

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION COMMISSION

APPLICATION OF GOODNIGHT
MIDSTREAM PERMIAN LLC FOR APPROVAL
OF A SALTWATER DISPOSAL WELL,
LEA COUNTY, NEW MEXICO.

COMM. CASE NO. 24123

APPLICATIONS OF GOODNIGHT
MIDSTREAM PERMIAN LLC FOR APPROVAL
OF SALTWATER DISPOSAL WELLS,
LEA COUNTY, NEW MEXICO.

DIV. CASE NOS. 23614-23617

APPLICATION OF GOODNIGHT
MIDSTREAM PERMIAN, LLC TO AMEND
ORDER NO. R-22026/SWD-2403 TO INCREASE
THE APPROVED INJECTION RATE IN ITS
ANDRE DAWSON SWD #1,
LEA COUNTY, NEW MEXICO.

DIV. CASE NO. 23775

APPLICATIONS OF EMPIRE NEW MEXICO LLC
TO REVOKE INJECTION AUTHORITY,
LEA COUNTY, NEW MEXICO.

DIV. CASE NOS. 24018-24020, 24025



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to End of Exhibit B**

Direct Testimony and Exhibits

August 26, 2024

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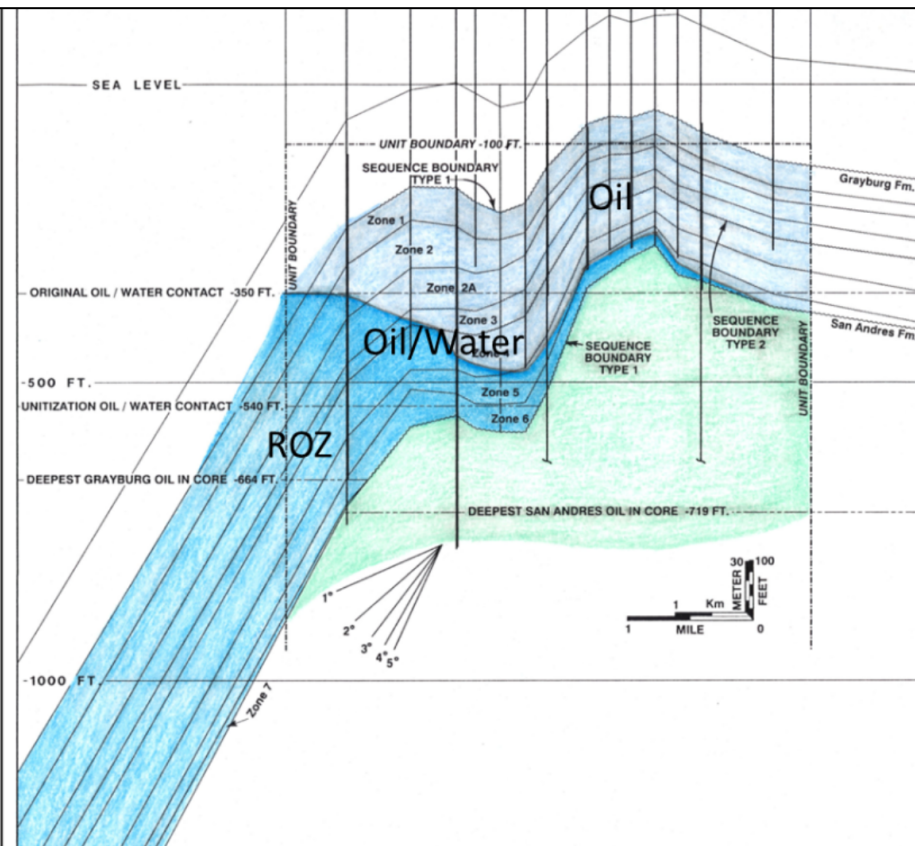
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Exhibit B-27

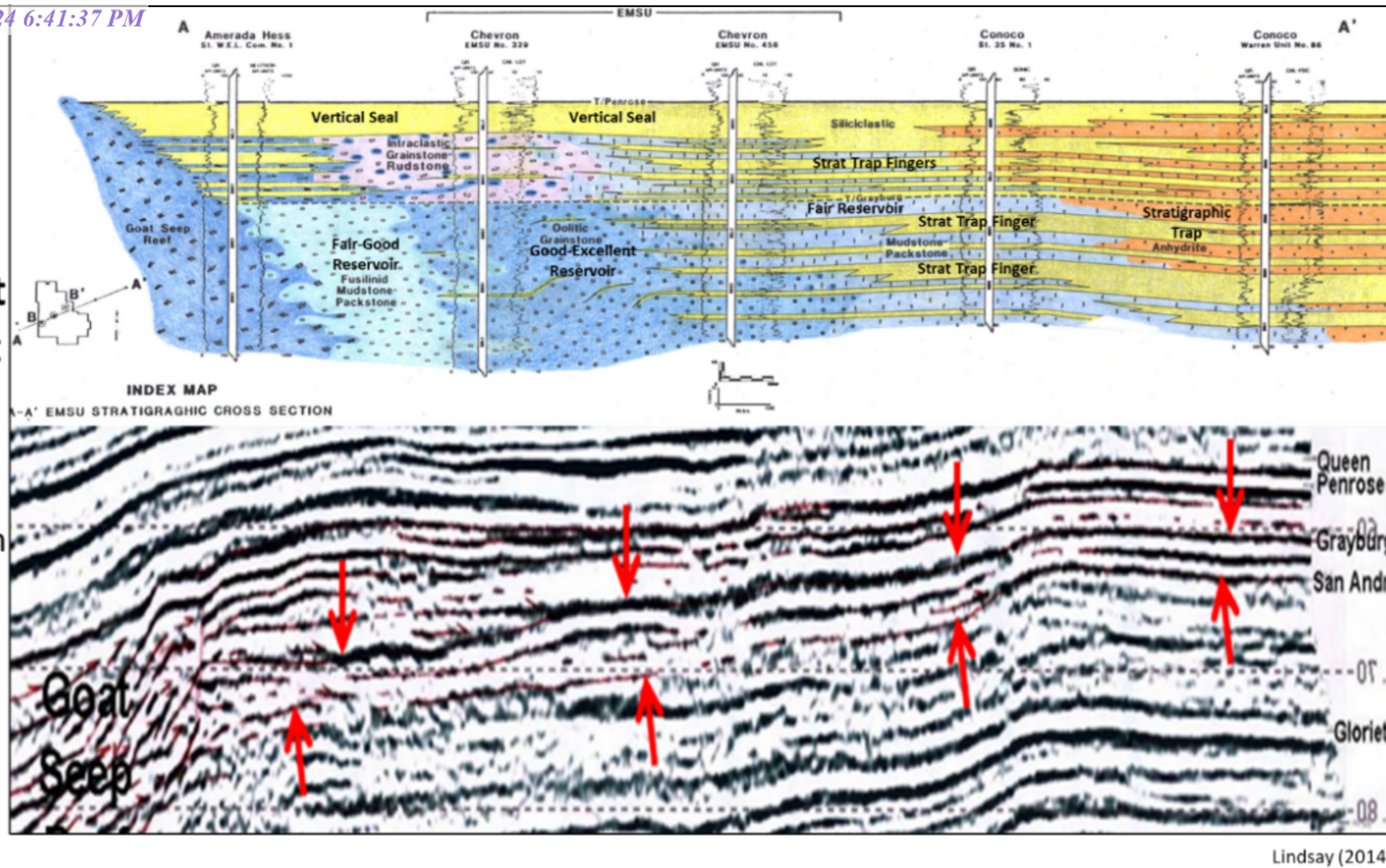
Eunice Monument
South Unit
Grayburg Fm
Edge Water Entry
Water Free Production
Oil/Water Production
& ROZ



Structural cross section through EMSU showing low salinity (<10,000 ppm) edge water entry into west side of EMSU. Source of edge water is Goat Seep Aquifer down-dip 1.5 to 2 miles of the west unit boundary of EMSU. Edge water entry is due to a drop in reservoir pressure from production through time. Injection of produced high salinity saltwater into San Andres strata will be sucked up by the drop in reservoir pressure to form vertically-oriented plumes of water entry into the Grayburg reservoir. Produced water, being heavier than low salinity (<10,000 ppm) edge water, will eventually through time work its way down-dip to contaminate the Goat Seep Aquifer.

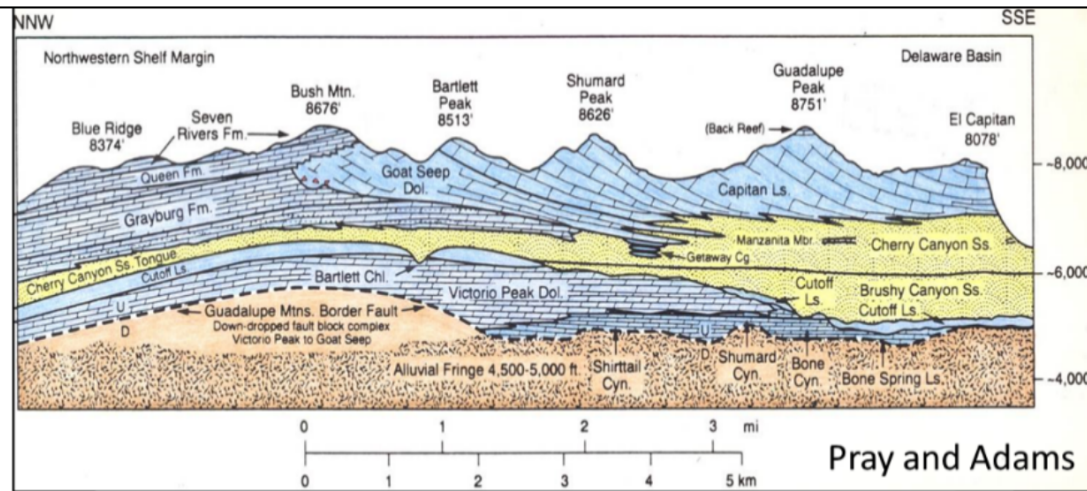
Exhibit B-28

**Eunice
Monument
South Unit**
Grayburg
Reservoir
NW Central
Basin Platform
Seismic Scale



Upper cross section from EMSU unitization hearings. Lower cross section is 3-d seismic through the same area. These show down-dip Goat Seep Aquifer (left) connected with Grayburg reservoir in EMSU (middle). Up-dip is lateral stratigraphic trap (right) and overlying vertical seal in base of Queen Formation. 3-d seismic show down-dip Goat Seep Aquifer (left) attached to eroded edge of Grayburg. Red arrows outline Grayburg. San Andres underlies the Grayburg. Datum is Yates Sandstone.

