

TABLE I

PRODUCTION DATA AS OF JUNE 1, 1985

TOTAL FIELD

FEATHER (MORROW) FIELD

LEA COUNTY, NEW MEXICO

YEAR	OIL(BBLS)		GAS(MCF)		GOR
	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE	MSCF/STB
1982	42812	42812	215127	215127	5.025
1983	41367	84179	212494	427621	5.137
1984	72646	156825	428294	855915	5.896
1985	44430	201255	350836	1206751	7.896

May 26, 1982

CORE LABORATORIES, INC.

LAB

Santa Fe Energy Company
One Security Park
7200 I-40 West
Amarillo, TX 79106

P. L. Moses
Manager
Reservoir Fluid Analysis

Attention: Mr. Patrick Gaume

806-359-2000

Subject: Reservoir Fluid Study
State UTP No. 1 Well
Lea County, New Mexico
RFL 820121

Gentlemen:

Samples of separator gas and condensate were collected from the subject well on February 2, 1982 by a representative of Tefteller, Inc. The samples were submitted to our Dallas laboratory for use in a reservoir fluid study, the results of which are presented in the following report.

The hydrocarbon composition of the separator gas was measured through pentanes by routine gas chromatography. The compositional analysis of the gas was then extended through undecanes plus by the use of temperature programmed chromatography. The overall hydrocarbon composition of the separator gas may be found on page four.

The hydrocarbon composition of the separator condensate was measured through hexanes by low temperature fractional distillation. The heptanes plus fraction of the separator liquid was then subjected to temperature programmed chromatographic analysis, the results of which may be found on page three.

After correction for the factors shown on page one, the producing gas/liquid ratio was calculated to be 5342 cubic feet of primary separator gas at 15.025 psia and 60°F. per barrel of stock tank liquid at 39°F. The shrinkage of the primary separator liquid to stock tank conditions was measured in the laboratory and the producing gas/liquid ratio was found to be equivalent to 4028 standard cubic feet of primary separator gas per barrel of primary separator liquid at 510 psig and 69°F. The separator gas and liquid samples were physically recombined in this gas/liquid ratio and the resulting fluid was used for the entire study. The hydrocarbon composition of the producing wellstream material was calculated by using the measured hydrocarbon compositions of the separator products in conjunction with the producing gas/liquid ratio. All of the aforementioned compositional data may be found on page two.

A small portion of the reservoir fluid was then charged to a high pressure visual cell and thermally expanded to the reported reservoir temperature of 174°F. During a constant composition expansion at this temperature, the fluid was found to have a retrograde dew point at 5368

psig. Presented on page five are the results of the pressure-volume measurements at the reservoir temperature, along with the deviation factor measurements at the dew point pressure and above.

A large portion of the reservoir fluid was then subjected to constant volume depletion at the reservoir temperature. After determining the saturated sample volume, a series of expansions and constant pressure displacements were made, with each displacement terminating at the original saturated volume. Each displaced wellstream was charged to low temperature fractional distillation equipment for compositional analysis, deviation factor measurement and determination of the produced volume. A summary of the constant volume depletion test data may be found on page six.

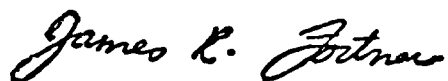
The smooth wellstream compositions were then used with published equilibrium ratios to calculate the cumulative and instantaneous surface recoveries that may be expected during pressure depletion of the reservoir. The cumulative surface recovery calculations were based upon one MMSCF of original fluid and they are presented on page seven. A summary of the instantaneous surface recovery calculations may be found on page eight.

Visual measurements of the retrograde condensate were performed at several points during the constant composition expansion and at each point during constant volume depletion at the reservoir temperature. The maximum observed volume of retrograde condensate was 27.6 percent of the hydrocarbon pore space. A tabulation of the retrograde liquid measurements may be found on page nine; a graphical interpretation of these data is given on page 14.

Thank you for the opportunity to perform this reservoir fluid study. It is always a pleasure to serve Santa Fe Energy Company and we look forward to assisting you again in the near future.

Very truly yours,

CORE LABORATORIES, INC.



James R. Fortner
Area Manager
Reservoir Fluid Analysis

JRF:la

7 cc: Addressee

1 cc: Tefteller, Inc.
P.O. Box 5247
14 East Industrial Loop
Midland, TX 79701
Attn: Mr. D. A. Warren

CORE LABORATORIES, INC.

Reservoir Fluid Analysis

Page 1 of 14File RFL 820121Company Santa Fe Energy Company Date Sampled February 2, 1982Well State UTP No. 1 County LeaField Undesignated State New Mexico

FORMATION CHARACTERISTICS

Formation Name	Morrow
Date First Well Completed	September 16, 1981 ✓
Original Reservoir Pressure	5539 PSIG @ 12373 Ft.
Original Produced Gas/Liquid Ratio	6586 SCF/Bbl
Production Rate	120 Bbls/Day
Separator Pressure and Temperature	PSIG °F.
Liquid Gravity at 60°F.	47.7 °API
Datum	Ft. Subsea

