Lake Oil Field, Reagan County," *Univ. Texas Bull. 3001* (1930), pp. 149–203.

[36] E. H. Sellards, "Pre-Paleozoic and Paleozoic Systems" in "The Geology of Texas," Vol. 1, "Stratigraphy," *Univ. Texas Bull. 3232*, (1933), p. 80.

After the late Pennsylvanian deformation the former area of subsidence of the Llanoria geosyncline stood as a land area, probably of mountainous character. North and northwest of this land, Permian sediments were deposited in new areas of subsidence, or foredeeps,[37] formed on the surface of broadly folded and deeply eroded foreland rocks. The subsidence was apparently irregular, and various facies of Permian sediments were sharply limited.

Stratigraphic relations.[38]—In such areas in trans-Pecos Texas as the Glass, Guadalupe, Delaware, and Apache mountains, and the Sierra Diablo, great changes in the character of the Permian strata may be observed along the strike. Thick deposits of siliceous shale are found in the Glass Mountains, and in the north similar rocks are associated with black shaly limestone and fine-grained sandstone. The three types of rock are apparently closely related; the sandstone grades by diminution of the grain size into siliceous shale, and the shale by increase in calcareous and bituminous matter into black limestone. In the Glass Mountains and Shafter district in the south, at least a part of these sediments came from the erosion of the upraised folds of the Llanoria geosyncline, since they contain fragments of granite and of the older Paleozoic cherts and limestones, but the source of the greater part of the Permian clastic sediments is still problematical.

Laterally the clastic sediments interfinger with massive lenticular bodies of limestone which are generally interpreted as limestone reefs.[39] Beyond the limestone reefs are bedded dolomitic limestones. The direction of this change in facies is the same in all parts of each section, but varies from one mountain area to another. These lateral changes are represented in the stratigraphic diagram of the Glass Mountains by the writer, and that of the Guadalupe Mountains by Crandall.[40] There was a tendency for rocks of one facies to be deposited in the same general area throughout Permian time.

[37] W. A. J. M. van der Gracht, "Permo-Carboniferous Orogeny in the South-Central United States," *Verh. der Kon. Akad. van Wetenschappen te Amsterdam*, Deel 27, No. 3 (1931), pp. 80–81.

[38] The stratigraphic and structural features of the Permian of this region are discussed and interpreted at greater length in the writer's paper on, "Permian Stratigraphy of Trans-Pecos Texas," *Bull. Geol. Soc. Amer.*, Vol. 45 (1934), pp. 697–798.

[39] E. R. Lloyd, "Capitan Limestone and Associated Formations of New Mexico and Texas," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 13, No. 6 (June, 1929), pp. 645–48.

[40] P. B. King, "Geology of the Glass Mountains," Pt. 1, "Descriptive Geology," *Univ. Texas Bull. 3038* (1931), Fig. 17, p. 52.
K. H. Crandall, "Permian Stratigraphy of Southeastern New Mexico and Adjacent Parts of Western Texas," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 13, No. 8 (August, 1929), Fig. 4, p. 934.

Drilling east of the mountains has disclosed similar relations, and demonstrated that this complex of clastic deposits, limestone reefs, and bedded limestones extends far toward the east. East of Pecos River borings have penetrated a broad uplift of north-northwest trend, not exposed at the surface, known as the Pecos uplift (Central Basin platform).[41] This is capped on the west side by massive

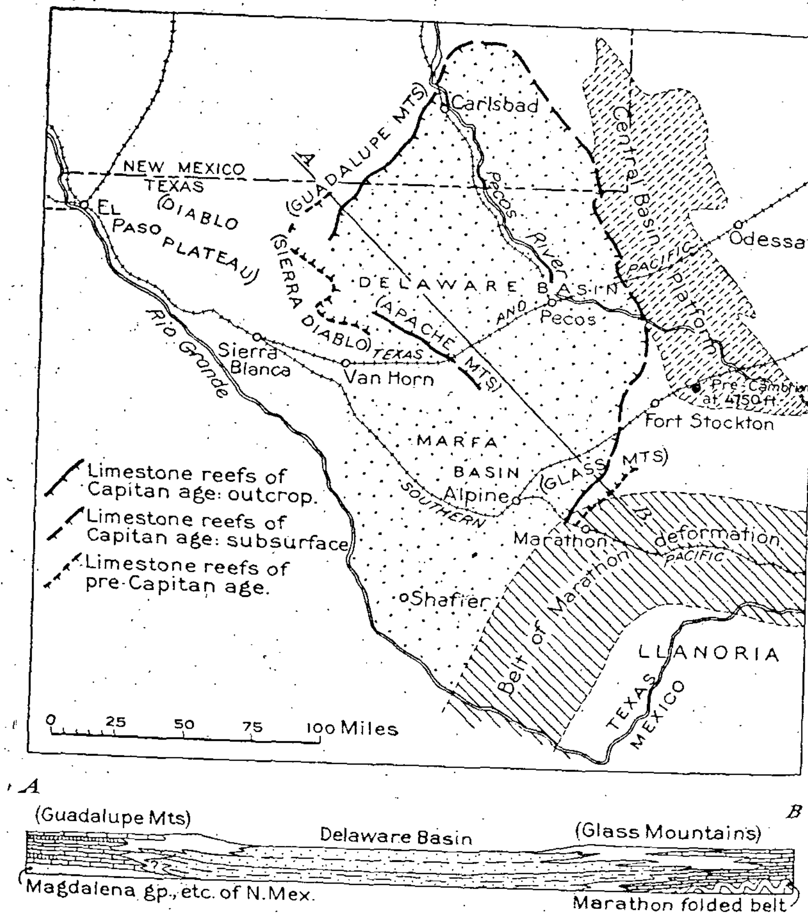


FIG. 3.—Map of Trans-Pecos Texas to show Permian structural features. Below is hypothetical stratigraphic diagram along line *AB* of map. Subsurface information chiefly from Bybee, Cartwright, and Lloyd. Surface information by P. B. King. The Central Basin platform has also been called the Pecos uplift. The Midland basin, noted in the text, lies east of it.

[41] Called Pecos uplift by Sellards, *op. cit.*, p. 52. Originally named the Central Basin platform by L. D. Cartwright, "Transverse Section of Permian Basin, West Texas and Southeast New Mexico," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 14, No. 8 (August, 1931), p. 970.

limestone deposits similar to those in the mountain areas farther west. They are shown by drilling to have been connected, in their later stages at least, with the upper limestones of the Glass Mountains on the south, and those of the Guadalupe Mountains on the north (Fig. 3). The black limestones, siliceous shales, and sandstones were apparently confined in their extent to the area between the limestone reefs in the mountains on the west and those on the Pecos uplift on the east. This intervening area has been called the Delaware basin.[42]

Other similar basins apparently existed on the east and west. East of the Pecos uplift is the Midland basin,[43] known only from drilling, which was joined with the Delaware basin around the south end of the Pecos uplift. West of the Delaware basin, south of the Sierra Diablo, and west of the Glass Mountains, there appears to have been another depression, which has been called the Marfa basin (Fig. 3),[44] but this feature is not well known.

During Permian time there was a gradual retreat of the sea southwestward, so that marine conditions persisted in the Midland basin and the area on the northeast only until the middle of the epoch. After this, the basin was cut off from free access to the sea and received only saline deposits and red sediments. Marine conditions persisted longer in the Delaware basin, but later on (in post-Capitan time) it too was cut off from the sea, and was filled by the gypsum, anhydrite, salt, and potash deposits of the Castile formation.

Structural features.—The Delaware basin, of which most is now known from a study of exposures and drill records, is believed by the writer to have been a region of subsidence greater than that of the surrounding areas during the time of Permian deposition. As such, it served as a trap for the clastic sediments deposited in it. The subsidence was probably greatest in the center where the deposits appear to be the thickest, but all the basin may have subsided more than the surrounding areas, which were apparently more stable. At many places, in exposures along the margins of the basin, the writer has observed that the rocks are bent down toward it on monoclinal flexures, which separate the clastic deposits from the limestone deposits near by.

The outlines of the basin were perhaps determined by lines of

[42] Originally named the Delaware Mountain basin by Robin Willis, "Structural Development and Oil Accumulation in Texas Permian," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 13, No. 8 (August, 1929), Fig. 1, p. 1034.

[43] So called by Sellards in his unpublished manuscript on the geologic structure of Texas. Originally named the main Permian basin by Willis, *op. cit.*, Fig. 1, p. 1034.

[44] F. H. Lahee, "Contributions of Petroleum Geology to Pure Geology in the Southern Mid-Continent Area," *Bull. Geol. Soc. Amer.*, Vol. 43 (1932), Fig. 2.

weakness in the basement rocks of the region. In the Apache Mountains and the Sierra Diablo, the margins of the basin area trend west-northwest and lie close to and parallel with Tertiary normal faults. The latter may have been produced by later movements along the same lines of weakness. A similar relation can be suspected in the Pecos uplift. Drilling in at least one place, near Fort Stockton toward its southern end, has shown it to be underlain by pre-Cambrian rocks at a relatively shallow depth. On Bybee's map[45] the platform is represented with block-like outlines, composed of a number of straight north-northwest trending parts which stand in *en échelon* relation to each other. The limestone reefs follow, in a general way, the margins of the uplift. Although the reefs are crossed by later minor folds,[46] this parallelism is close enough to suggest that the reefs owe their positions to a structural control. It is possible that slight movements on monoclinal flexures at the time of deposition would bring about an environment, on the upper parts of the flexures, which would be more favorable than the surrounding areas, both for the precipitation of limestone and for the growth of lime-secreting organisms. The Diablo Plateau area, west of the Delaware basin, received limestone deposits during Permian time, and may, like the Pecos uplift, have been a relatively stable area.