Exhibit B-29



Western Escarpment
 Guadalupe Mountains
 Grayburg Erosional Surface



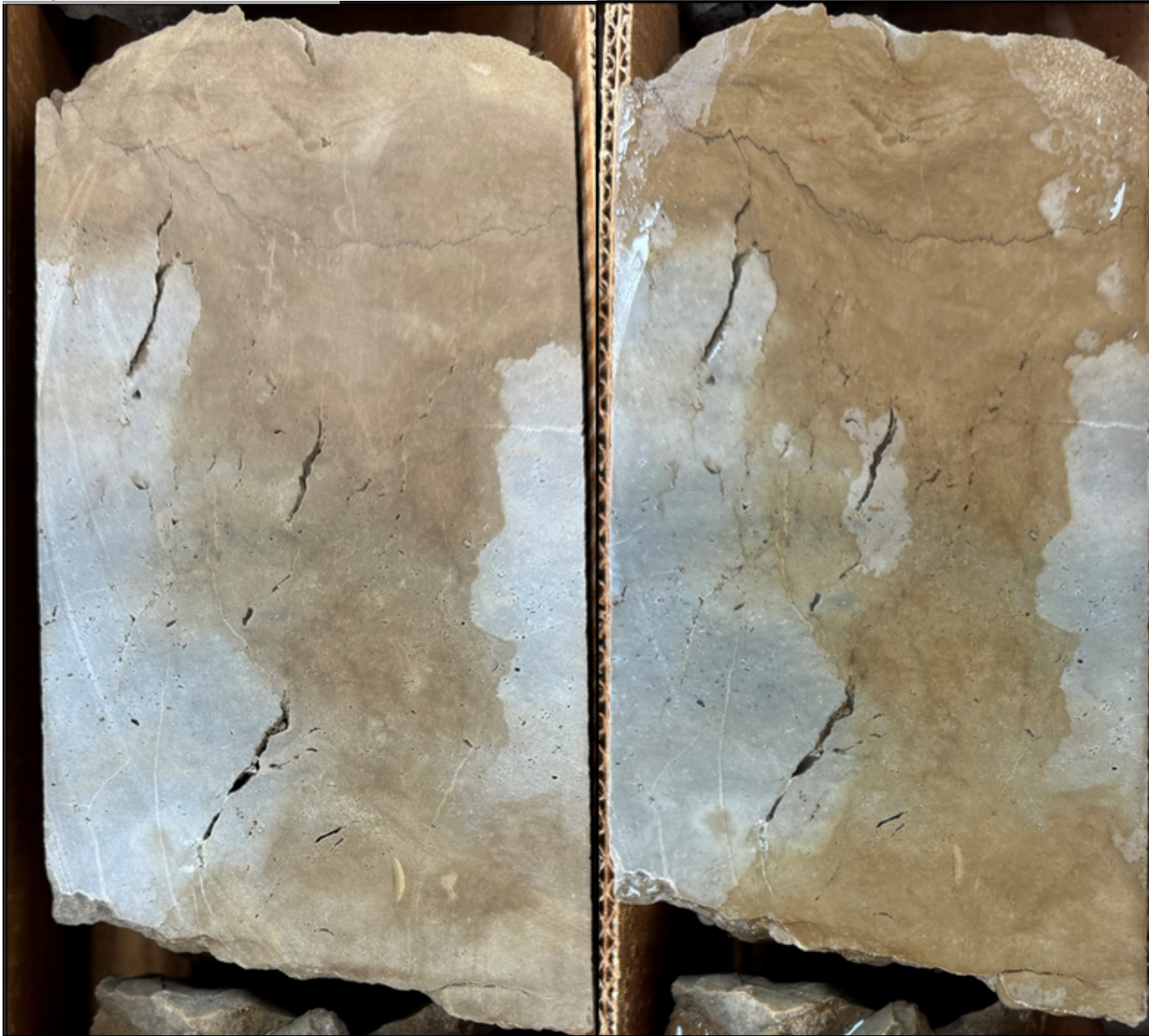
Upper and lower illustrations show down-dip eroded edge of Grayburg Formation, with Goat Seep Dolostone attached to Grayburg, Western Escarpment, Guadalupe Mountains.

Exhibit B-31



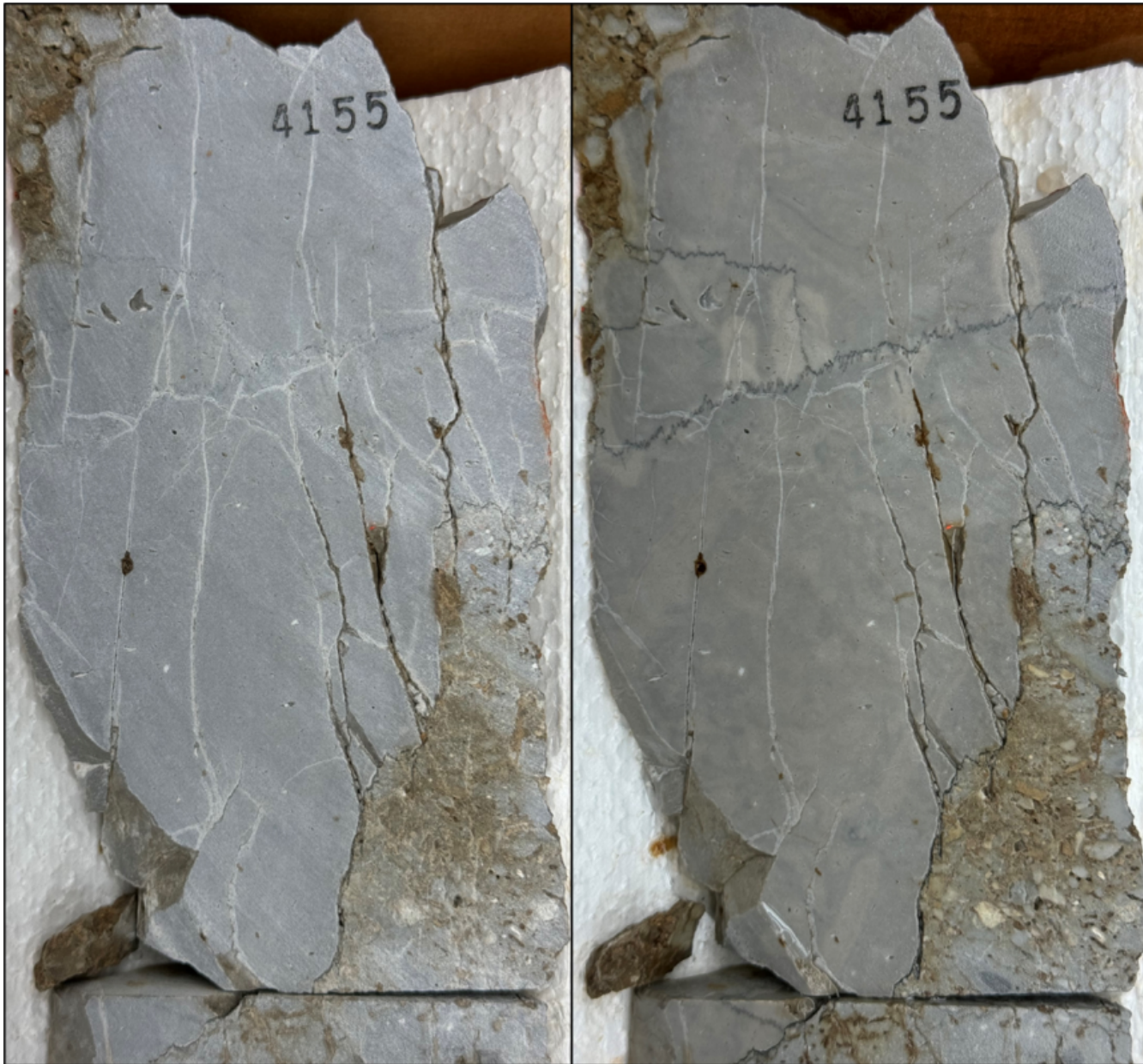
San Andres collapse breccia along U.S. Highway 82 near the foothills of the Sacramento Mountains, New Mexico. Meteoric recharge of low salinity (<10,000 ppm) water dissolved San Andres evaporite strata (CaSO_4) and formed a cavernous porosity, which caused carbonate strata forming the cave roof to collapse. Dissolved evaporite strata (CaSO_4) added sulfate (SO_4) to low salinity (<10,000 ppm) meteoric water as it recharged farther into the subsurface.