WELL CHARACTERISTICS

Elevation	4310.1 GL, 4325 KB	Ft.
Total Depth	13558 PB	Ft.
Producing Interval	12364-12383	Ft.
Tubing Size and Depth	2-3/8 In. to 12303	Ft.
Open Flow Potential	8.391	MMSCF/Day
Last Reservoir Pressure	5298 PSIG @ 12374	Ft.
Date	February 18, 1982	
Reservoir Temperature	174 °F. @ 12224	Ft.
Status of Well	Flowing	
Pressure Gauge	Amerada	

SAMPLING CONDITIONS

Flowing Tubing Pressure	2265	PSIG
Flowing Bottom Hole Pressure	4620	PSIG
Primary Separator Pressure	510	PSIG
Primary Separator Temperature	69	°F.
Secondary Separator Pressure	33	PSIG
Secondary Separator Temperature	130	°F.
Field Stock Tank Liquid Gravity	47.7	°API @ 60°F.
Primary Separator Gas Production Rate	334.35	MSCF/Day
Pressure Base	15.025	PSIA
Temperature Base	60	°F.
Compressibility Factor (F _{pv})	1.057	
Gas Gravity (Laboratory)	0.705	
Gas Gravity Factor (F _g)	1.1910	
Stock Tank Liquid Production Rate @ 39°F.	62.593	Bbls/Day
Primary Separator Gas/Stock Tank Liquid Ratio	5342	SCF/Bbl
or	187.2	Bbls/MMSCF
Sampled by	Tefteller, Inc.	

REMARKS:

CORE LABORATORIES, INC.
Reservoir Fluid Analysis

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File RFL 820121

Well State UTP No. 1

HYDROCARBON ANALYSES OF SEPARATOR PRODUCTS AND CALCULATED WELL STREAM

<u>Component</u>	<u>Separator Liquid,</u>	<u>Separator Gas</u>		<u>Well Stream</u>	
	<u>Mol Percent</u>	<u>Mol Percent</u>	<u>GPM</u>	<u>Mol Percent</u>	<u>GPM</u>
Hydrogen Sulfide	0.00	0.00		0.00	
Carbon Dioxide	0.17	0.43		0.38	
Nitrogen	0.03	1.74		1.41	
Methane	12.08	79.37		66.20	
Ethane	8.95	11.05	3.013	10.64	2.902
Propane	13.25	5.28	1.482	6.84	1.919
iso-Butane	3.04	0.55	0.183	1.04	0.347
n-Butane	8.16	1.05	0.337	2.44	0.784
iso-Pentane	2.83	0.17	0.063	0.69	0.258
n-Pentane	3.20	0.16	0.059	0.75	0.277
Hexanes	6.22	0.09	0.037	1.29	0.537
Heptanes plus	42.07	0.11	0.055	8.32	5.127
	<u>100.00</u>	<u>100.00</u>	<u>5.229</u>	<u>100.00</u>	<u>12.151</u>

Properties of Heptanes plus

API gravity @ 60°F.	41.4		
Density, Gm/Cc @ 60°F.	0.8174		0.817
Molecular weight	157	97	156

Calculated separator gas gravity (air=1.000) = 0.705

Calculated gross heating value for separator gas = 1233 BTU
per cubic foot of dry gas @ 15.025 psia and 60°F.

Primary separator gas collected @ 510 psig and 69°F.

Primary separator liquid collected @ 510 psig and 69°F.

Primary separator gas/separator liquid ratio = 4028 SCF/Bbl @ 69°F.

Primary separator liquid/stock tank liquid ratio = 1.326 Bbls @ 69°F./Bbl @ 39°F.

Primary separator gas/well stream ratio = 804.39 MSCF/MMSCF

Stock tank liquid/well stream ratio = 150.6 Bbls/MMSCF

CORE LABORATORIES, INC.
Reservoir Fluid Analysis

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File RFL 820121

Well State UTP No. 1

HYDROCARBON ANALYSIS OF HEPTANES PLUS FRACTION OF SEPARATOR LIQUID SAMPLE

<u>Component</u>	<u>Weight Percent</u>	<u>Mol Percent</u>
Methylcyclopentane	0.85	1.58
Benzene	0.00	0.00
Cyclohexane	3.62	6.71
Heptanes	5.15	8.01
Methylcyclohexane	6.23	9.88
Toluene	1.76	2.98
Octanes	7.39	10.08
Ethylbenzene	0.64	0.95
Meta & Para Xylenes	1.86	2.73
Orthoxylene	0.50	0.74
Nonanes	6.28	7.63
iso-Propyl Benzene	0.15	0.19
n-Propyl Benzene	0.40	0.52
1,2,4 Trimethylbenzene	0.56	0.73
Decanes	5.95	6.52
Undecanes	5.99	5.97
Dodecanes	4.92	4.51
Tridecanes	5.75	4.85
Tetradecanes	5.46	4.29
Pentadecanes	5.72	4.20
Hexadecanes	4.89	3.37
Heptadecanes	4.52	2.93
Octadecanes	4.21	2.58
Nonadecanes	3.40	1.97
Eicosanes plus	13.80	6.08
	<u>100.00</u>	<u>100.00</u>