The formation of basins and platforms in the foreland area during Permian time was accomplished by relatively slight movements. It may be that toward the southeast, within the area of the former Llanoria geosyncline and the land Llanoria, there were stronger movements. At Las Delicias, southwestern Coahuila, which may lie within this province, the Permian rocks are largely lava flows and tuffs, with subordinate marine shales and limestones. These rocks are thrown into steep folds, broken by small overthrust faults, and intruded by granite.[47] The deformation by which this was accomplished is older than the Cretaceous, but is younger than the strong folding and faulting in the Llanoria geosyncline in trans-Pecos Texas. It may, however, have been a continuation of the same disturbance.

MESOZOIC AND EARLY TERTIARY STRATIGRAPHY

In early Mesozoic time the surface features of late Paleozoic time were obliterated by a long period of erosion, during which the region

[45] H. P. Bybee, "Some Major Structural Features of West Texas," *Univ. Texas Bull. 3101* (1931), Fig. 5, p. 26.

[46] According to information from the subsurface geologists. An example of later folding near a limestone reef is given by Willis, *op. cit.*, Fig. 3, p. 1039.

[47] R. E. King, "The Permian of Southwestern Coahuila," *Amer. Jour. Sci.*, 5th Ser., Vol. 27 (1934), pp. 108–11.

was reduced to a peneplain. There was a slight recurrence of downwarping in the Permian basin northeast of trans-Pecos Texas, where Triassic red beds (Dockum group) were deposited,[48] but activity on Paleozoic structural lines almost ceased. Deposition commenced in Jurassic time in new basins which had a different position and different outlines from those of the Paleozoic.

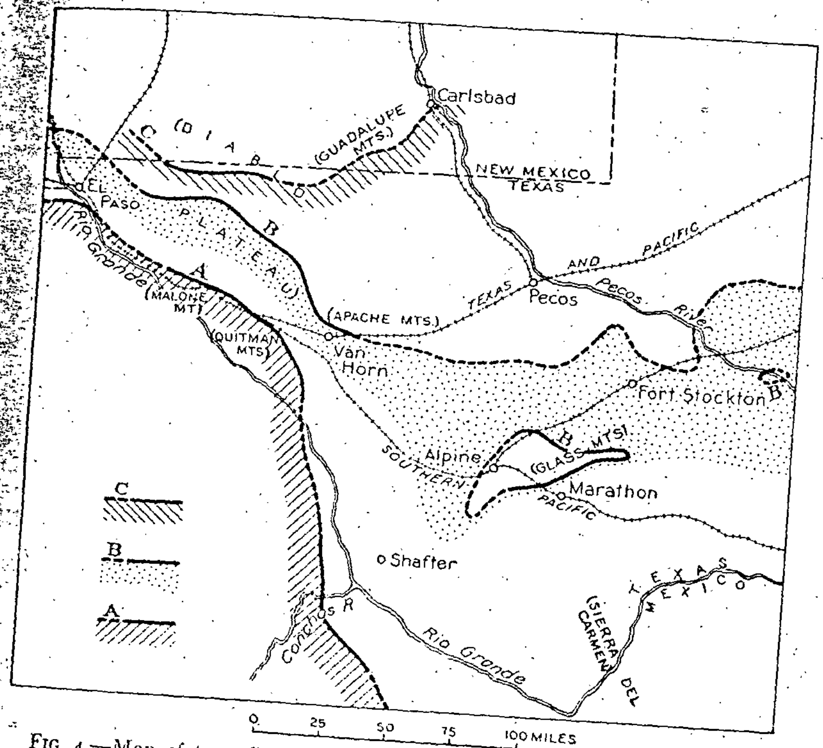
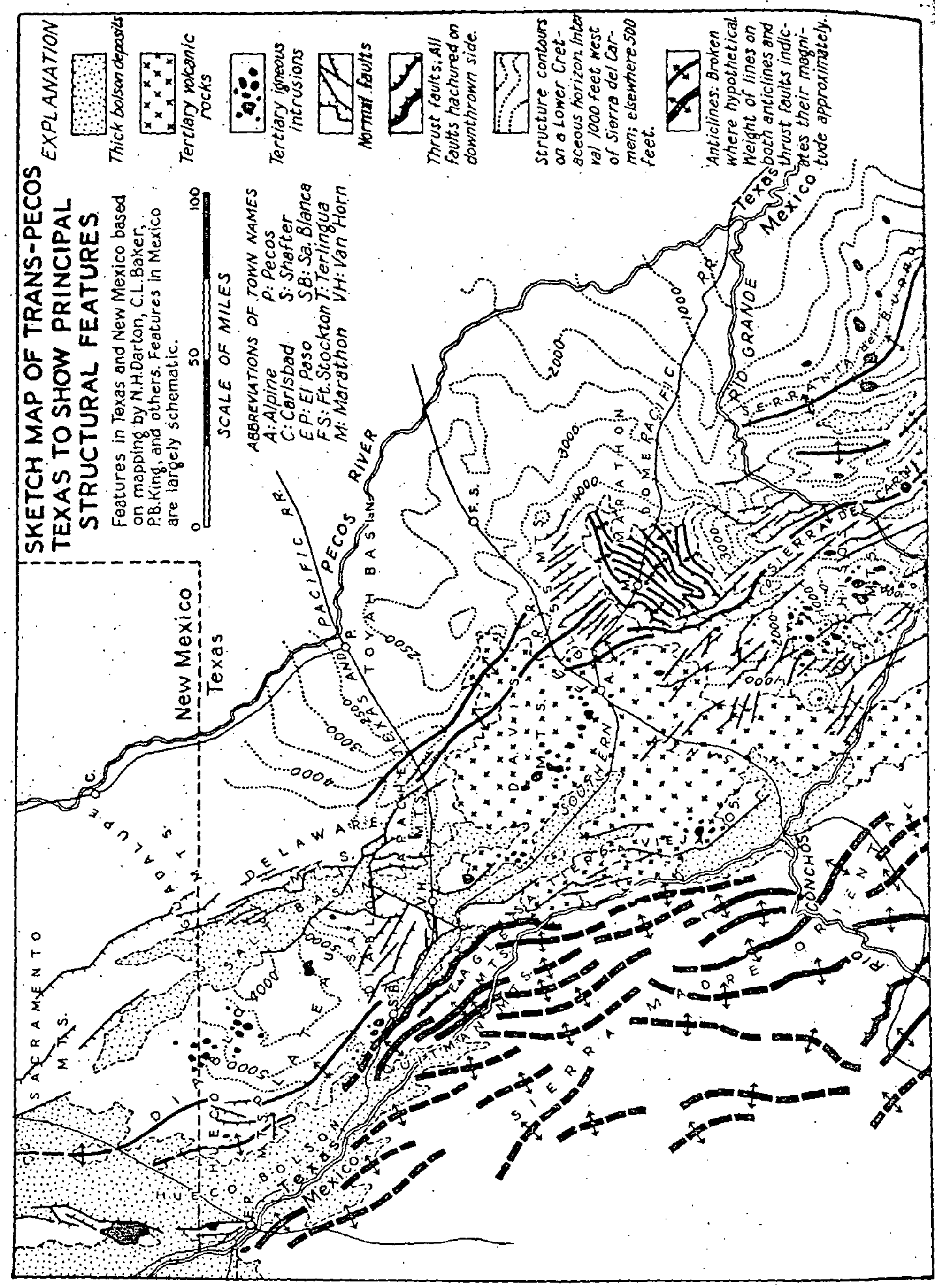


FIG. 4.—Map of trans-Pecos Texas to show advance of sea during Jurassic and Lower Cretaceous time. *A*—Shore line in late Jurassic and early Cretaceous time. *B*—Shore line at close of Trinity time; stippled area show extent of marginal sandstone facies of Trinity group. *C*—Shore line at close of Fredericksburg time. Based on observations of W. S. Adkins, C. L. Baker, and P. B. King.

Jurassic and Lower Cretaceous stratigraphy.—In late Jurassic time, seas extended into a new northwest-trending geosynclinal area lying west and southwest of trans-Pecos Texas (Fig. 4). Northwestward the geosyncline extended as far as the mountains in Mexico south of El Paso and the Eagle, Quitman, and Malone mountains on the Texas side of Rio Grande. Southeastward, it followed the southwest side of the early Mesozoic positive area of northern Coahuila.

[48] J. E. Adams, "Triassic of West Texas," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 13, No. 8 (August, 1929), pp. 1045–54.