Exhibit B-32



EMSU R.R. Bell #4 3958 ft (-407 ft) nonporous to porous, partially oil-stained strata containing solution-widened fractures. Core is 75 ft beneath top of the San Andres. Porosity = 8.2%. Permeability = 50.4 mD. Oil saturation = 15.4%. Water saturation = 41.0%. Core width is 3 inches (7.62 cm). Left: Core is dry. Right: Core is wet. Well location is near southeast unit boundary of EMSU. Within EMSU near the up-dip pinch out of the reservoir porosity, permeability, and oil saturation decrease and eventually terminate.

Exhibit B-33



EMSU-679 San Andres swarm of vertical fractures. Some fractures are solution-widened and oil-stained, and some are simple hairline fractures. Fractures are in nonporous (tight) to porous strata along the edge of a solution pipe or sink hole.

Core is 11 ft beneath top of the San Andres.

Porosity = 11.4%.

Permeability = 560 mD to 1,044 mD.

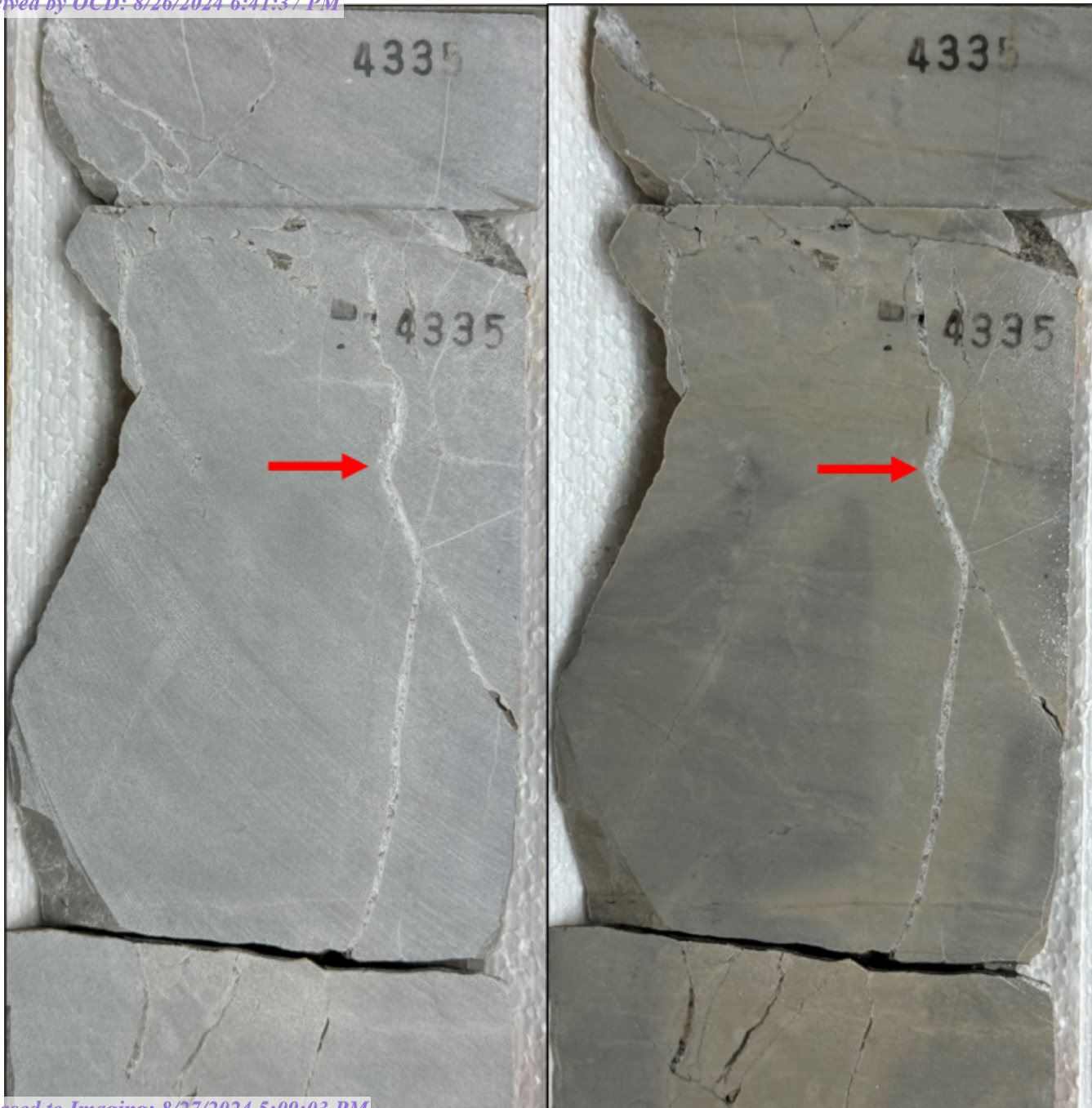
Oil saturation = 14.5%.

Water saturation = 35.4%.

Note intense fracturing in less porous strata adjacent to porous, oil-stained, grain-rich strata that filled the solution pipe or sink hole.

Left: core is dry. Right: core is wet. Laramide (Late Cretaceous-Early Cenozoic) reactivation of basement-cored fault blocks folded Permian strata and preferentially fractured less porous San Andres dolostone strata. Core width is 3 inches (7.62 cm).

Exhibit B-34



EMSU-679 San Andres 4335 ft (-739 ft) with less porous (gray) to more porous (beige) strata, adjacent to solution-widened fractures that are partially calcite cemented.

Core is 191 ft beneath top of San Andres.

Left Figure: Core is dry.

Right Figure: Core is wet.

Core width is 3 inches (7.62 cm).

Porosity = 3.7%.

Permeability = 11 mD to 46 mD.

Oil saturation (S_o) = 0.0%.

Water saturation (S_w) = 88.3%.

Note porosity zonation adjacent to fractures (beige color), while strata farther away from the fracture is less porous (gray). Initial solution-widening of fractures was via undersaturated fluid that extended away from fractures into surrounding matrix and was followed later by a calcite cementation event as fluid reached saturation.

CORE LABORATORIES

CHEVRON U.S.A., INC.
E.M.S.U. NO. 679

Field : EUNICE MONUMENT SOUTH
Formation : GRAYBURG

File No.: 57181-16203
Date : 10-16-90

C O R E A N A L Y S I S R E S U L T S

SAMPLE NUMBER	DEPTH ft	PERMEABILITY				PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	SATURATION		GRAIN DENSITY gm/cc	DESCRIPTION
		KA MAX md	90 DEG md	N/S md	E/W md			(PORE VOLUME) OIL %	WATER %		
78	4141.0- 42.0			25.0	27.0	6.60	11.5	13.4	47.7	2.85	Do1 sli/any f vug styl
79	4142.0- 43.0			294.	308.	5.30	11.9	13.1	44.8	2.85	Do1 sli/any vug
80	4143.0- 44.0			25.0	0.13	0.11	7.9	12.6	64.4	2.82	Do1 vf vug
81	4144.0- 45.0	T/SADR		9.20	8944.	606.	3.9	5.9	59.5	2.86	Do1 sli/any vf f vug styl
82	4145.0- 46.0			0.56	0.35	0.33	3.3	1.6	65.3	2.84	Do1 vug styl
83	4146.0- 47.0			14.0	268.	7.40	6.2	2.2	43.9	2.86	Do1 sli/any F vuf vug
84	4147.0- 48.0			0.57	4.60	1.40	4.8	6.0	60.2	2.82	Do1 vf f vug
85	4148.0- 49.0			66.0	317.	13.0	10.0	23.1	33.0	2.85	Do1 vf f sli/vug styl
86	4149.0- 50.0			97.0	114.	906.	12.8	20.3	33.8	2.84	Do1 vf f p.p.
87	4150.0- 51.0			62.0	56.0	126.	6.5	0.0	55.8	2.89	Do1 cht sli/pyr vf f vug
88	4151.0- 52.0			40.0	10940.	5056.	6.4	0.0	68.0	2.87	Do1 sli/cht sli/pyr vf f vug
89	4152.0- 53.0			22.0	14.0	4.40	9.4	24.8	41.4	2.85	Do1 sli/cht sli/pyr vf vug
90	4153.0- 54.0			157.	2189.	108.	11.8	15.8	40.7	2.86	Do1 sli/any sli/cht vf vug
91	4154.0- 55.0			530.	543.	75.0	11.1	1.1	44.6	2.86	Do1 cht sli/any vf vug
92	4155.0- 56.0			560.	1044.	63.0	11.4	14.5	35.4	2.80	Do1 cht vf vug
93	4156.0- 57.0			785.	6107.	795.	14.6	21.2	32.4	2.85	Do1 cht sli/any vf vug
94	4157.0- 58.0			34.0	26.0	6.60	8.0	21.0	42.1	2.83	Do1 cht vf vug
95	4158.0- 59.0			16.0	20.0	4.90	6.0	25.0	34.4	2.86	Do1 sli/any sli/cht vf f sli/vug
96	4159.0- 60.0			1.70	0.15	0.07	4.3	1.9	94.5	2.86	Do1 sli/any sli/shy vf f styl
97	4160.0- 61.0			<.01	0.04	0.07	4.1	1.3	91.6	2.86	Do1 sli/any F styl
* 98	4161.0- 62.0			0.02	<.01		0.9	8.5	84.9	2.85	Do1 sli/any sli/pyr F styl
99	4162.0- 63.0			20.0	47.0	39.0	10.6	29.8	29.8	2.83	Do1 sli/sdy p.p.
* 100	4163.0- 64.0		84.0			138.	11.7	14.0	46.6	2.83	Do1 sli/sdy vf p.p. styl
101	4164.0- 65.0			36.0	25.0	43.0	9.0	25.7	31.9	2.83	Do1 vf p.p.
102	4165.0- 66.0			711.	281.	61.0	9.6	27.9	31.9	2.85	Do1 sli/any vf p.p. foss
103	4166.0- 67.0			20.0	20.0	0.66	11.2	26.0	31.2	2.83	Do1 vf p.p. styl
104	4167.0- 68.0			1.70	1.80	1.70	11.0	22.8	32.5	2.89	Do1 any p.p.
105	4168.0- 69.0			4.50	5.00	3.50	10.7	20.8	36.3	2.87	Do1 any sli/sdy vf p.p.
106	4169.0- 70.0			3.10	3.80	3.10	10.7	23.5	33.8	2.85	Do1 sli/sdy sli/any p.p.