CORE LABORATORIES, INC.
Reservoir Fluid Analysis

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Well State UTP No. 1

EXTENDED HYDROCARBON ANALYSIS OF SEPARATOR GAS SAMPLE

<u>Component</u>	<u>Mol Percent</u>	<u>GPM</u>
Hydrogen Sulfide	0.00	
Carbon Dioxide	0.43	
Nitrogen	1.74	
Methane	79.37	
Ethane	11.05	3.013
Propane	5.28	1.482
iso-Butane	0.55	0.183
n-Butane	1.05	0.337
iso-Pentane	0.17	0.063
n-Pentane	0.16	0.059
Hexanes	0.09	0.037
Heptanes	0.07	0.033
Octanes	0.03	0.016
Nonanes	0.01	0.006
Decanes	Trace	Trace
Undecanes plus	Trace	Trace
	<u>100.00</u>	<u>5.229</u>

Calculated gas gravity (air = 1.000) = 0.705

Calculated gross heating value = 1233 BTU per
cubic foot of dry gas at 15.025 psia and 60°F.

Collected at 510 psig and 69°F.

CORE LABORATORIES, INC.
Reservoir Fluid Analysis

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File RFL 820121

Well State UTP No. 1

PRESSURE-VOLUME RELATIONS OF RESERVOIR FLUID AT 174°F.
(Constant Composition Expansion)

<u>Pressure,</u> <u>PSIG</u>	<u>Relative</u> <u>Volume</u>	<u>Deviation Factor,</u> <u>Z</u>
7000	0.9365	1.331
6500	0.9527	1.257
6000	0.9713	1.184
5500	0.9944	1.111
5400	0.9991	1.096
5368 Dew Point Pressure	1.0000	1.091*
5298	1.0038	
5200	1.0094	
5050	1.0184	
4850	1.0318	
4600	1.0512	
4350	1.0738	
3850	1.1340	
3350	1.2264	
2850	1.3770	
2350	1.6206	
1850	2.0456	
1328	2.8926	
1109	3.5030	
950	4.1307	
763	5.2090	
652	6.1425	

*Gas Expansion Factor = 1.513 MSCF/Bbl.

CORE LABORATORIES, INC.
Reservoir Fluid Analysis

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File RFL 820121

Well State UTP No. 1

DEPLETION STUDY AT 174°F.

Hydrocarbon Analyses of Produced Well Stream - Mol Percent

Component	Reservoir Pressure - PSIG						
	5368	4600	3800	3000	2100	1300	700
Carbon Dioxide	0.38	0.38	0.39	0.39	0.40	0.42	0.44
Nitrogen	1.41	1.50	1.58	1.64	1.67	1.63	1.54
Methane	66.20	68.73	71.59	73.89	75.34	75.26	73.70
Ethane	10.64	10.61	10.59	10.58	10.72	11.23	11.97
Propane	6.84	6.64	6.46	6.28	6.20	6.30	6.91
iso-Butane	1.04	0.97	0.90	0.86	0.84	0.86	0.93
n-Butane	2.44	2.25	2.08	1.94	1.86	1.89	2.04
iso-Pentane	0.69	0.60	0.52	0.47	0.43	0.43	0.45
n-Pentane	0.75	0.65	0.55	0.49	0.44	0.43	0.45
Hexanes	1.29	1.00	0.78	0.63	0.52	0.49	0.51
Heptanes plus	8.32	6.67	4.56	2.83	1.58	1.06	1.06
	100.00	100.00	100.00	100.00	100.00	100.00	100.00
							700*
							0.15
							0.10
							12.86
							6.97
							9.22
							2.10
							5.66
							2.28
							2.69
							6.23
							51.74
							100.00

Molecular weight of heptanes plus	156	130	119	109	105	106	166
Density of heptanes plus	0.817	0.804	0.791	0.780	0.769	0.765	0.825
Deviation Factor - Z							
Equilibrium gas	1.091	0.955	0.842	0.793	0.797	0.853	0.915
Two-phase	1.091	0.984	0.889	0.816	0.739	0.684	0.587

Well Stream produced-							
Cumulative percent of initial	0.000	5.022	13.112	25.190	42.016	61.081	75.332

*Equilibrium liquid phase.

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgement of Core Laboratories, Inc. (all errors and omissions excepted), but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitability of any oil, gas or other mineral well or in connection with which such report is used relied upon.

CORE LABORATORIES, INC.
Reservoir Fluid Analysis

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File RFL 820121

Well State UTP No. 1

CALCULATED CUMULATIVE RECOVERY DURING DEPLETION

Cumulative Recovery per MMSCF of Original Fluid	Initial in Place	Reservoir Pressure - PSIG				
		5368	4600	3800	3000	2100
Well Stream - MSCF	1000	0	50.22	131.12	251.90	420.16
						610.81
						753.22
Normal Temperature Separation*						
Stock Tank Liquid - Barrels	140.82	0	5.22	10.45	14.80	17.68
Primary Separator Gas-MSCF	888.70	0	45.88	122.15	238.84	404.22
Second Stage Gas - MSCF	1.97	0	0.08	0.15	0.22	0.27
Stock Tank Gas - MSCF	3.03	0	0.11	0.23	0.32	0.39
						0.44
						0.48
Total "Plant Products" in						
Primary Separator Gas - Gallons						
Ethane	2847	0	143	375	721	1212
Propane	1796	0	89	231	440	730
Butanes (total)	921	0	45	115	219	362
Pentanes plus	574	0	28	74	144	244
						359
						448
Total "Plant Products" in						
Second Stage Gas - Gallons						
Ethane	9.37	0	0.35	0.71	1.01	1.23
Propane	6.90	0	0.25	0.51	0.72	0.87
Butanes (total)	3.78	0	0.14	0.27	0.38	0.46
Pentanes plus	2.27	0	0.08	0.17	0.24	0.29
						0.33
						0.35
Total "Plant Products" in						
Well Stream - Gallons						
Ethane	2902	0	145	379	727	1219
Propane	1919	0	94	240	453	746
Butanes (total)	1131	0	53	131	241	389
Pentanes plus	6199	0	236	491	734	946
						1135
						1280