A typical geosynclinal section of Jurassic and Lower Cretaceous rocks is exposed along Conchos River in northeastern Chihuahua, across the Rio Grande from trans-Pecos Texas (Fig. 5).[49] Here, the lower 4,000 feet are shales, thin limestones, and thick sandstones, with locally some gypsum, of late Jurassic and early Cretaceous (Neocomian and Aptian) age. This is followed by 5,000 feet of massive rudistid limestone, embracing the upper part of the Trinity, the Fredericksburg, and the Washita groups of Texas. The same formations are also probably present farther southeast, at Sierra Mojada, Coahuila (Fig. 7).[50] A similar, thinner sequence is found in the Malone and Quitman mountains in Texas.[51]

In the foreland area of trans-Pecos Texas on the east and northeast the deposits thin out.[52] Jurassic and early Cretaceous rocks are unknown outside the geosynclinal area, and successive parts of the later Lower Cretaceous section disappear northeastward by overlap on the Paleozoic (Fig. 4). The thick limestone mass of the Conchos valley thins and loses its identity. In southern trans-Pecos Texas the Washita and Fredericksburg parts retain their massive character and form imposing escarpments and canyon walls several thousand feet in height in the Mesa de Anguilla south of Terlingua, and the Sierra del Carmen on the east (Fig. 6).[53] The Trinity part, however, has changed here to alternating limestones and marls,[54] which northward in the Marathon region thin to a few hundred feet and are replaced by a marginal sandstone facies which forms the basal deposit of the Lower Cretaceous in central trans-Pecos Texas (Fig. 4).[55] The Fredericksburg part of the massive rudistid limestones extends far toward the northeast as the Edwards limestone, but in the central Diablo Plateau, it also changes into a marginal sandstone facies,[56] which almost, if not quite, disappears by overlap near the New Mexico line (Fig. 4).[57] The massive limestones of the Washita group change

49 From notes furnished by W. S. Adkins and R. E. King after field work in June and July, 1933. See also R. H. Burrows, "Geology of Northern Mexico," *Bol. Soc. Geol. Mexicana*, Vol. 7 (1910), pp. 1–15.

50 Personal communication from W. S. Adkins, January, 1934.

51 W. S. Adkins, "Mesozoic Systems," in "The Geology of Texas," Vol. 1, "Stratigraphy," *Univ. Texas Bull. 3232* (1933), pp. 292–97.

52 W. S. Adkins, *op. cit.*, Fig. 15, p. 292.

53 J. A. Udden, "Sketch of the Geology of the Chisos Country," *Univ. Texas Bull. 93* (1907), pp. 23–26.

54 W. S. Adkins, *op. cit.*, p. 305.

55 P. B. King, "The Geology of the Glass Mountains," Pt. 1, "Descriptive Geology," *Univ. Texas Bull. 3038* (1931), p. 91.

56 W. S. Adkins, *op. cit.*, p. 353.

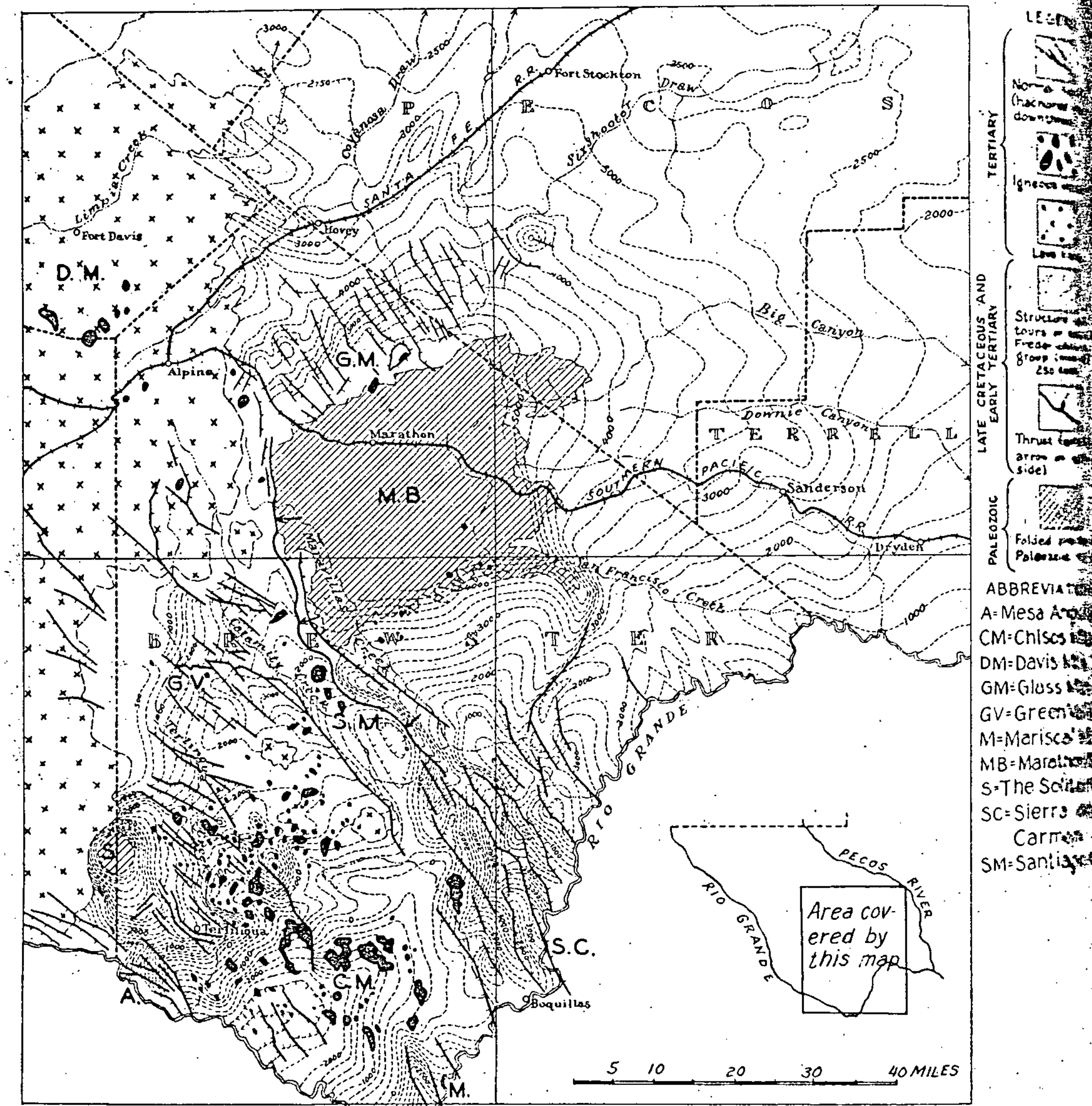


FIG. 6.—Map of southwestern trans-Pecos Texas to show structural features in greater detail than in preceding

northward into marls with abundant fossils of neritic facies; near Fort Stockton two tongues of rudistid limestone of the southern facies are interbedded.[58]

Upper Cretaceous stratigraphy.—The lower part of the Upper Cretaceous, consisting of shales and chalky limestones, is extensively exposed over trans-Pecos Texas, and is found in a few patches overlying the Lower Cretaceous in the geosyncline on the west. The upper part (of Taylor and younger age) is preserved, however, only in two remnant areas, the Sierra Tierra Vieja and the downwarped area surrounding the Chisos Mountains (Figs. 5 and 6). These upper strata, about 3,000 feet thick, record a gradual change from marine to continental conditions.[59] Resting on fossiliferous marine shales of Taylor age are sandstones, containing marine fossils in their lower part and coal beds and dinosaur remains above (Aguja of Adkins). These are followed by bright colored clays (Tornillo of Udden) which are apparently the highest Cretaceous in the region. These are overlain by tuffaceous beds which are apparently of Tertiary age.[60]

Similar beds are found in Mexico on the south, at Hacienda de Mohovano, Coahuila, between Sierra Mojada and Las Delicias (Fig. 7), which contain fossil wood and dinosaur bones, as well as conglomerate beds.[61] No strata of this age have been reported in the geosynclinal area on the west.

Early Tertiary stratigraphy.—Volcanic rocks of Tertiary age occupy a wide tract in central trans-Pecos Texas, including the Davis Mountains on the north, and extending to the Rio Grande between Terlingua and Shafter on the south (Fig. 5). The volcanic succession of lavas, tuffs, and agglomerates reaches a thickness of 4,500 feet in the Sierra Tierra Vieja toward the west.[62] In the Davis Mountains the thickness is less, but even here some escarpments and canyon walls show sections up to 2,000 feet in thickness. Intrusive rocks in the form of dikes, plugs, bosses, and laccoliths, found both in the

[57] *Ibid.*, pp. 354–55.

[58] *Ibid.*, p. 361, *et seq.*

[59] J. A. Udden, *op. cit.*, pp. 41–67.
W. S. Adkins, *op. cit.*, pp. 505–14.

[60] J. A. Udden (*op. cit.* p. 68) found no evident break in the Chisos country between the Tornillo and the tuffaceous beds (Chisos formation) and concluded that the Cretaceous-Tertiary boundary lay above them. The placing of the boundary in the present paper follows the recent conclusions of C. L. Baker for the Sierra Tierra Vieja and C. P. Ross for the Chisos country.

[61] C. Burckhardt, "Etude synthetique sur le Mesozoique mexicain," *Société Paléontologique Suisse Mémoires 49–50* (1930), pp. 217–59.

[62] C. L. Baker, "Exploratory Geology of a Part of Southwestern Trans-Pecos Texas," *Univ. Texas Bull. 2745* (1927), p. 35.

lava country and in surrounding areas of sedimentary rocks, probably belong to the same general epoch. The igneous rocks range from basic to acidic,[63] but alkalic types are common in all classes.