Table B-1

EMSU-679 San Andres
core analysis 4141-4170 ft
(-545 to -574 ft).

Green = oil saturation
percentage (So).

CORE LABORATORIES

CHEVRON U.S.A., INC.
E.M.S.U. NO. 679

Field : EUNICE MONUMENT SOUTH
Formation : GRAYBURG

File No.: 57181-16203
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C O R E A N A L Y S I S R E S U L T S

SAMPLE NUMBER	DEPTH ft	PERMEABILITY				PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	SATURATION (PORE VOLUME)		GRAIN DENSITY gm/cc	DESCRIPTION
		KA MAX md	90 DEG md	N/S md	E/W md			OIL %	WATER %		
107	4170.0- 71.0			52.0	21.0	13.0	10.7	23.9	34.1	2.85	Do1 sli/sdy sli/any F p.p.
108	4171.0- 72.0			0.86	0.76	0.52	8.6	23.3	33.3	2.84	Do1 F bnd p.p.
109	4172.0- 73.0			7.80	12.0	1.10	8.8	33.1	25.3	2.84	Do1 sli/sdy p.p.
110	4173.0- 74.0			0.25	0.46	0.18	7.2	37.0	26.4	2.82	Do1 sli/sdy F vf p.p.
111	4174.0- 75.0			21.0	1.30	0.16	6.7	32.1	33.4	2.84	Do1 sli/sdy F p.p.
112	4175.0- 76.0			5.20	4.90	16.0	12.5	24.2	36.3	2.82	Do1 sli/sdy p.p.
113	4176.0- 77.0			226.	159.	58.0	16.1	25.7	37.0	2.84	Do1 sli/sdy p.p. styl
114	4177.0- 78.0			232.	197.	165.	15.9	22.7	46.5	2.82	Do1 sli/sdy p.p.
115	4178.0- 79.0			0.95	1.10	0.89	6.6	33.4	52.4	2.84	Do1 sli/cht F styl
116	4179.0- 80.0			2.00	3.30	1.90	7.2	7.2	72.2	2.84	Do1 cht F styl
CORE NO. 3 4180-4240 CUT 60' REC 60'											
117	4180.0- 81.0	5.50	4.80			3.20	10.5	25.2	37.9	2.86	Do1 sli/sdy sli/any vf f p.p.
118	4181.0- 82.0	61.0	61.0			72.0	14.7	29.7	39.6	2.83	Do1 sdy vf
119	4182.0- 83.0	12.0	11.0			24.0	12.7	24.9	37.4	2.82	Do1 sli/sdy vf p.p.
120	4183.0- 84.0	5.10	4.00			2.60	9.5	35.3	31.1	2.83	Do1 sli/sdy vf p.p. ool
121	4184.0- 85.0	5.70	5.10			4.30	6.3	26.5	60.7	2.80	Do1 sli/sdy vf
122	4185.0- 86.0	0.95	0.35			1.00	4.9	28.5	52.2	2.85	Do1 sli/any vf f sli/vug ool
123	4186.0- 87.0	12.0	1.10			2.40	6.8	4.2	75.2	2.84	Do1 vf f ool
124	4187.0- 88.0	0.12	0.03			0.10	3.7	6.6	85.6	2.82	Do1 vf f styl
125	4188.0- 89.0	0.90	0.24			0.14	3.2	2.7	81.3	2.84	Do1 vf f styl
126	4189.0- 90.0	3.40	0.43			0.90	2.4	0.8	94.7	2.83	Do1 vf f foss
127	4190.0- 91.0	0.04	0.02			0.40	5.3	3.9	85.4	2.84	Do1 sli/pyr vf f p.p. foss
128	4191.0- 92.0	0.21	0.13			0.16	3.8	4.4	92.3	2.84	Do1 vf f styl
129	4192.0- 93.0	0.98	0.91			0.24	5.9	4.0	79.4	2.83	Do1 vf f vug
130	4193.0- 94.0	0.37	0.03			0.10	8.9	2.3	81.5	2.82	Do1 vf f sli/vug
131	4194.0- 95.0	11.0	1.90			1.60	2.1	11.5	80.6	2.82	Do1 sli/sdy vf f
132	4195.0- 96.0	71.0	15.0			7.30	10.0	7.8	65.9	2.81	Do1 vf p.p.

Table B-2

EMSU-679 San Andres
core analysis 4170-4196 ft
(-574 to -600ft).

Green = oil saturation
percentage (So).

CORE LABORATORIES

CHEVRON U.S.A., INC.
E.M.S.U. NO. 679

Field : EUNICE MONUMENT SOUTH
Formation : GRAYBURG

File No.: 57181-16203
Date : 10-16-90

C O R E A N A L Y S I S R E S U L T S

SAMPLE NUMBER	DEPTH ft	PERMEABILITY				PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	SATURATION		GRAIN DENSITY gm/cc	DESCRIPTION
		KA MAX md	90 DEG md	N/S md	E/W md			(PORE VOLUME) OIL %	WATER %		
133	4196.0- 97.0	10.0	4.10			7.60	8.4	20.3	59.9	2.82	Dol vf f p.p.
134	4197.0- 98.0	3.20	2.40			0.90	6.1	38.9	51.9	2.82	Dol sli/shy vf f
135	4198.0- 99.0	32.0	18.0			3.80	10.1	27.5	52.9	2.82	Dol vf p.p.
136	4199.0- 00.0	113.	11.0			9.20	7.4	23.6	62.9	2.83	Dol sli/shy vf f sli/vug styl
137	4200.0- 01.0	1.70	0.94			0.53	5.7	1.3	79.7	2.83	Dol vf f p.p.
138	4201.0- 02.0	3.50	1.80			3.30	6.2	24.2	67.7	2.82	Dol vf f sli/vug
139	4202.0- 03.0	119.	98.0			26.0	6.8	25.2	60.5	2.84	Dol vf f vug
140	4203.0- 04.0	27.0	22.0			48.0	5.6	10.7	64.2	2.83	Dol f vf vug
141	4204.0- 05.0	4.90	1.70			3.10	9.8	13.9	62.0	2.80	Dol vf f sli/vug
142	4205.0- 06.0	11.0	11.0			11.0	7.9	12.4	74.6	2.82	Dol vf f vug styl
143	4206.0- 07.0	82.0	59.0			7.80	7.2	20.2	72.7	2.81	Dol vf f vug styl
144	4207.0- 08.0	30.0	29.0			24.0	13.4	19.7	59.9	2.85	Dol vf vug
145	4208.0- 09.0	24.0	14.0			2.80	10.5	21.3	53.2	2.86	Dol vf vug styl
146	4209.0- 10.0	5.80	1.60			5.50	8.8	15.6	62.2	2.77	Dol sli/pyr vf sli/vug
147	4210.0- 11.0	0.33	0.19			0.05	6.4	12.1	72.8	2.83	Dol vf f sli/vug
148	4211.0- 12.0	0.61	0.52			0.93	11.5	11.0	72.1	2.83	Dol vf f sli/vug
149	4212.0- 13.0	4.30	4.20			4.60	11.2	7.6	76.2	2.83	Dol vf f sli/vug
150	4213.0- 14.0	6.40	3.90			2.60	8.3	16.7	52.4	2.84	Dol vf
151	4214.0- 15.0	11.0	4.50			2.80	8.5	33.2	37.9	2.83	Dol sli/sdy sli/vug
152	4215.0- 16.0	3.50	1.50			1.60	9.4	28.5	39.2	2.83	Dol sli/sdy sli/vug p.p.
153	4216.0- 17.0	8.80	6.60			6.00	10.2	17.8	48.4	2.83	Dol sli/sdy vug
154	4217.0- 18.0	231.	141.			17.0	12.7	19.7	61.9	2.82	Dol sli/sdy vf vug
155	4218.0- 19.0	23.0	5.00			0.48	5.8	12.1	62.0	2.84	Dol vf p.p. styl
156	4219.0- 20.0	17.0	5.90			4.00	7.5	21.1	46.9	2.84	Dol sli/sdy vf p.p. styl
157	4220.0- 21.0	197.	100.			12.0	7.2	36.1	40.6	2.84	Dol vf f p.p. styl
158	4221.0- 22.0	0.44	0.22			0.15	8.5	26.9	49.3	2.84	Dol p.p.
159	4222.0- 23.0	25.0	2.40			33.0	5.8	18.0	59.8	2.82	Dol vf f p.p.
160	4223.0- 24.0	1.40	1.10			0.18	13.3	38.1	42.4	2.86	Dol vf p.p.
161	4224.0- 25.0	15.0	6.00			27.0	8.0	26.5	58.6	2.82	Dol vf

Table B-3

EMSU-679 San Andres
core analysis 4196-4225 ft
(-600 to -629 ft).

Green = oil saturation
percentage (So).

CORE LABORATORIES

Table B-4

EMSU-679 San Andres
core analysis 4225-4251 ft
(-629 to -655 ft).

Green = oil saturation
percentage (So).