*Primary separator at 50 psig and 70°F., second stage at 25 psig and 80°F., stock tank at 75°F.

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted), but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitability of any oil, gas or other mineral well or in connection with which such report is used relied upon.

CORE LABORATORIES, INC.
Reservoir Fluid Analysis

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File RFL 820121

Well State UTP No. 1

CALCULATED INSTANTANEOUS RECOVERY DURING DEPLETION

	Reservoir Pressure - PSIG					
	5368	4600	3800	3000	2100	1300
Normal Temperature Separation*						
Stock Tank Liquid Gravity, °API at 60°F.	48.3	50.8	53.6	56.3	59.0	60.2
Separator Gas/Well Stream Ratio, MSCF/MNSCF						
Primary Separator Gas Only	888.70	913.50	942.78	966.13	982.91	989.75
Primary and Second Stage Separator Gases	890.68	915.00	943.75	966.69	983.20	989.92
Separator Gas/Stock Tank Liquid Ratio, SCF/STB						
Primary Separator Gas Only	6311	8791	14589	26806	57339	98945
Primary and Second Stage Separator Gases	6325	8805	14604	26822	57355	98962
						96316

TPM from Smooth Well Stream Compositions

Ethane plus	12.151	10.512	8.810	7.570	6.803	6.717
Propane plus	9.249	7.619	5.922	4.684	3.880	3.655
Butanes plus	7.330	5.755	4.109	2.922	2.140	1.887
Pentanes plus	6.199	4.709	3.140	2.012	1.262	0.993
						7.189
						3.925
						1.986
						1.020

*Primary separator at 50 psig and 70°F., second stage at 25 psig and 80°F., stock tank at 75°F.

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Reservoir Fluid Analysis

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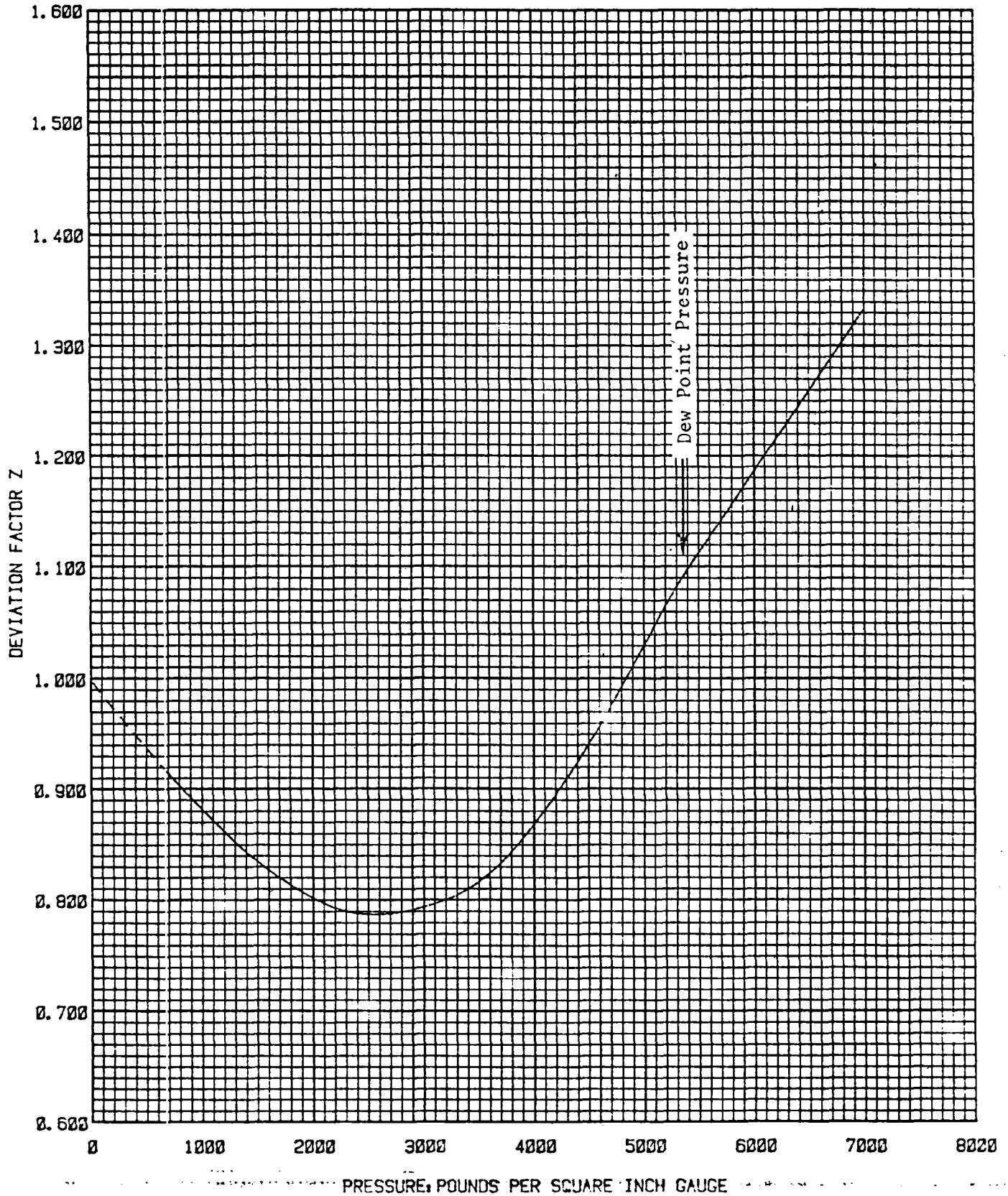
Well State UTP No. 1