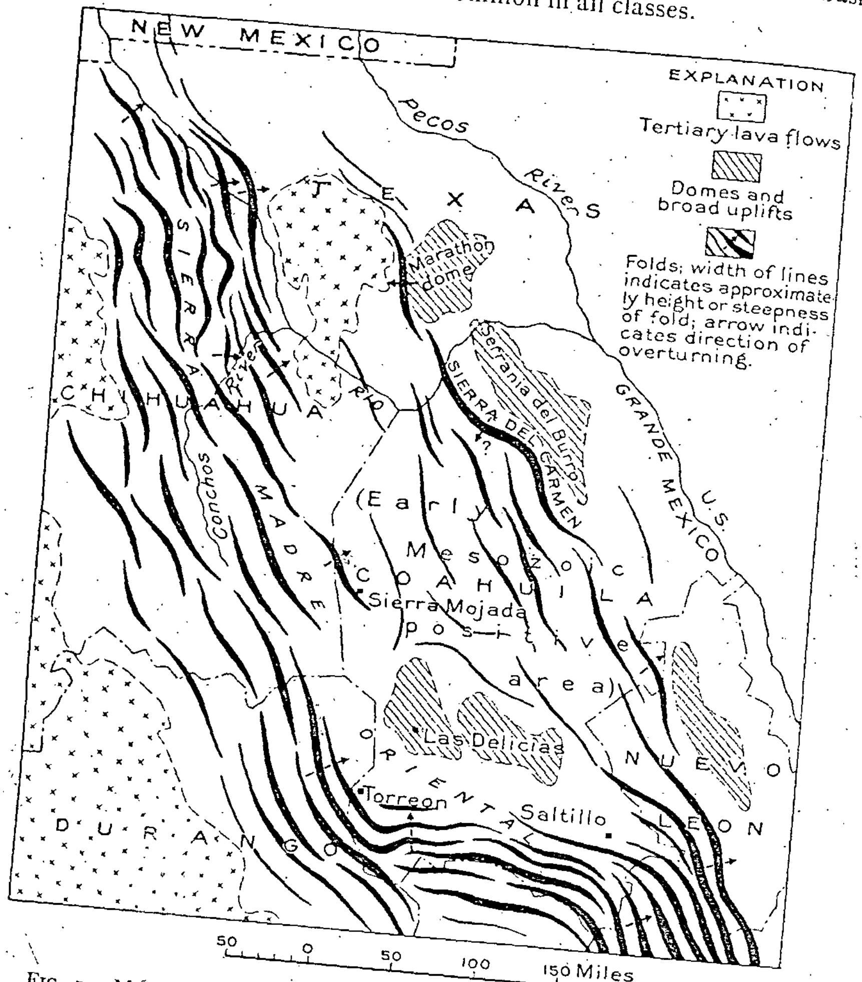


FIG. 7.—Map of western Texas and adjacent parts of northeastern Mexico, to show relation of post-Cretaceous folds of trans-Pecos Texas to those of Sierra Madre Oriental. Compiled from various published and unpublished sources, including Böse, Kellum, and R. E. King.

In the Chisos country the volcanic succession (Chisos formation of Udden) begins with white clays and tuffaceous sandstones, which rest with abrupt contact on the latest Cretaceous clays below. These

[63] F. B. Plummer, "Cenozoic systems," in "The Geology of Texas," Vol. I, "Stratigraphy," *Univ. Texas Bull. 3232* (1933), pp. 800–03.

are followed by coarser sediments, largely of pyroclastic origin, containing numerous lenses of conglomerate, whose fragments are well-rounded pebbles and cobbles of igneous rock and of Lower Cretaceous limestones and cherts. These are overlain by lava flows with interbedded agglomerates and tuffs.[64] A similar succession of pyroclastic sediments (Vieja formation of Vaughan), with few lava flows in the lower several thousand feet, has been studied by Baker in the Sierra Tierra Vieja, but at this place it rests with slight angular discordance on the latest Cretaceous beds below. At the base are conglomerates which contain "huge boulders of Permian and of Lower Cretaceous rocks."[65] It is possible that Tertiary sedimentation began earliest in these two areas, and that the younger members of the volcanic succession overlapped the higher surrounding areas which had been more highly elevated and folded after Cretaceous time.

In areas outside the Chisos country and the Sierra Tierra Vieja the Tertiary volcanic rocks rest, not on the highest Cretaceous, but on a considerable variety of older rocks. At numerous places they lie on the lower part of the Upper Cretaceous (Eagle Ford and Austin), and at many others on the Lower Cretaceous. The steeply tilted Cretaceous rocks on the west flank of the Solitario dome are overlain by lavas gently tilted in the same direction. At one place on the north flank these overlap onto the lower beds of the Washita group, and in the basin carved from the crest of the dome, pyroclastic rocks rest on the folded Paleozoic.[66] A short distance to the west, in the dome-like uplift of the Shafter district, lavas and tuffs lie on the truncated surface of Lower Cretaceous and Permian rocks.[67] Outlying patches of the volcanics rest with gentle dips on the strongly folded and faulted geosynclinal rocks of the northern Eagle and southern Quitman mountains. Similar small patches are reported by R. E. King near Conchos River in Chihuahua. Here they have been tilted, but not as steeply as are the Cretaceous rocks.

In the southeastern Davis Mountains, Baker has collected plants from tuffs near the base of the volcanics, to which an Eocene age has been assigned.[68] Farther north, and also near the base of the vol-

[64] J. A. Udden, *op. cit.*, pp. 60–66, also personal communications from C. P. Ross, August, 1934.

[65] Letter from C. L. Baker, June, 1931.

[66] As pointed out to the writer in the field by C. P. Ross, August, 1934.

[67] C. L. Baker, "Note on the Permian Chinati Series," *Univ. Texas Bull. 2901* (1929), p. 81.

[68] C. L. Baker and W. F. Bowman, "Geologic Exploration of the Southeastern Front Range of Trans-Pecos Texas," *Univ. Texas Bull. 1753* (1917), p. 123.

canics, mammalian teeth have been collected by him which are said to be of Oligocene age.[69] In the western part of the area, Baker has seen only the remains of land tortoises in the volcanics.[70] At the present time no fossils of Miocene age have been collected in the succession. That its upper part may be of this age is suggested by the widespread occurrence of Miocene tuffs and lavas in northern New Mexico and elsewhere in the Cordilleran province. The plant and vertebrate fossils in the lower part of the succession furnish conflicting evidence for its age, but they seem definitely to be older than Miocene.

EARLY TERTIARY STRUCTURAL FEATURES

Most of the folding and faulting of the rocks of southern trans-Pecos Texas occurred in the first half of the Tertiary period, and is the northern continuation of structural features in the Sierra Madre Oriental of northeastern Mexico. In Mexico, south of Saltillo, Coahuila, the Sierra Madre is a single bundle of close folds of north-northwest trend, which face the Gulf Coastal Plain on the east. In the vicinity of Saltillo the Sierra Madre bifurcates northward (Fig. 7). The lower outer folds, composed largely of Lower and Upper Cretaceous rocks, continue north-northwestward through Coahuila into eastern trans-Pecos Texas. The main group of folds bends west following the belt of Jurassic deposition which lies south of the early Mesozoic positive area and then, near Torreon, turns north-northwestward and extends through Chihuahua into the Quitman, Eagle, and Malone mountains of trans-Pecos Texas (Fig. 7).

Western branch of Sierra Madre.—The western group of folds was raised from the thick deposits of the Jurassic and Lower Cretaceous geosyncline, as may be seen by comparing Figures 4 and 5. Both along Conchos River in Chihuahua, and in the Quitman and Eagle mountains in Texas, the geosynclinal rocks are thrown into long steep folds, trending north-northwest, and are broken by overthrust faults which in Texas have carried these rocks northeastward over the thinner foreland sequence of the Lower Cretaceous.[71] Remnant patches of Tertiary lavas rest on the truncated edges of the folds in the northern Eagle and southern Quitman mountains. There appears, however, to have been some broad arching after the lavas were deposited. Thus, they dip northeast and southwest off the axis of the Quitman Mountains. They are also found low in the intermontane area east of the

[69] F. B. Plummer, *op. cit.*, p. 805.

[70] C. L. Baker, "Exploratory Geology of a Part of Southwestern Trans-Pecos Texas," *Univ. Texas Bull. 2745* (1927), p. 35.

[71] *Op. Cit.*, "Overthrusting in Trans-Pecos Texas," *Pan-Amer. Geol.*, Vol. 53 (1920), p. 24.

Eagle Mountains, whereas in that range and in the next one at the east, they cap the summits. In this range on the east, Baker has found some thrust faults which displace the volcanics.[72] In the Conchos River area of Chihuahua, R. E. King has observed down-warped patches of Tertiary lava between the anticlinal areas of Mesozoic rocks. These rest unconformably on more steeply downfolded Upper Cretaceous strata.

Toward the northwest, near the Texas and Pacific Railway, the intense folding of the western branch of the Sierra Madre dies out along the strike. North of the railway are the gently tilted and block-faulted rocks of the Diablo Plateau and other mountain areas of the Basin and Range province. In the western part of the plateau a line of broad arches extends northwestward from the Quitman Mountains into New Mexico (Fig. 5), closely following the fold of Paleozoic age in the Hueco Mountains (Fig. 2). It is probably an outer branch of the system of close folding.

Eastern folds of Sierra Madre.—The eastern branch of the Sierra Madre enters Texas as the high broad fold of the Sierra del Carmen (Fig. 6) which dies out south of the Marathon region. It is broken by normal faults, and Baker reports[73] that in the Mexican part of the range there are one or two great faults on the west side. Two other broad folds west of the Sierra del Carmen in Mexico, the Sierra San Vincente, and Mariscal Mountain, reach up to the Rio Grande or pass beyond it only a few miles before they die out (Fig. 6).[74] North of the Sierra del Carmen is the much smaller and narrower anticline of the Santiago and Del Norte mountains, which in their northern part form the crumpled western edge of the Marathon dome. This fold, like the Sierra del Carmen, is faulted on the western side. The fault is a thrust fault which has carried strata westward,[75] in a direction the reverse of the thrusting farther west. Udden[76] has suggested that the narrowing of the post-Cretaceous folds west of the Marathon basin was caused by the competent nature of the deformed Paleozoic

[72] Letter from C. L. Baker, November, 1933.