CHEVRON U.S.A., INC.
E.M.S.U. NO. 679

Field : EUNICE MONUMENT SOUTH
Formation : GRAYBURG

File No.: 57181-16203
Date : 10-16-90

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY				PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	SATURATION		GRAIN DENSITY gm/cc	DESCRIPTION
		KA MAX md	90 DEG md	N/S md	E/W md			(PORE VOLUME) OIL %	WATER %		
162	4225.0- 26.0	6.80	6.00			9.90	10.7	34.0	34.0	2.83	Dol sli/anh p.p.
163	4226.0- 27.0	0.95	0.91			16.0	10.0	35.4	26.0	2.87	Dol vf p.p.
164	4227.0- 28.0	35.0	1.90			89.0	9.4	34.3	30.1	2.84	Dol sli/anh vf p.p.
165	4228.0- 29.0	0.44	0.35			0.33	7.5	39.4	33.8	2.84	Dol vf p.p.
166	4229.0- 30.0	2.00	0.37			1.00	6.4	37.2	39.1	2.83	Dol vf p.p.
167	4230.0- 31.0	5.10	2.00			3.30	7.6	29.4	37.8	2.87	Dol sli/anh vf p.p. styl
168	4231.0- 32.0	1790.	0.04			4432.	3.9	13.6	59.9	2.84	Dol vf p.p.
169	4232.0- 33.0	9.90	6.80			14.0	5.4	35.1	50.2	2.83	Dol vf vug styl
170	4233.0- 34.0	1292.	102.			7.70	4.8	33.8	46.4	2.81	Dol vf f vug
171	4234.0- 35.0	1.60	1.20			0.88	5.6	29.8	59.6	2.83	Dol vf f sli/vug styl
172	4235.0- 36.0	1.70	1.30			1.10	6.7	37.1	42.9	2.84	Dol vf f sli/vug
173	4236.0- 37.0	8.30	7.30			4.40	9.5	28.4	38.6	2.84	Dol sli/anh sli/vug
174	4237.0- 38.0	30.0	26.0			1.90	6.6	34.3	38.1	2.83	Dol sli/anh vf p.p.
175	4238.0- 39.0	23.0	22.0			7.70	11.2	32.5	28.9	2.84	Dol sli/sdy p.p.
176	4239.0- 40.0	33.0	33.0			4.30	13.5	30.7	34.8	2.83	Dol sli/sdy p.p.
CORE NO. 4 4240-4297 CUT 57' REC 41'											
177	4240.0- 41.0	19.0	17.0			40.0	14.9	38.4	28.4	2.82	Dol f sli/vug p.p.
178	4241.0- 42.0	42.0	41.0			5.90	13.2	21.0	41.9	2.83	Dol f sli/vug p.p.
179	4242.0- 43.0	5.30	3.50			6.20	9.8	25.4	42.4	2.84	Dol F p.p.
180	4243.0- 44.0	23.0	19.0			36.0	12.4	30.2	40.3	2.82	Dol F p.p.
181	4244.0- 45.0	164.	1.20			1895.	8.5	22.8	39.8	2.85	Dol F vf p.p.
182	4245.0- 46.0	2940.	0.41			96.0	8.8	19.9	39.8	2.88	Dol F vf p.p.
183	4246.0- 47.0	0.68	0.02			<.01	6.3	32.4	55.5	2.85	Dol F sli/vug p.p. styl
184	4247.0- 48.0	26.0	24.0			23.0	15.0	33.0	26.7	2.88	Dol F sli/vug p.p.
185	4248.0- 49.0	35.0	32.0			1.50	12.7	18.3	52.9	2.83	Dol F sli/vug p.p. foss
186	4249.0- 50.0	12.0	10.0			3.70	12.5	16.3	52.0	2.84	Dol sli/vug
187	4250.0- 51.0	7.00	6.50			3.00	12.1	17.3	41.9	2.87	Dol f sli/vug p.p. styl

CORE LABORATORIES

CHEVRON U.S.A., INC.
E.M.S.U. NO. 679

Field : EUNICE MONUMENT SOUTH
Formation : GRAYBURG

File No.: 57181-16203
Date : 10-16-90

C O R E A N A L Y S I S R E S U L T S

Table B-5

EMSU-679 San Andres
core analysis 4251-4280 ft
(-655 to -684 ft).

Green = oil saturation
percentage (So).

SAMPLE NUMBER	DEPTH ft	PERMEABILITY				PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	SATURATION		GRAIN DENSITY gm/cc	DESCRIPTION
		KA MAX md	90 DEG md	N/S md	E/W md			(PORE VOLUME) OIL %	WATER %		
188	4251.0- 52.0	197.	1.40			11.0	9.1	17.3	52.0	2.83	Dol vf sli/vug p.p.
189	4252.0- 53.0	1.80	1.20			1.40	5.9	5.2	77.8	2.85	Dol F sli/vug styl
190	4253.0- 54.0	1.10	1.10			1.40	4.9	4.0	88.0	2.85	Dol F sli/vug styl
191	4254.0- 55.0	0.88	0.08			0.20	9.2	10.5	54.8	2.84	Dol F sli/vug p.p. lam
192	4255.0- 56.0	0.39	0.14			0.06	8.0	8.2	59.3	2.83	Dol F sli/vug p.p. lam
193	4256.0- 57.0	0.21	0.20			0.06	8.2	24.4	40.7	2.85	Dol sli/arg f p.p. lam
194	4257.0- 58.0	0.87	0.58			0.69	10.1	18.8	43.4	2.87	Dol sli/arg sli/vug p.p.
195	4258.0- 59.0	7.40	5.20			4.80	11.4	15.9	49.9	2.85	Dol f sli/vug p.p.
196	4259.0- 60.0	3.10	1.20			0.93	11.4	17.8	54.3	2.85	Dol F vf sli/vug p.p.
197	4260.0- 61.0	2.20	2.10			1.90	12.4	13.6	48.5	2.85	Dol f p.p.
198	4261.0- 62.0	1.40	1.40			1.00	12.3	19.4	41.2	2.86	Dol f p.p.
199	4262.0- 63.0	1.20	0.11			<.01	3.5	20.0	79.8	2.85	Dol F vf p.p.
* 200	4263.0- 64.0		<.01			<.01	2.2	0.0	94.8	2.83	Dol F p.p.
* 201	4264.0- 65.0		<.01				2.1	0.0	92.0	2.80	Dol
* 202	4265.0- 66.0		<.01				2.5	4.1	87.2	2.84	Dol f
203	4266.0- 67.0	0.94	0.64			58.0	3.1	4.1	82.2	2.86	Dol F vf sli/vug
204	4267.0- 68.0	290.	193.			115.	19.6	13.5	75.7	2.82	Dol F p.p.
205	4268.0- 69.0	<.01	<.01			0.93	6.0	5.9	59.1	2.88	Dol F vf p.p.
206	4269.0- 70.0	0.41	0.34			0.48	8.2	17.3	61.5	2.84	Dol f sli/vug p.p.
207	4270.0- 71.0	14.0	8.60			7.00	7.0	17.5	67.4	2.83	Dol F vf p.p. styl
208	4271.0- 72.0	0.93	0.93			0.43	7.0	19.7	70.8	2.84	Dol F sli/vug p.p. styl
209	4272.0- 73.0	36.0	27.0			3.20	10.2	19.0	63.3	2.84	Dol F p.p.
* 210	4273.0- 74.0		4.80				12.6	15.7	67.3	2.83	Dol p.p.
* 211	4274.0- 75.0		3.10				10.2	10.3	73.9	2.83	Dol p.p.
* 212	4275.0- 76.0		46.0			35.0	14.3	12.2	69.9	2.82	Dol p.p.
213	4276.0- 77.0	6.60	2.80			8.70	9.9	11.2	52.2	2.86	Dol F vf p.p.
214	4277.0- 78.0	37.0	5.10			25.0	10.1	14.8	67.6	2.82	Dol F vf p.p.
* 215	4278.0- 79.0		276.				19.7	10.4	76.5	2.82	Dol p.p.
* 216	4279.0- 80.0		6.00				9.8	15.3	48.3	2.83	Dol sli/vug p.p.

CORE LABORATORIES

Table B-6

EMSU-679 San Andres
core analysis 4280-4321 ft
(-684 to -725 ft).

Green = oil saturation
percentage (So).