RETROGRADE CONDENSATION DURING GAS DEPLETION AT 174°F.

Pressure, PSIG	Retrograde Liquid Volume, Percent of Hydrocarbon Pore Space
5368 Dew Point Pressure	0.0
5298	0.3
5200	1.1
5050	2.6
4850	6.2
4600	11.5
3800	21.4
3000	27.0
2100	27.6
1300	25.9
700	23.7
0	17.7

DEVIATION FACTOR Z OF WELL STREAM DURING DEPLETION AT 174°F.

Company	SANTE FE ENERGY COMPANY	Formation	MORROW
Well	STATE UTP NO. 1	County	LEA
Field	UNDESIGNATED	State	NEW MEXICO



VOLUME OF WELL STREAM PRODUCED DURING DEPLETION

Company SANTE FE ENERGY COMPANY

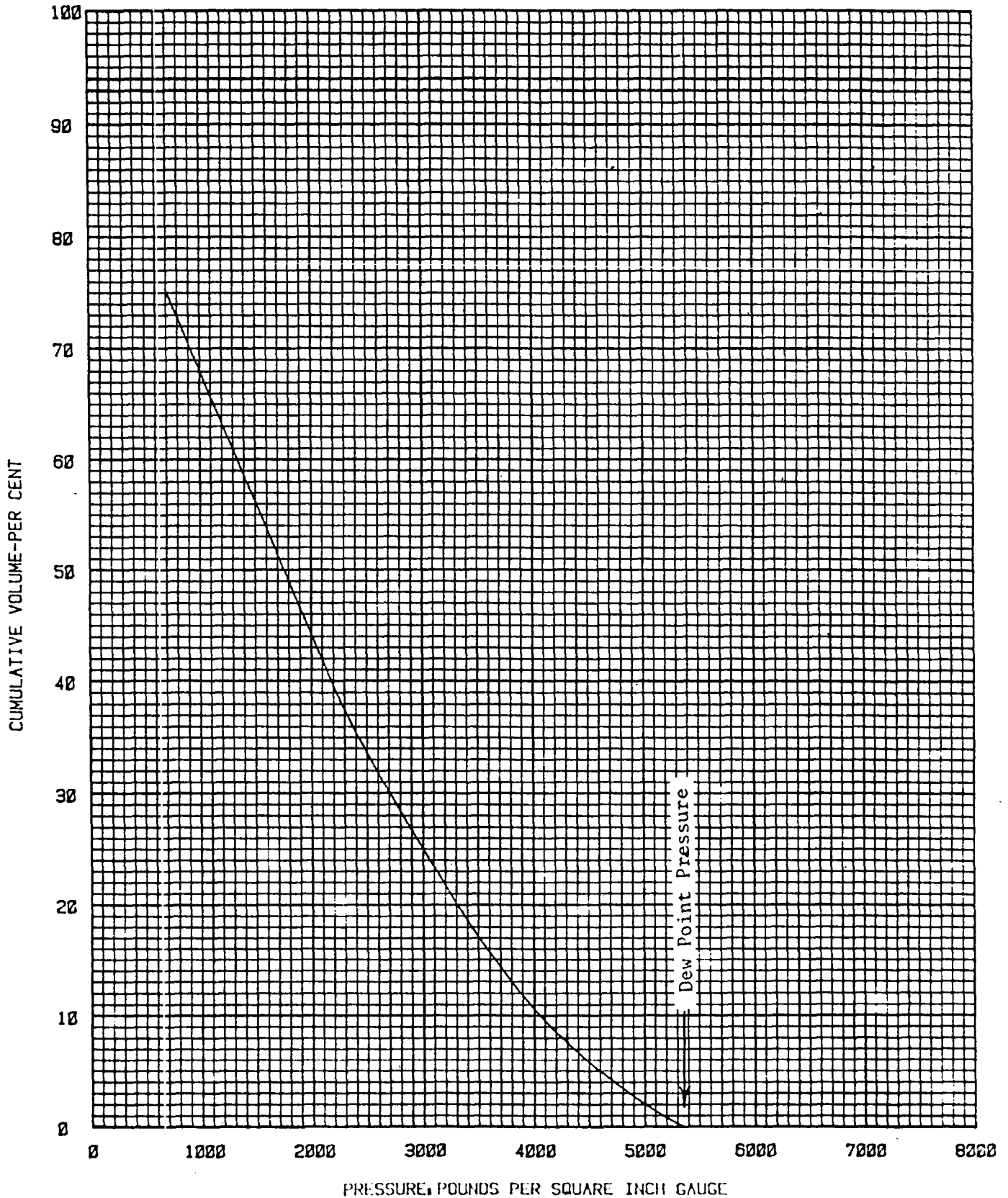
Formation MORROW

Well STATE UTP NO. 1

County LEA

Field UNDESIGNATED

State NEW MEXICO



CUMULATIVE RECOVERY DURING DEPLETION

Company SANTE FE ENERGY COMPANY

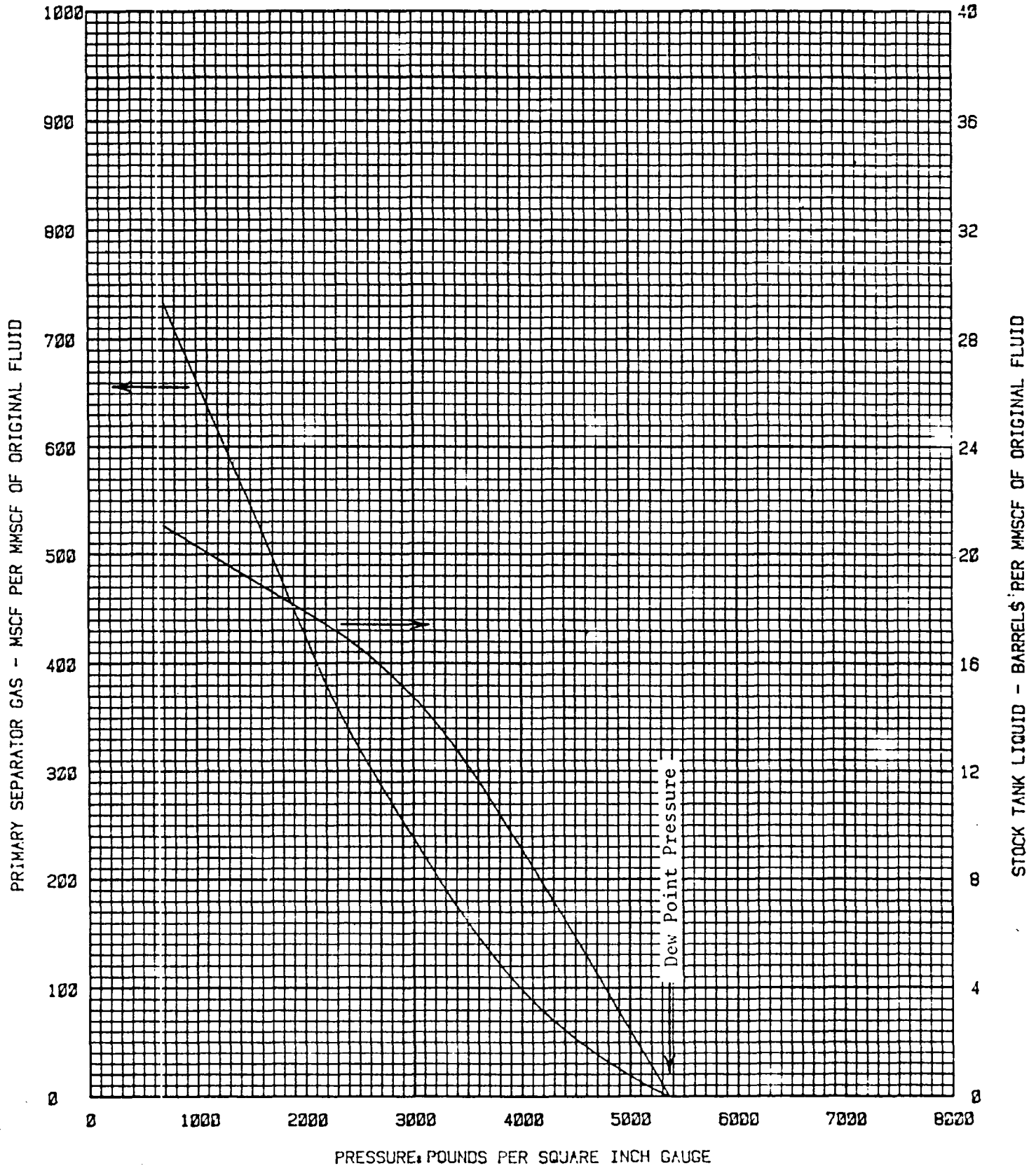
Formation MORROW

Well STATE UTP NO. 1

County LEA

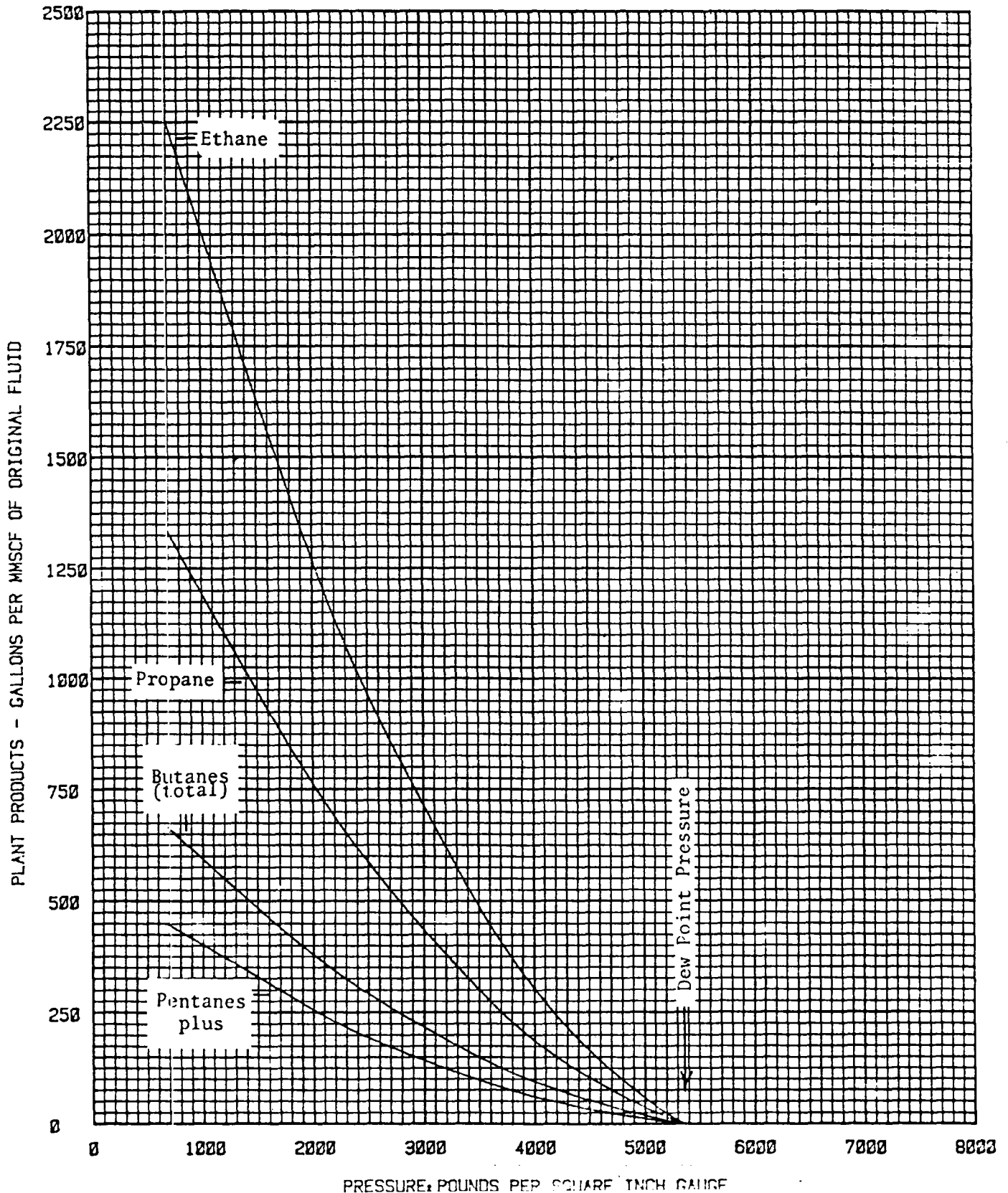
Field UNDESIGNATED

State NEW MEXICO



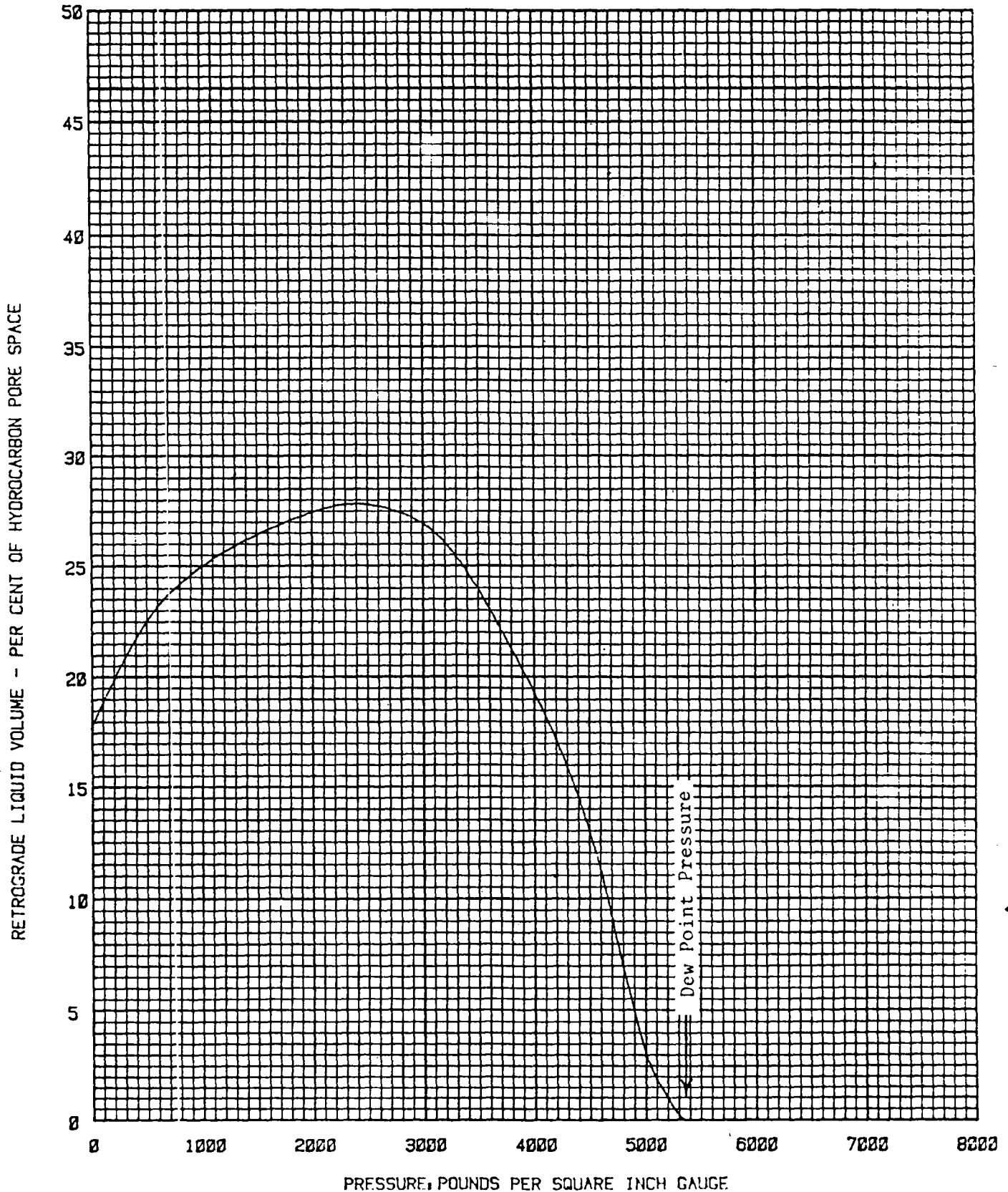