[73] C. L. Baker, "Desert Range Tectonics of Trans-Pecos Texas," *Pan-Amer. Geol.*, Vol. 50 (1928), pp. 341–73.

[74] J. A. Udden, "Sketch of the Geology of the Chisos Country," *Univ. Texas Bull. 93* (1907), p. 85. See also Udden's "The Anticlinal Theory as Applied to Some Quicksilver Deposits," *Univ. Texas Bull. 1932* (1918), pp. 11–12.

[75] C. L. Baker and W. F. Bowman, "Geologic Exploration of the Southeastern Front Range of Trans-Pecos Texas," *Univ. Texas Bull. 1753* (1917), pp. 150–51; P. B. King, "The Geology of the Glass Mountains," Pt. 1, "Descriptive Geology," *Univ. Texas Bull. 3038* (1931), p. 122.

[76] J. A. Udden, "Sketch of the Geology of the Chisos Country," *Univ. Texas Bull. 93* (1907), p. 76.

rocks below, but it should also be remembered that the eastern branch of the Sierra Madre is dying out northward.

North of the Marathon region, broad anticlines which lie somewhat east of the north end of the Del Norte Mountains continue with the same trend past the northeast end of the Davis Mountains to the Apache Mountains north of the Texas and Pacific Railway (Fig. 5). The folds both in the Del Norte Mountains and on the north involve Tertiary lavas[77] and are therefore, in considerable part, at least as young as Oligocene.

Between the western folds of the Sierra Madre and their narrower outer branch on the east is a structurally lower area. On the north it is occupied by the gently dipping lava flows of the Davis Mountains (Fig. 5), which, in part at least, are younger than the main deformation. South of the Davis Mountains, in the Chisos country, near the southern end of the big bend of the Rio Grande, is a broad synclinal area in which strata of late Upper Cretaceous age are preserved, and in which the base of the system extends several thousand feet below sea-level (Fig. 6).[78] West of the Chisos Mountains the strata rise into the broad, irregular, much faulted uplift of the Terlingua district,[79] in which Lower Cretaceous limestones are extensively exposed. This uplift culminates in the Solitario dome, in which the base of the Cretaceous lies more than 5,000 feet above sea-level. Northwest of the Terlingua uplift is a broad syncline in the Tertiary volcanics, beyond which Lower Cretaceous and Permian rocks rise again in the dome of the Chinati Mountains near Shafter (Fig. 5). The dome is truncated by erosion and overlain unconformably by lavas. The sedimentary rocks, and perhaps also the lavas, are intruded by large bosses of syenite and diorite.[80]

East of the eastern branch of the Sierra Madre in Texas is the Marathon dome (Fig. 6), a broad irregular uplift from whose central area the Cretaceous cover has been removed by erosion, exposing the deformed Paleozoic rocks of the Llanoria geosyncline. On the east flank of the dome, Cretaceous rocks slope toward Pecos River at angles of a few degrees or less. On the north and south flanks, their inclination is steeper and the base of the system descends from an altitude of more than 6,000 feet near the crest of the dome, to near

[77] C. L. Baker and W. F. Bowman, *op. cit.*, p. 142.

[78] The "sunken block" of Udden, *op. cit.*, pp. 80–87.

[79] J. A. Udden, "The Anticlinal Theory as Applied to Some Quicksilver Deposits," *Univ. Texas Bull. 1822* (1918), pp. 25–29.

[80] C. L. Baker, "Note on the Permian Chinati Series," *Univ. Texas Bull. 2901* (1929), pp. 79–82.

sea-level, a few score miles toward the north and south. The western edge of the Marathon dome is the sharp narrow fold of the Del Norte and Santiago mountains, overturned and thrust toward the west. South of the Rio Grande, in northeastern Coahuila, a similar broad dome, the Serrania del Burro has about the same structural height as the Marathon dome, but the Cretaceous cover is complete over its crest.[81] It is elongate northwest-southeast parallel with the Sierra del Carmen and other folds of the eastern branch of the Sierra Madre, which flank it on the southwest (Fig. 7).

Post-Cretaceous structural features related to Paleozoic trend lines.—Some of the post-Cretaceous structural features trend in directions seemingly parallel with the strike of the Paleozoic rocks beneath, rather than in the northwestward direction of the dominant folds of the Sierra Madre. These may have been produced by posthumous movements along Paleozoic trend lines. On the east slope of the Marathon dome several broad arches in the Cretaceous rocks extend nearly to Pecos River and trend in approximately the same direction as that suspected for the axes of the Paleozoic folds.

On the opposite side of the Marathon dome, Paleozoic rocks are again concealed by the Cretaceous, but on a southwest-trending belt through Green Valley, which connects the dome with the uplifted area near Terlingua and the Solitario, the rocks of this system stand much higher than they do in either the Chisos country on the southeast or the Davis Mountains on the northwest. They form a very broad, irregular arch (Fig. 6). Along the northwest side of the arch are many closely spaced, sub-parallel, short normal faults, similar to those in the Glass Mountains on the northeast flank of the Marathon dome (Fig. 6). It has been suggested [82] that the latter were formed in rocks overlying the northwest margin of the Marathon folded belt, and those on the southwest may have had a similar relation. That this arch which extends southwest from the Marathon dome may be related to the belt of folded Paleozoic rocks beneath is suggested by the outcrops of these rocks at the two ends, in the Marathon basin and the Solitario.

Some of the structural features southeast of the arch may also be related to Paleozoic trend lines. The synclinal basin of the Chisos country appears to have a northeast trend and to be aligned with several other synclinal areas south of the Marathon basin (Fig. 6). In that part of the Sierra del Carmen lying on the Texas side of the Rio Grande, the main northwest-trending axis appears to be

[81] W. S. Adkins, *op. cit.*, p. 298.

[82] P. B. King, *op. cit.*, p. 119.

crossed by minor northeast-trending arches, now greatly displaced and broken by normal faults (Fig. 6).

Structural events in late Mesozoic and early Tertiary time.—This survey of the stratigraphic and structural features of late Mesozoic and early Tertiary time permits some generalizations as to the sequence of events. In later Mesozoic time, after the Paleozoic structural features had become dormant, deposition began in western trans-Pecos Texas in a new geosynclinal area which crossed the older trend lines at an oblique angle. The first deposits laid down were confined to the geosynclinal area, and were sandstones and finer clastic sediments. Some of them were probably derived from marginal lands on the northeast, but the greater part probably came from farther west in Mexico. Over these was deposited a great mass of limestone, comparable to the early Paleozoic limestones of the southern Appalachian geosyncline. The mass thins northeastward toward the foreland, where successive parts change first into marly beds of neritic facies, and then into marginal sandstone deposits. Upper Cretaceous marine shaly beds follow, and change upward, in the region east of the geosynclinal area, into continental beds.

Cretaceous time was closed by a period of diastrophism, by which the western branch of the Sierra Madre appears to have been strongly folded and faulted, and the foreland area on the east thrown into broader folds and arches. After this movement the Cretaceous and older rocks were deeply eroded in the uplifted areas, and their fragments were distributed through the basal beds of the succeeding early Tertiary deposits. In early Tertiary time, lava flows and tuffs were spread over the worn-down surface of the foreland, resting in places on downfolded remnants of the highest Cretaceous, and in others on beds as old as the Paleozoic. At least locally they overlapped across the deformed geosynclinal rocks on the west.

After the period of early Tertiary volcanism there were further movements, by which the lavas were themselves deformed, chiefly along the trends of the preceding deformation. In most places the volcanic rocks were broadly arched and downwarped, but in some places in the west, along the edge of the strongly folded belt, thrust faults younger than the lavas have been found. In the eastern branch of the Sierra Madre near the Marathon dome, a considerable amount of broad folding appears to be younger than the lavas. The evidence for these different times of movement is not as complete as might be desired, because the late Cretaceous and early Tertiary rocks have not been worked out in detail, and because only a few fossils have been collected from them. Actually, the deformation may have been

accomplished by several more pulsations than the two suggested by the available evidence.

The steepness of many of the mountain ridges in both the eastern and western branches of the Sierra Madre, and the fact that a considerable number consist of uparched or upfaulted rocks, has led Baker[83] to suggest that most of their structural features are of late date. It seems unlikely to the writer, however, that all the deformation in the region took place at the same time. There have evidently been two periods of deformation. Moreover, the mountains may not have been uplifted to their present form and height during these times of folding, but may have been raised by later broad arching or normal faulting.

It should be remembered, also, that hard rocks in desert regions typically preserve steep and rugged slopes much later in the cycle of erosion than in humid regions. Mountain areas in the southwest thus rise abruptly from gently sloping, more extensive plains, even though many of them are relatively small erosion remnants of former highland areas, of which the plains are the worn-down parts. A large number of the mountains in trans-Pecos Texas consist of hard rocks; for example, the limestones of Lower Cretaceous age, which may possess either a monoclinal, anticlinal, or even (as at Malone Mountain)[84] a synclinal structure. The intervening lowland areas have been produced, not entirely by downfolding, but by the carrying away of non-resistant Upper Cretaceous rocks from synclinal areas, and of early Lower Cretaceous, late Jurassic, or Paleozoic rocks from anticlinal areas. Moreover, in structure sections across the anticlinal mountains, a reconstruction of the folds demonstrates that a great thickness of strata, now eroded away, formerly extended over their summits.