CHEVRON U.S.A., INC.
E.M.S.U. NO. 679

Field : EUNICE MONUMENT SOUTH
Formation : GRAYBURG

File No.: 57181-16203
Date : 10-16-90

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY				PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	SATURATION		GRAIN DENSITY gm/cc	DESCRIPTION
		KA MAX md	90 DEG md	N/S md	E/W md			(PORE VOLUME) OIL %	WATER %		
* 217	4280.0- 81.0 4281.0- 97.0		14.0			14.3	16.1	54.5	2.84	Dol sli/vug p.p. Lost core	
CORE NO. 5 4297-4358 CUT 61' REC 61'											
218	4297.0- 98.0	99.0	1.30		1.10	7.8	12.1	82.5	2.86	Dol F vf p.p. styl	
* 219	4298.0- 99.0		<.01			1.8	8.1	81.3	2.83	Dol F vf sli/vug	
220	4299.0- 00.0	0.19	0.17		0.07	3.7	4.3	85.7	2.85	Dol F sli/vug	
221	4300.0- 01.0	0.09	0.08		<.01	5.4	2.6	92.1	2.86	Dol sli/pyr F biot styl	
222	4301.0- 02.0	0.75	0.15		0.05	11.8	1.7	93.6	2.77	Dol sli/sdy F sli/vug	
223	4302.0- 03.0	0.05	0.05		<.01	12.1	0.0	95.4	2.79	Dol sli/sdy sli/pyr	
224	4303.0- 04.0	0.17	0.16		<.01	13.6	2.6	79.4	2.82	Dol sli/sdy	
225	4304.0- 05.0	0.12	0.11		0.06	14.5	0.0	83.7	2.84	Dol sli/sdy	
226	4305.0- 06.0	0.25	0.24		0.13	14.8	0.0	85.0	2.83	Dol sli/sdy	
227	4306.0- 07.0	0.02	<.01		0.06	12.8	0.0	89.7	2.81	Dol sli/sdy	
228	4307.0- 08.0	1.50	1.10		0.16	12.4	0.0	96.6	2.85	Dol sli/sdy	
229	4308.0- 09.0	<.01	<.01		0.06	8.4	0.0	96.5	2.80	Dol sli/sdy sli/shy sh lam	
230	4309.0- 10.0	0.05	0.01		0.14	8.8	0.0	96.9	2.83	Dol F sli/shy sh lam	
231	4310.0- 11.0	3.60	2.70		2.40	12.1	4.6	83.6	2.83	Dol F sli/vug styl	
232	4311.0- 12.0	0.55	0.35		0.50	5.9	5.9	83.2	2.86	Dol anhy sli/vug	
233	4312.0- 13.0	0.13	0.08		0.12	8.5	1.6	87.5	2.86	Dol F p.p.	
234	4313.0- 14.0	0.13	0.10		0.13	9.7	2.0	94.0	2.84	Dol F shr p.p. styl	
235	4314.0- 15.0	0.10	0.10		0.28	5.7	12.0	82.6	2.82	Dol sli/vug shr foss	
236	4315.0- 16.0	3.40	0.91		0.92	10.1	19.8	59.3	2.84	Dol sli/lim F p.p.	
237	4316.0- 17.0	0.23	0.19		0.06	4.3	13.8	82.9	2.85	Dol F p.p. styl	
238	4317.0- 18.0	<.01	<.01		<.01	6.0	1.3	92.7	2.86	Dol shy sli/pyr vf sh lam styl	
239	4318.0- 19.0	0.08	0.03		0.09	7.0	2.6	89.8	2.85	Dol F vf styl	
240	4319.0- 20.0	1.20	0.19		0.76	10.3	8.1	62.3	2.85	Dol F	
241	4320.0- 21.0	0.14	0.14		<.01	8.0	4.7	93.2	2.84	Dol vf	

CORE LABORATORIES

CHEVRON U.S.A., INC.
E.M.S.U. NO. 679

Field : EUNICE MONUMENT SOUTH
Formation : GRAYBURG

File No.: 57181-16203
Date : 10-16-90

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY				PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	SATURATION		GRAIN DENSITY gm/cc	DESCRIPTION
		KA MAX md	90 DEG md	N/S md	E/W md			(PORE VOLUME) OIL %	WATER %		
242	4321.0- 22.0	0.11	0.06			<.01	9.3	2.7	93.7	2.85	Do1 sli/shy sli/pyr sh lam
243	4322.0- 23.0	0.17	0.15			<.01	9.6	3.9	86.3	2.84	Do1 p.p. styl
244	4323.0- 24.0	0.35	0.20			0.18	9.7	10.9	62.2	2.82	Do1 vf sli/vug
245	4324.0- 25.0	0.13	0.06			<.01	9.6	6.8	84.0	2.84	Do1
246	4325.0- 26.0	1.90	1.20			0.83	5.4	5.7	91.7	2.84	Do1 F
247	4326.0- 27.0	1.20	0.19			0.15	9.1	2.7	82.3	2.88	Do1 styl
248	4327.0- 28.0	0.58	0.53			19.0	10.1	2.8	87.8	2.84	Do1 vf
249	4328.0- 29.0	0.50	0.45			9944.	11.4	2.2	88.2	2.88	Do1 vf
250	4329.0- 30.0	0.13	0.04			9101.	9.4	0.0	94.6	2.86	Do1 vf
251	4330.0- 31.0	0.17	0.11			<.01	8.5	1.5	87.1	2.85	Do1 F
252	4331.0- 32.0	0.11	0.04			0.04	9.6	0.0	91.0	2.85	Do1
253	4332.0- 33.0	0.86	0.66			1.10	9.1	0.0	93.4	2.85	Do1 vf
254	4333.0- 34.0	11.0	2.20			9269.	5.8	0.0	92.2	2.86	Do1 vf
255	4334.0- 35.0	0.24	0.09			0.03	8.8	0.0	96.8	2.84	Do1 F styl
256	4335.0- 36.0	46.0	11.0			10.0	3.7	0.0	88.3	2.86	Do1 sli/lim F vf
257	4336.0- 37.0	4705.	0.45			1962.	3.9	0.0	78.1	2.88	Do1 vf
258	4337.0- 38.0	0.90	0.65			0.79	12.2	6.6	75.0	2.85	Do1 sli/lim p.p.
259	4338.0- 39.0	1.30	1.10			0.82	11.3	7.4	76.9	2.85	Do1 sli/vug
260	4339.0- 40.0	0.48	0.23			<.01	8.9	0.0	95.5	2.84	Do1 vf
261	4340.0- 41.0	0.84	0.35			0.29	12.7	0.0	92.9	2.84	Do1 F
262	4341.0- 42.0	1.60	1.30			0.28	9.5	0.0	92.9	2.84	Do1 sli/shy F sh lam styl
263	4342.0- 43.0	9.60	2.40			<.01	6.3	0.0	96.7	2.85	Do1 sli/lim sli/shy F styl
264	4343.0- 44.0	0.51	0.18			0.22	3.1	0.0	95.7	2.83	Do1 sli/lim vf vug
265	4344.0- 45.0	1.10	0.58			0.34	3.2	6.5	51.6	2.89	Do1 sli/lim F vug shr
266	4345.0- 46.0	4.20	1.70			2.10	2.1	8.8	80.7	2.85	Do1 sli/im F sli/vug shr
* 267	4346.0- 47.0		<.01				0.7	0.0	91.7	2.85	Do1 F vf sli/vug
268	4347.0- 48.0	0.17	0.09			0.05	2.3	0.0	80.0	2.86	Do1 F p.p.
269	4348.0- 49.0	0.48	0.11			1.10	2.5	0.0	96.7	2.85	Do1 F vf styl
270	4349.0- 50.0	0.40	0.20			0.23	2.7	0.0	80.0	2.87	Do1 F

Table B-7

EMSU-679 San Andres
core analysis 4321-4350 ft
(-725 to -754 ft).

Green = oil saturation
percentage (So).

Table B-8

**EMSU-679 San Andres
core analysis 4350-4358 ft
(-754 to -762 ft).**

**Green = oil saturation
percentage (So).**

**Oil to bottom of core
@-762 ft**

CORE LABORATORIES

CHEVRON U.S.A., INC.
E.M.S.U. NO. 679

Field : EUNICE MONUMENT SOUTH
Formation : GRAYBURG

File No.: 57181-16203
Date : 10-16-90

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY				PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	SATURATION		GRAIN DENSITY gm/cc	DESCRIPTION
		KA MAX md	90 DEG md	N/S md	E/W md			(PORE VOLUME) OIL %	WATER %		
271	4350.0- 51.0	83.0	32.0			2.90	4.4	0.0	82.4	2.85	Dol sli/lim sli/pyr F vug styl
272	4351.0- 52.0	4.20	0.70			1.90	1.8	0.0	89.7	2.85	Dol sli/lim F vug
* 273	4352.0- 53.0		<.01				1.5	0.0	94.6	2.86	Dol F vf sli/vug
274	4353.0- 54.0	134.	19.0			42.0	4.9	0.0	82.8	2.86	Dol sli/lim F vug
275	4354.0- 55.0	143.	71.0			80.0	9.5	12.7	61.8	2.87	Dol sli/lim vug
276	4355.0- 56.0	7.20	5.90			2.60	6.5	18.9	69.4	2.82	Dol vf p.p.
277	4356.0- 57.0	109.	64.0			39.0	12.0	16.2	81.1	2.83	Dol p.p.
* 278	4357.0- 58.0		5.70				14.4	10.1	89.4	2.85	Dol F vf vug shr