CUMULATIVE RECOVERY-PLANT PRODUCTS IN PRIMARY SEPARATOR GAS

Company	SANTE FE ENERGY COMPANY	Formation	MORROW
Well	STATE UTP NO. 1	County	LEA
Field	UNDESIGNATED	State	NEW MEXICO



RETROGRADE CONDENSATION DURING DEPLETION

Company SANTE FE ENERGY COMPANY Formation MORROW
Well STATE UTP NO. 1 County LEA
Field UNDESIGNATED State NEW MEXICO



H. L. BROWN, JR. ✓
300 WEST LOUISIANA
POST OFFICE BOX 2237
MIDLAND, TEXAS 79702
915 683-5216

Established
Pool
UTP-3 — Feather
morrow

July 31, 1985

State of New Mexico
Energy & Minerals Department
P. O. Box 1980
Hobbs, New Mexico 88240

Attn: Mr. Jerry Sexton

Re: Request for Reduced
Allowable, State UTP #3
Section 16, T-15-S, R-32-E,
Lea County, New Mexico

Dear Jerry,

Recently we received a shut-in order from Santa Fe on the subject well directing us to cease production until cumulative overproduction of 40,281 MCF could be made up. This is to request that we be allowed to continue producing the well at a reduced rate of 2,000 barrels of oil per month and 18,870 MCF gas pending the outcome of a hearing to obtain an increased gas-oil ratio limit for this well.