Relation of structural events in trans-Pecos Texas to sedimentation on the Gulf Coastal Plain.—In trans-Pecos Texas the structural events of Tertiary time can be deduced partly from the nature of the structural features, and partly from the older Tertiary rocks, most of which are of volcanic origin. Interpretations can not be perfect because of the fragmentary nature of the record and the small number of fossils which have so far been collected. In the Gulf Coastal Plain, east of the Sierra Madre of northeastern Mexico and trans-Pecos Texas, there was, during Tertiary time, more nearly continuous sedimenta-

[83] C. L. Baker, unpublished manuscript and letters to the writer, 1932–34.

[84] C. L. Baker, "Overthrusting in Trans-Pecos Texas," *Pan-Amer. Geol.*, Vol. 53 (1929), Fig. 1, p. 24.
N. H. Darton, "Guidebook of the Western United States, Pt. F, Southern Pacific Lines," *U.S. Geol. Survey Bull. 845* (1933), Pl. 17 B.

tion, and a more complete sequence of fossils. It is possible that events in the mountains have left their mark on the record in the coastal plain. The same pulsations may have influenced both regions. Moreover, the ancestral Rio Grande, flowing down the coastward slope from trans-Pecos Texas, and streams heading in the newly raised mountains in Mexico, must have carried large quantities of detritus to the coast, and probably influenced the character of sediments deposited there.

No very complete correlation between events in the two regions has ever been attempted, and it is a promising field for study. The record of events in the mountains is probably obscured in the coastal plain by the influence of structural events in other regions, by climatic changes, and by local factors which would cause fluctuations in the strand line.[85] The record should be plainest in the Rio Grande embayment and the coastal plain of Mexico, nearest the mountain area.

Cretaceous rocks are separated from the oldest Tertiary (Midway group) on the Texas coastal plain by a persistent hiatus and disconformity, and Baker reports that toward the Rio Grande and beyond in Mexico, the discordance is angular.[86] The succeeding Midway and Wilcox beds thicken southwestward by several thousand feet from Texas into northeastern Mexico.[87] Above the Wilcox in Texas, over a well-marked unconformity, is the coarse-grained and widespread Carrizo sandstone. Farther south, near Tampico, according to Baker,[88] the fine-grained clastic deposit of the Velasco shale (latest Cretaceous or earliest Tertiary), well developed toward the east, is replaced between the oil fields and the front of the Cordillera by the Chicontepec formation, in which beds of sand and gravel are interbedded with shale. The gravel consists of fragments of Lower Cretaceous limestone and chert, but the formation is folded equally with the older beds. These features of early Eocene stratigraphy are probably related to the first epoch of diastrophism in the mountains on the west.

The succeeding Eocene deposits of the Texas coastal plain are mostly fine-grained clastics, but toward the top sandstones are again prominent (Fayette) and there is an increasing amount of volcanic detritus (in Yegua and Fayette). Higher in the section is a marked

[85] F. B. Plummer, "Cenozoic Systems" in "The Geology of Texas," Vol. 1, "Stratigraphy," *Univ. Texas Bull. 3232* (1933), pp. 526–29.

[86] F. B. Plummer, *op. cit.*, p. 531.

[87] R. A. Jones, "Reconnaissance Study of the Salado Arch, Nuevo Leon and Tamaulipas, Mexico," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 9, No. 1 (January-February, 1925) p. 129.

[88] Personal communication from C. L. Baker, May, 1934.

unconformity at the base of the Catahoula formation, whose strata overlap the older beds and include coarse sandstones and great quantities of pyroclastic sediments.[89] At least a part of these are commonly believed to have come from the mountains on the west. The stratigraphic relations and a few plant fossils suggest that the Catahoula is of Oligocene age,[90] which is apparently in agreement with some of the determinations made on fossils from the volcanics in trans-Pecos Texas. North of Tampico Baker reports a similar unconformity and overlap at the base of the Oligocene.

Above the Catahoula formation in Texas is the Oakville sandstone, of Miocene age, which is also unconformable on older beds, and marks the first occurrence in the Texas Tertiary section of reworked Cretaceous rocks and fossils. It may reflect a pronounced uplift of the land behind the Balcones fault in central Texas,[91] but might it not also be related to the post-volcanic folding in trans-Pecos Texas? Unconformities are found higher in the section, at the base of the Goliad and the Lissie, and both formations contain much gravel. Many of the fragments in the latter clearly come from distant sources.[92] Perhaps the two formations reflect such later events in trans-Pecos Texas as the widespread block faulting, the regional uplift of the area, and the breaking through of the Rio Grande from its sources in Colorado. These events are discussed in the following paragraphs.

LATER TERTIARY AND QUATERNARY STRUCTURAL FEATURES

At numerous places in trans-Pecos Texas, the rocks are broken by faults which in ground plan are straight or angular, and with jagged offsets. Where the planes of such faults can be observed, they are either nearly vertical or dip steeply (60° or more) toward the downthrow, and are therefore probably normal faults. Where the rocks of the region are also folded, as in the southern part, the trend of the faults is roughly parallel with that of the anticlines and synclines, and this had led Baker to suggest[93] that they were formed during the folding of the region. However, where the writer has had an opportunity to study the detailed relations between folds and faults, as in the Glass Mountains and along the western edge of the Marathon basin, the parallelism is not perfect, and in many places

[89] F. B. Plummer, *op. cit.*, p. 720.

[90] *Ibid.*, p. 727.

[91] *Ibid.*, p. 734.

[92] *Ibid.*, p. 784.

[93] C. L. Baker, "Desert Range Tectonics of Trans-Pecos Texas," *Pan-Amer. Geol.*, Vol. 50 (1928), p. 372.

anticlines and synclines are cut cleanly across by faults. A similar relation may be suspected in the Sierra del Carmen, from inspection of geologic and topographic maps. The normal faults of this district are represented on Figure 6 as cutting across the folds. Moreover, where strong folding has taken place along the western edge of the Marathon basin, some of the larger normal faults are downthrown in a direction opposite to that of the overturning and thrusting of the strata. The writer therefore believes that these faults are a later feature than the folds, and that they were produced during a time of regional tension which followed the time of compression. He suggests that the earliest movements on the normal faults occurred in the late Tertiary.

In northern trans-Pecos Texas, most of the disturbance of the rocks is by such faulting. The region is divided into blocks many miles across, whose uplift, subsidence, and tilting has given rise to most of the present topographic features of the district. The rocks within the mountains are not conspicuously folded, probably because the area was relatively stable during the preceding time of compression. The relation between folding and normal faulting here is thus not clearly evident.

Faults of northern trans-Pecos Texas.—The outlines of a large part of the mountains of northern trans-Pecos Texas are determined by faults which lie along their bases. The edges of the mountains in places (as in parts of the Sierra Diablo and Delaware mountains) are remarkably straight and are dented only at intervals by the heads of alluvial fans. In other districts erosion has progressed farther and pediments embay the mountain slopes to such an extent that the original fault block form is lost. In many areas the fault trace is covered by thick alluvial-fan deposits, probably as a result of relatively recent uplifts of the mountain blocks, but locally even here (as along the edges of the Salt Basin, in the Guadalupe and Delaware mountains and the Sierra Diablo) small exposures of the downfaulted rocks crop out on the alluvial slopes in front of the escarpments. In some places there are also blocks (such as the Baylor Mountains east of the Sierra Diablo) which stand at a level intermediate between the rocks of the high mountains and those of the intermontane areas. Abundant exposures demonstrate that these owe their present position to faulting.

The intermontane areas of northern trans-Pecos Texas are apparently depressed blocks, lowered to their present positions by faulting. The two largest areas are the Hueco Bolson and Salt Basin on the east and west sides of the Diablo Plateau (Fig. 5). A smaller inde-

pendent basin, Eagle Flat, lies west of the Salt Basin in the latitude of Van Horn. These basins are filled by a great thickness of later Tertiary and Quaternary deposits. Some measure of the depression of the rocks in the intermontane areas may be gained from well records.[94] Several wells in the Hueco Bolson have been drilled to more than 2,000 feet, and one not far from the base of the Franklin Mountains near the New Mexico line to 4,920 feet, without passing out of basin deposits. In the Salt Basin a well drilled about 40 miles north of Van Horn went to 1,620 feet without leaving the basin deposits, and one 30 miles south-southeast of Van Horn encountered bed rock at 1,180 feet. In Eagle Flat a well was drilled to 1,000 feet without reaching bed rock.

The normal faults of northern trans-Pecos Texas have two general trends (Fig. 5). One system extends in general north and south, but it is highly irregular in detail, with some members trending north-northeast or north-northwest. The eastern boundary fault of the Sierra Diablo, a part of the system, has a bight and cusp pattern. In the Van Horn region the north-south system is crossed by another of west-northwest trend, most of whose members have less displacement than those of the first, but whose pattern is much more regular. Many of these show clear evidence of recurrent movements. Permian limestone reefs lie parallel with some of them and were probably formed during a flexing of the underlying rocks along the same trends as the later faults. Some others on the south side of the Sierra Diablo also show striking differences in the thickness of Paleozoic rocks on opposite sides. On one of these, for example, Cretaceous rocks rest on the pre-Cambrian on the downthrown side, while on the upthrown side they rest on 900 feet of Permian limestone and Cambrian sandstone. An earlier movement, the reverse of the recent one, evidently took place on this fault.[95] The recurrent movements along the west-northwest trending faults suggest that they coincide with persistent lines of weakness in the basement rocks of the region.