Table B-9

Gulf Oil Expl. & Prod. Co. ROTARY ENGINEERS LABORATORIES									
R. R. Bell #4									
Lea County, New Mexico									
WHOLE CORE ANALYSIS TABULAR DATA Page (6)									
SAMPLE NUMBER	DEPTH	RATING	GRAIN DENSITY	POROSITY	WHOLE CORE PERMEABILITY MAX.	FLUIDS Sw	FLUIDS So	FLO.	REMARKS
T/SADR 3783-3785									Not Recovered Core # (6) 3785-3820
217	3785-3786	P	2.88	6.9	<.1	Plug	40.7	13.5	Recovered 17' Cut 15'
218	-86.6	P	2.82	5.1	0.5	Plug	46.5	11.2	3888
219	-88	P	2.86	7.0	<.1	Plug	49.9	15.5	
220	-89	P	2.84	5.8	4.3	Plug	56.8	11.9	
221	-94	VP	2.84	4.1	<.1	Plug	58.8	16.0	
222	-92	VP	2.83	3.3	<.1	Plug	38.0	30.3	
223	-93	P	2.83	4.0	<.1	Plug	37.0	17.3	
224	-94	VP	2.83	2.4	<.1	Plug	53.6	14.9	
225	-94	P	2.81	4.1	<.1	Plug	50.9	13.5	
226	3795-3796	VP	2.83	2.5	<.1	Plug	42.8	18.4	
227	-97	VP	2.81	1.8	<.1	Plug	56.7	14.9	
228	-98	VP	2.82	2.7	<.1	Plug	47.1	15.9	
229	-99	VP	2.82	3.5	<.1	Plug	50.6	19.9	
230	3799-3799.6	No Analysis	(SCAL - Dolo, Sc. S/P, Sc. PPP, Fr. Spotty Fluorescence)						
231	-01	VP	2.84	3.1	<.1	Plug	56.8	12.2	
232	-02	VP	2.85	4.2	<.1	Plug	64.2	15.0	
233	3802-3820	Not Recovered Core # (7) 3820-3834							Recovered 10' Cut 14'
234	-22	P	2.84	7.2	<.1	Plug	74.4	10.1	
235	-23	VP	2.88	7.2	<.1	Plug	70.4	14.5	
236	-24	VP	2.85	3.7	<.1	Plug	62.6	25.9	
237	3824-3825	P	2.85	4.0	2.8	2.3	56.9	15.7	
238	3825-3826	No Analysis	(SCAL - Dolo, Sc. S/P, Vugs, Fr. 100% Fluorescence)						
239	-27	F	2.83	5.6	<.1	Plug	35.4	18.0	
240	-28	P	2.85	3.8	<.1	Plug	51.9	15.3	
241	-29	P	2.84	4.6	<.1	Plug	42.3	17.7	
242	3829-3830	VP	2.86	2.9	<.1	Plug	52.3	27.8	
243	3830-3834	Not Recovered Core # (8) 3834-3869							Recovered 30' 15' Cut
244	-36	P	2.82	3.3	0.9	0.5	56.0	13.5	
245	-37	VP	2.84	3.4	<.1	Plug	57.0	21.0	
246	-38	P	2.86	4.2	8.1	Plug	40.3	10.6	
247	-39	P	2.89	4.4	<.1	Plug	31.6	27.1	
248	3839-3840	VP	2.86	4.0	0.1	Plug	62.3	9.5	
249	-41	P	2.82	6.7	1.1	Plug	58.4	12.4	
250	-42	P	2.85	3.9	3.6	Plug	50.5	22.7	
251	-43	F	2.85	5.4	<.1	Plug	40.9	6.9	
252	-44	F	2.91	6.8	<.1	Plug	30.0	8.8	
253	3844-3845	F	2.85	11.6	2.9	2.1	50.7	8.2	
254	3845-3846	No Analysis	(SCAL - Dolo, Sc. S/P, Vugs, Fr. 100% Fluorescence)						
255	-47	F	2.81	10.6	<.1	Plug	53.7	5.5	
256	-48	F	2.87	10.0	2.3	1.1	59.2	7.2	
257	-49	F	2.85	10.0	26.9	21.1	35.7	11.4	
258	3849-3850	P	2.82	4.0	<.1	Plug	38.5	12.2	
259	-51	P	2.84	4.5	3.9	Plug	30.8	13.2	
260	-52	F	2.81	6.3	0.8	Plug	20.9	9.0	
261	3854-3855	F	2.81	11.4	2.3	Plug	53.3	10.8	
262	-54	F	2.83	7.9	1.2	Plug	44.7	4.6	
263	3856-3857	F	2.83	12.7	68.4	66.0	47.1	7.0	
264	-56	F	2.87	10.6	0.1	0.1	62.1	7.1	
265	3858-3859	No Analysis	(SCAL - Dolo, Sc. S/P, Vugs, Fr. 100% Fluorescence)						
266	-58	F	2.83	8.2	50.4	Plug	41.0	15.4	
267	-59	F	2.81	9.5	<.1	Plug	53.9	14.4	
268	3859-3860	F	2.83	10.8	1.1	Plug	45.7	15.4	
269	-61	F	2.83	8.2	<.1	Plug	39.4	13.7	
270	3861-3862	No Analysis	(SCAL - Dolo, Sc. S/P, Vugs, Fr. 100% Fluorescence)						
271	3862-3863	F	2.86	9.5	<.1	Plug	46.6	6.0	
272	3863-3864	VP	2.86	4.4	1.2	Plug	62.4	6.5	
273	3864-3869	Not Recovered							

T/SADR	3783-3785		Not Recovered	Core # (6) 3785-3820
217	3785-3786	P	2.88	6.9
218	-86.6	P	2.82	5.1
219	-88	P	2.86	7.0
220	-89	P	2.84	5.8
221	-94	VP	2.84	4.1
222	-92	VP	2.83	3.3
223	-93	P	2.83	4.0
224	-94	VP	2.83	2.4
225	-94	P	2.81	4.1

R.R. Bell #4

Residual Oil Zone (ROZ)
So = Oil Saturation (Green)

EMSU R.R. Bell #4 San Andres core analysis from 3883 ft to 3969 ft (-332 ft to -418 ft) in the residual oil zone (ROZ).

Green = Oil saturation percentage (So).

Core analysis depths were off by 100 ft and were hand adjusted to their proper depth.

Table B-10

Gulf Oil Expl. & Prod. Co. ROTARY ENGINEERS LABORATORIES									
R. R. Bell #4									
Lea County, New Mexico WHOLE CORE ANALYSIS TABULAR DATA Page (7)									
AMPLE NUMBER	DEPTH	RAT-ING	GRAIN DENS-ITY	PORO-SITY	WHOLE CORE PERMEABILITY 90° MAX.	FLUIDS %W	FLUIDS %O	FLO.	REMARKS
									Core # (9) 3869-3906, Recovered 35' ³⁹⁰⁶ ₃₉₀₄
267	3869-3870	F	2.80	7.8	<.1	Plug 28.2	16.9	100	Dolo, S/P, Fr.
268	-71	G	2.79	13.5	2.5	Plug 36.0	15.7	100	Dolo, S/P, Small Vugs, Fr.
269	-72	F	2.82	5.5	7.8	7.7	41.5	11.9	100 Dolo, S/P, Fr.
	3872-3873								No Analysis (SCAL - Dolo, Sc. S/P, Fr. Spotty Fluorescence)
270	-74	P	2.74	5.2	0.1	<.1	60.0	14.6	Sp. Dolo, S/P, Fr.
271	3874-3875	P	2.73	4.8	0.5	0.5	57.6	8.0	Sp. Dolo, S/P, Fr.
272	-76	P	2.77	6.7	0.4	<.1	55.8	26.2	Sp. Dolo, S/P, Fr.
273+	-77	F	2.67	10.6	1.3	0.1	45.3	11.2	Sp. Dolo, S/P, Fr.
274	-78	G	2.67	11.8	3.2	1.5	41.0	14.2	Sp. Dolo, S/P, Fr.
275	-79	G	2.73	13.7	5.9	0.9	32.6	11.7	100 Dolo, S/P, Fr.
276	3879-3880	F	2.66	10.9	0.2	0.1	43.9	14.8	Sp. Dolo, S/P, Fr.
277	-81	F	2.69	9.2	0.2	0.1	52.3	14.1	Sp. Dolo, S/P, Fr.
278	-82	F	2.73	7.3	1.2	0.9	49.1	22.0	100 Dolo, S/P, Fr.
279	-83	P	2.78	6.6	15.3	0.3	56.0	23.3	100 Dolo, S/P, Fr.
280	-84	VP	2.78	4.6	0.4	0.1	74.0	18.3	100 Dolo, S/P, Fr.
281	3884-3885	F	2.72	7.3	0.8	0.2	41.3	21.1	100 Dolo, S/P, Fr.
282+	-86	VP	2.74	4.5	0.1	Plug	61.3	29.2	50 Dolo, S/P, Fr.
283	-87	VP	2.81	7.7	0.1	0.1	84.4	7.6	60 Dolo, S/P, Fr.
284	-88	P	2.76	8.0	0.4	<.1	76.7	10.9	100 Dolo, S/P, Fr.
285	-89	F	2.74	9.0	78.1	Plug	42.4	19.0	100 Dolo, S/P, Fr.
286	3889-3890	F	2.81	8.1	<.1	Plug	33.9	24.9	100 Dolo, S/P, Fr.
287+	-91	F	2.81	10.6	38.5	8.6	26.2	25.4	100 Dolo, S/P, Fr.
288	-92	F	2.81	12.7	2.9	0.3	34.6	25.0	100 Dolo, S/P, Fr.
289	-93	P	2.79	5.9	<.1	<.1	64.2	15.9	100 Dolo, S/P, Fr.
290	-94	VP	2.86	6.3	7.8	1.1	81.6	4.7	100 Dolo, S/P, Fr.
291	3894-3895	P	2.88	5.4	<.1	Plug	61.3	5.3	100 Dolo, S/P, Sc. Vugs, Fr.
	3895-3896								No Analysis (SCAL - Dolo, Sc. S/P, Sc. Vugs, Fr, 100% Fluorescence)
292	-97	P	2.80	3.3	2.6	2.3	41.3	8.5	100 Dolo, S/P, Sc. Vugs, Fr.
293	-98	F	2.78	6.5	0.3	0.3	31.2	13.1	100 Dolo, S/P, Sc. Vugs, Fr.
294	-99	P	2.82	7.3	3.1	0.1	73.0	6.1	Sp. Dolo, S/P, Fr.
295	3899-3900	VP	2.80	7.5	3.2	0.6	73.1	11.5	100 Dolo, S/P, Fr.
296	-01	F	2.83	7.9	2.7	1.4	48.8	14.1	100 Dolo, S/P, Small Vugs, Fr.
297+	-02	F	2.80	12.5	0.3	<.1	30.6	22.0	100 Dolo, S/P, Small Vugs, Fr.
298	-03	F	2.79	10.4	0.1	0.1	38.3	15.3	100 Dolo, S/P, Fr.
	3903-3904								No Analysis (SCAL - Dolo, Sc. S/P, Sc. Vugs, Fr, 100% Fluorescence)
	3904-3906								Not Recovered

Lovington Sdstn

R.R. Bell #4
Residual Oil Zone (ROZ)
So = Oil Saturation
(Green)

EMSU R.R. Bell #4 San Andres core analysis from 3969 ft to 4006 ft (-418 ft to -455 ft) in the residual oil zone (ROZ) to the base of the cored interval.