Movements on the normal faults have occurred several times. The eastern slope of the Franklin Mountains north of El Paso has been deeply embayed by pediments, yet at many places near its base is an escarpment 100 feet or more in height, produced by recent movements and composed partly of bed rock and partly of fanglomerate.[96]

94 Well data chiefly from unpublished manuscript by C. L. Baker, 1934.

95 This fault is shown at the left-hand end of Figure 25, in N. H. Darton, "Guidebook of the Western United States, Pt. F, Southern Pacific lines," *U.S. Geol. Survey Bull. 845* (1933), p. 125.

96 First noted by G. B. Richardson, *U.S. Geol. Survey El Paso Folio 166* (1909), p. 9.

The lowest points on the floor of the Hueco Bolson on the east lie within a few miles of the base of these mountains, and from here eastward the basin floor slopes gently upward to the much lower Hueco Mountains. This slope may have been caused by recent tilting, perhaps at the same time as the last faulting. In the Sierra Diablo several canyons 5 miles or more in length drain eastward to the downfaulted block, and were probably extended headward from consequent streams draining the faces of the first fault scarps.[97] The mountain base line is, however, remarkably even, and is fringed with great alluvial fans still in the process of formation. In some places the fans themselves are broken by small faults, along which are escarpments 10 or 20 feet high. The floor of the Salt Basin on the east is, like the Hueco Bolson, asymmetrical, with a group of salt lakes in the lowest part, close to the high escarpments of the Sierra Diablo. The faults within the Sierra Diablo, including the west-northwest system, do not appear to have shared the last time of movement. Their scarps are considerably dissected, and the scarp bases are free from alluvial deposits. Several well marked high-level pediments and stream terraces in the south part of this mountain area (west of Beach Mountain) were apparently formed prior to its later uplifts.

Faults of southern trans-Pecos Texas.—A great fault system of general north-south or south-southeast trend has been mapped by C. L. Baker in the Sierra Tierra Vieja and southward along the west side of the Chinati Mountains beyond the latitude of Shafter (Fig. 5).[98] It may be considered as a southward extension of the system along the east side of the Sierra Diablo. The fault pattern as worked out by Baker consists of a number of parallel or *en échelon* fractures, with the greatest displacement now on one, and now on another. Most of the faults are downthrown to the west, in a direction the reverse of the overthrusting near by. In the north, bed rock is exposed on both sides of the main fault and here the throw is estimated at 2,000 or 3,000 feet; farther south the trace of the main fault follows the even western base line of the mountains and is mostly concealed by late Tertiary deposits. The rocks which cap the upthrown blocks are relatively non-resistant tuffs and lavas, and Baker suggests[99] that their preservation on the escarpments is evidence for the faults being of relatively recent age.

[97] G. B. Richardson. *U.S. Geol. Survey Van Horn Folio 194* (1914), p. 8.

[98] C. L. Baker, "Exploratory Geology of a Part of Southwestern Trans-Pecos Texas," *Univ. Texas Bull. 2745* (1927), pp. 43-44 and Pl. 1, also later unpublished manuscripts and maps of the same author.

[99] C. L. Baker, "Desert Range Tectonics in Trans-Pecos Texas," *Pan-Amer. Geol* Vol. 50 (1928), p. 355.

Near Conchos River, in the strongly folded area of the western Sierra Madre, R. E. King has observed some large normal faults which have locally broken the folds. A small part of the topographic features of this region is probably caused by them.

In southeastern trans-Pecos Texas, normal faulting is not as pronounced as on the north, but is almost as extensive. The numerous faults in the belt between the Terlingua and Marathon uplifts and those in the Glass Mountains have already been noted. A great normal fault bounds the east side of the Mesa de Anguila (Fig. 6), and the Rio Grande cuts an imposing canyon through the fault block.[100] Another lies on the east side of the folded Santiago Mountains in the south part of the Marathon basin. The latter is not now shown by a scarp, and the upthrown block has been deeply eroded. The former stands as a high steep escarpment; non-resistant beds lie on its downthrown side, however, and it is probably a fault-line scarp.[101] The Sierra del Carmen is broken by numerous faults parallel with the long axis of the range.[102] Their apparent recency also may have been caused by the erosion of soft overlying beds from the surface of the Lower Cretaceous limestones. Baker[103] reports that south of the Rio Grande, fine-grained basin deposits lie against the face of the westernmost scarp without displacement.

Late Tertiary and Quaternary basin deposits.—During and after the first period of normal faulting the intermontane areas of the Basin and Range province were filled to a great depth by sediments, as suggested by the well records previously noted. Other areas of thick deposits are found farther south,[104] as in the Rio Grande valley west of Shafter, and there are smaller remnant areas west of the Sierra del Carmen. The upper parts of the basin deposits are well exposed along the Rio Grande, which has entrenched them to a depth of several hundred feet. Away from the mountains they are gray to flesh-colored silts,[105] in part gypsiferous, with some sandy lenses. Near the mountains they are interbedded with, and grade into, fan-

[100] J. A. Udden, "Sketch of the Geology of the Chisos Country," *Univ. Texas Bull. 93* (1907), p. 80.
F. B. Plummer, *op. cit.*, Fig. 27, p. 518.

[101] C. L. Baker, *op. cit.*, p. 356.

[102] C. L. Baker and W. F. Bowman, "Geologic Exploration of the Southeastern Front Range of Trans-Pecos Texas," *Univ. Texas Bull. 1753* (1917), Pl. 6, Sec. 21.

[103] C. L. Baker, "Desert Range Tectonics of Trans-Pecos Texas," *Pan-Amer. Geol.*, Vol. 50 (1928), p. 358.

[104] C. L. Baker, "Exploratory Geology of a Part of Southwestern Trans-Pecos Texas," *Univ. Texas Bull. 2745* (1927), pp. 37-40.

[105] N. H. Darton, *op. cit.*, Pl. 17 A.

glomerates and mud-flow deposits. The silts were probably deposited in broad, shallow, and perhaps intermittent lakes. Bones of *Elephus* and *Equus* of Pleistocene age have been collected by Richardson[106] near El Paso, either from the uppermost part of the deposits or from later gravels which lie unconformably above them. The age of the greater part is unknown. Pliocene or late Miocene fossils have been collected from similar beds in northern New Mexico.[107] In some places the deposits are faulted[108] and tilted.[109]

On the piedmont slopes east and west of the Franklin Mountains near El Paso, and probably farther southeast along the Rio Grande, the upper surface of the basin deposits is apparently a pediment rather than an aggraded slope. Overlying the deposits unconformably are coarser fanglomerates and terrace gravels of small thickness. Similar relations are reported along the course of the Rio Grande on the north in New Mexico.[110] The later faulting of the mountains may be related to these younger deposits. In the Salt Basin, where no recent dissection has taken place, the older basin deposits are probably not exposed. The surface materials here include gypsum dunes and beds of salt in the center, and coarse fanglomerates, which are apparently related to recent faulting at the margins.

River systems of trans-Pecos Texas.—Two important rivers, the Pecos and the Rio Grande, bound the east and southwest sides of trans-Pecos Texas. Their origin and history are in some way related to the development of the later structural features, but as a whole they have not been studied with care. In places their relation to adjacent land forms seems to be anomalous, and they possess many features which have yet to be explained.

The Rio Grande, in its course southeastward from the Sierra del Carmen to the coast, is apparently a consequent stream, which follows the structurally low areas down the regional dip of the beds (Fig. 7). On the northwest in trans-Pecos Texas, however, its course lies in a succession of intermontane desert basins, which it crosses at an oblique angle (Fig. 5). It passes from one basin to another through separating mountain barriers in gorges cut on bed rock. Thus the river crosses the Sierra del Carmen in the great canyons below Boquillas, and the Mesa de Anguila through the impressive Grand Can-

[106] G. B. Richardson, *U.S. Geol. Survey El Paso Folio 166* (1909), p. 6.

[107] N. H. Darton, "'Red beds' and Associated Formations in New Mexico," *U.S. Geol. Survey Bull. 794* (1928), p. 57.

[108] G. B. Richardson, *op. cit.*, p. 9 and Fig. 13.

[109] C. L. Baker, *op. cit.*, p. 40.

[110] Personal communication from Kirk Bryan, July, 1933.

yon of Santa Helena. In the western corner of the state it passes from the Mesilla Bolson eastward into the Hueco Bolson through a less impressive rock gorge above El Paso, the Paso del Norte of early Spanish travelers. A course partly through desert basins and partly through gorges in the mountains is also followed by the Rio Conchos in northeastern Chihuahua (Fig. 7). The relations of the Rio Grande in New Mexico are similar, save that its course is more nearly parallel with the dominant structural trends, so that it flows for longer distances through desert basins, and crosses mountain ranges in fewer places.[111]

Through all its long course from its sources in the Rocky Mountains in Colorado to the sea, the river receives few tributaries. From northern New Mexico to the Sierra del Carmen only one important stream contributes water, the Rio Conchos of Chihuahua. Not far east of the Sierra del Carmen the Rio Grande receives the waters of the Pecos, a stream which is nearly as long as the upper part of the main river, and which, like it, heads in the Rocky Mountains.