Green = Oil saturation percentage (So).

Core analysis depths are off by 100 ft and were hand adjusted to their proper depth.

Lovington Sandstone between 3973-3986 ft helped locate proper core depths.

EMSU-679 San Andres

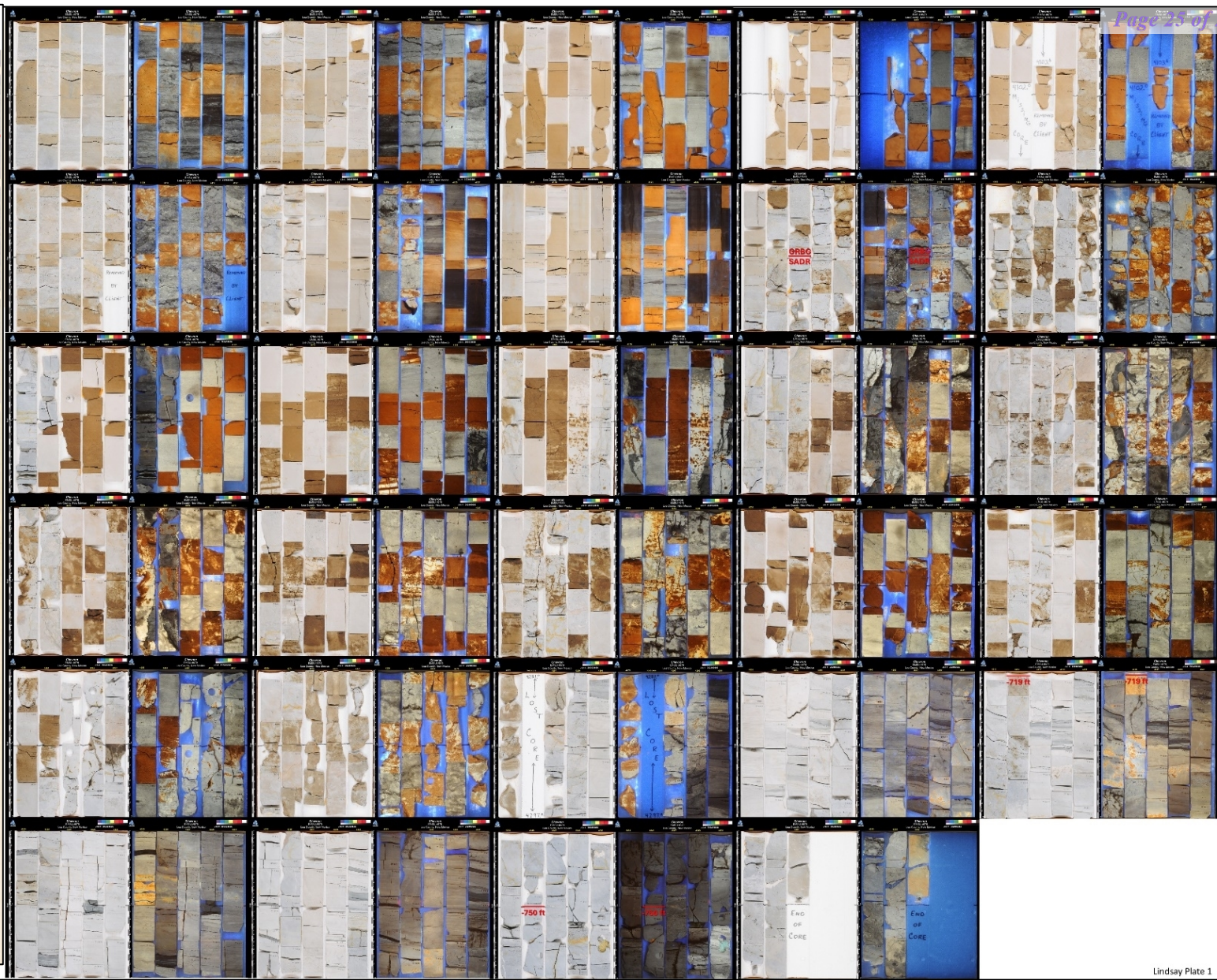
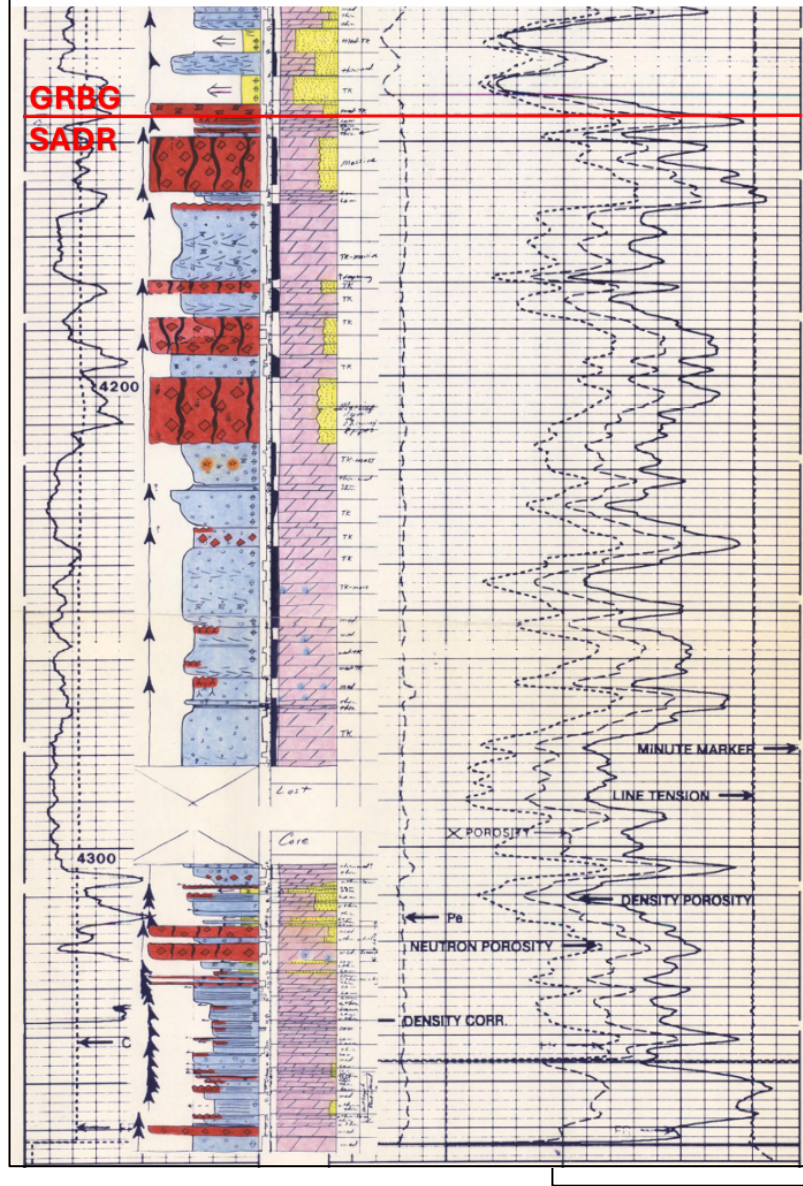
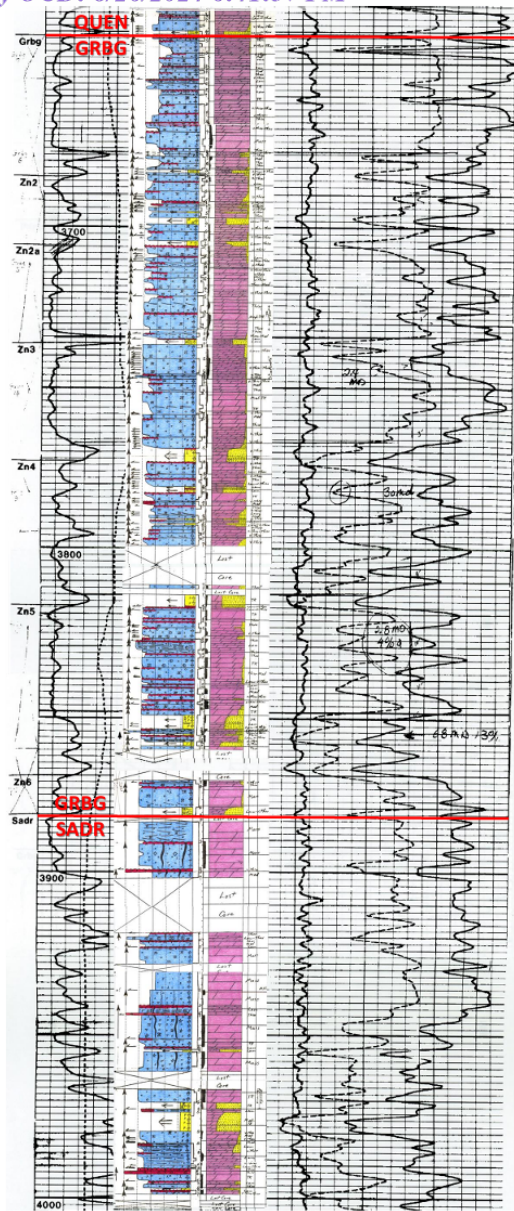


Plate B-1

EMSU-679 basal Grayburg and upper San Andres well log, core description, and core photographs (Plain light and UV) showing porous oil-stained strata.



Lindsay Plate 2

Plate B-2

EMSU R.R. Bell #4 basal Queen, Grayburg, and upper San Andres well log, core description, and core photographs (Plain light and UV) showing oil-stained strata.