In its course across the desert basins the river flows in a well defined, level-bottomed valley, which near El Paso has been cut about 250 feet below the floor of the Hueco and Mesilla bolsons. Near Elephant Butte Dam in New Mexico, Lee reports that the river lies 450 feet below the surface of the Jornada del Muerto. The flood plains are underlain by sands and water-worn gravels to a thickness of less than 100 feet.[112] Terraces at levels intermediate between the surfaces of the desert basins and the flood plains of the river may be observed at many places. In many of the gorges, the highest bed rock seems to rise no higher than the level of the bolson deposits on either side, and at those places where the river crosses a continuous mountain barrier, the point of crossing seems to be structurally lower than that part of the mountains farther north or south.[113]

The basin deposits of trans-Pecos Texas adjacent to the course of the Rio Grande show no evidence of the existence of a large river at the time of their deposition. They consist in greater part of fine silts, and the only fragmental materials are the angular débris washed into them from the adjacent mountain ranges. This agrees with the record in the coastal plain near the Rio Grande. Gravel of distant origin appears first in the coastal plain section only in the

[111] The best published description of this part of the Rio Grande valley is that of W. T. Lee, "Water Resources of the Rio Grande Valley in New Mexico," *U.S. Geol. Survey Water Supply Paper 188* (1907). Many of his interpretations do not harmonize with modern ideas, but his observations are still valuable.

[112] G. B. Richardson, *op. cit.*, p. 6.

[113] This latter feature was noted in the Sierra del Carmen by Udden, *op. cit.*, p. 80.

Pleistocene (Lissie) deposits.[114] In New Mexico, however, near Albuquerque, Bryan[115] has found in the late Tertiary basin deposits "river gravels quite similar to those of the existing stream." He considers it likely that a river existed here as far back as Miocene time. Lee also reports that rounded pebbles of quartzite and argillite have been encountered in water wells in the central parts of the Jornada del Muerto and the Mesilla Bolson.

Pecos River, unlike the Rio Grande, crosses no mountain barriers, but follows the eastern side of the mountains through New Mexico and west Texas. Some miles east of the Pecos, beyond a pronounced west-facing escarpment, is the level surface of the High Plains, underlain by several hundred feet of Pliocene deposits. These are commonly supposed to have been washed out from the mountains west and northwest of Pecos River.[116] As evidence for this conclusion may be cited the apparent beheading of the upper tributaries of the Colorado, Brazos, and Canadian rivers by the Pecos, and the high level surface in the Sacramento Mountains west of the Pecos valley described by Nye. The latter can be projected eastward across the valley into the plains surface.[117] At some time after the deposition of the Pliocene deposits, for causes not well understood, the Pecos established itself parallel with the mountain front, and at right angles to the pre-existing drainage.

In its lower course, from the crossing of the Santa Fe Railway east of Fort Stockton southward (Fig. 5), the Pecos flows on bed rock, and has carved a canyon through the Edwards Plateau hundreds of feet deep. Farther upstream, in the Toyah basin, it flows over alluvial deposits 500–1,000 feet deep.[118] Many geologists believe these to have been deposited because of a subsidence of the basin floor, caused at least in part by the leaching out of Permian salt beds beneath. In the Roswell basin, north of Carlsbad in New Mexico, alluvial fill somewhat greater than 250 feet has been encountered, although between it and the Toyah basin alluvial deposits beneath the channel

[114] F. B. Plummer, *op. cit.*, p. 784.

[115] Letter from Kirk Bryan, October, 1929.

[116] F. B. Plummer, *op. cit.*, Fig. 51, p. 770.
S. S. Nye, "Geology" in "Geology and Ground Water Resources of the Roswell Artesian Basin," *U.S. Geol. Survey Water Supply Paper 639* (1933), pp. 96–97.

[117] F. B. Plummer, *op. cit.*, p. 771.
S. S. Nye, *op. cit.*, Fig. 1, p. 11, and p. 97.

[118] First reported by G. B. Richardson, "Report of a Reconnaissance in Trans-Pecos Texas North of the Texas and Pacific Railway," *Univ. Texas Bull. 23* (1904), pp. 79–80. Described in various later reports, including an unpublished paper by H. S. Gale on the geology and underground water of the Toyah basin, submitted to the United States Geological Survey for publication.

of the river are in places only 50 feet deep.[119] Nye describes four distinct terrace surfaces in the vicinity of the Roswell basin.

Structural events of late Cenozoic time.—The first epoch of normal faulting, probably of later Tertiary (Miocene or Pliocene) age, apparently disturbed nearly all of trans-Pecos Texas, but its effects were greatest in the north. During and after this epoch, basin deposits were laid down to great thickness in the lower fault blocks. There is no evidence that these areas were connected by any large streams. The sediments were probably derived from the immediately adjacent mountains, and were deposited in broad shallow lakes or playas. Toward the end of the epoch of basin filling, their surfaces may have been built up to such a height, and pediments cut back from them so far, that they were more or less connected with adjacent basins at the lowest points on the encircling mountain barriers.

Later movements apparently took place along the faults of northern trans-Pecos Texas, and continued until relatively recent time. During this time the mountains of the area, which had been greatly eroded during the epoch of basin filling, were again uplifted, and assumed their present form and height. The older basin deposits were somewhat deformed and new deposits were laid down unconformably over the old at the bases of the mountains. Probably few or none of the faults of southeastern trans-Pecos Texas were affected by the later movements. The escarpments which follow them are probably fault-line scarps, many of which are now deeply eroded. Those few which are straight and fresh seem to have been covered at one time by soft, easily removable strata on the downthrown block.

It is probable that the Rio Grande did not take its course across New Mexico and western Texas until long after the first time of faulting, and after the time of basin filling. The first evidence of river action to be seen is in the pediments and terraces eroded on the upper surface of the basin deposits.

The lower consequent course of the river, between the Sierra del Carmen and the gulf, probably came into existence much earlier. This ancestral stream may have made important contributions of sediment to Tertiary formations on the gulf coast as far back as the Eocene. An older river may also have existed in central New Mexico, as suggested by the evidence of Lee and Bryan. Lee supposed that for a time this stream did not flow to the sea, but emptied southwestward into the basin of Laguna Guzman, in northern Chihuahua west of El Paso.

[119] S. S. Nye, *op. cit.*, p. 26.

What could have caused the integration of these disconnected and wholly unrelated streams? A clue has been given by Blackwelder in a recent paper on the origin of Colorado River,[120] a stream which has many of the same peculiar relations as the Rio Grande. Blackwelder points out that there is evidence of great uplifts in Pliocene and Pleistocene time in the Rocky Mountain region. If such occurred there must have been a marked increase in rainfall in a region that had previously been low and semi-arid. Much water must have been shed off toward the south and southwest, filling near-by desert basins to their rims, overflowing into adjacent lower basins, and eventually establishing through-flowing drainage to the sea. One such through-flowing stream was the Colorado, another the Rio Grande. The increase in the amount of run-off may also have aided the Pecos in establishing its course east of the mountains.

The waters that shed south from the Rocky Mountains may have followed for a distance the river supposed by Bryan and Lee to have existed earlier in central New Mexico. If, however, this stream led to an interior basin, as supposed by Lee, the waters soon sought an outlet into adjacent basins. If the basins had previously been made partly confluent by prolonged filling and pediment cutting, this process may have been easy. That the waters found their outlet to the southeast across trans-Pecos Texas was largely fortuitous, and depended entirely on the accidental placing of the structurally low areas. The establishment of through-flowing drainage from Colorado to the sea was perhaps aided in mid-course by uplifts of mountains in Mexico. R. E. King[121] finds that in the Sierra Madre Occidental of western Chihuahua there is a widespread mature surface of broad valleys and low rolling divides at elevations of 6,000–8,000 feet, which is now being dissected on its west side by tremendous canyons. The uplift of this surface may have given rise to the Rio Conchos, and perhaps for a time to other streams, which joined the Rio Grande west of its crossing of the last mountain barriers. After crossing the last mountain range, the Sierra del Carmen, the waters from the Rocky Mountains, augmented by those from Mexico, joined the ancestral Rio Grande, which had previously existed east of the mountains on the coastal slope.

The subsequent history of the Rio Grande has been one of downcutting. This is expressed in most of its course by the trenching of the basin deposits, and the cutting of gorges in the more resistant rocks.

[120] Eliot Blackwelder, "Origin of the Colorado River," *Bull. Geol. Soc. Amer.*, Vol. 45 (1934), pp. 551–65.

[121] R. E. King, personal communication, April, 1933.

In the basins nearest the sea, such as that between the Sierra del Carmen and the Mesa de Anguila, greater quantities of non-resistant rocks were probably carried away, causing such knots of hard rock as the intrusives of the Chisos Mountains to stand out in bold relief. The deep cutting in the southeastern basins also permitted the river to be superimposed on lower folds and fault blocks, such as Mariscal Mountain, which had hitherto been concealed. It is possible that some of the fault blocks in southeastern trans-Pecos Texas were, at about this time, subject to renewed normal faulting, and that the stream cut down through them as they were raised. The river has, in fact, been interpreted by some geologists as antecedent to many of the fault blocks, and even of the folds, but most of the supposed cases of antecedency are subject to alternative interpretations. Until further evidence is obtained, it seems most probable that the river is either consequent to or superimposed on most of the structural features which it crosses.[122]

[122] Interpretations very similar to those here presented have been made by C. L. Baker, in "Desert Range Tectonics of Trans-Pecos Texas," *Pan-Amer. Geol.*, Vol. 50 (1928), p. 363, and the writer wishes to acknowledge his indebtedness to this earlier paper. In Baker's unpublished manuscript on the structure of trans-Pecos Texas, similar theories and some of the alternative hypotheses are discussed in some detail.