On September 13, 1984 we submitted Form C-122 for the initial potential test on the subject well as an oil well recognizing that the GOR on the initial potential was 5,320:1. Your return letter of September 17, 1984 indicated that wells in the Feather Morrow oil pool appeared to have increasing GOR's. In a telephone conversation with Jean Mills of our office on September 18, 1984, you suggested that we might want to produce the well for a while to determine its GOR behavior to generate data necessary for a hearing. Apparently, we misunderstood that you meant 30-60 days and as a result we continued to produce the well exceeding our gas allowable and have, as a result, built up an overproduction of some 40,000 MCF. The GOR during the last ten months on this well has increased from 5,320:1 to 9,434:1.

This afternoon I contacted our attorney in Santa Fe, Mr. Ernie Padilla, and requested that he file for an increased GOR limit hearing immediately. If we are able to advertise the hearing on Tuesday, Ernie predicts that it can be held near the end of August. If you would permit us to leave the well on production at a limited rate until the hearing we will be able to determine the GOR performance of the well at the lower rate while making up some of the overproduction.

I apologize for our misunderstanding of your suggestion. I will see to it that it does not occur in the future. Thank you.

Yours truly,



Les Skinner
Operations Manager

LDS:ps

cc: Ernie Padilla ✓

END →

NOV 2/5

NOV 1985

50 YEARS



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
HOBBS DISTRICT OFFICE



1935 - 1985

TONEY ANAYA
SILVERADO

August 1, 1985

POST OFFICE BOX 1980
HOBBS NEW MEXICO 88240
(505) 393-6161

E. L. Brown, Jr.
P. O. Box 2237
Midland, Texas 79702

Attention Mr. Les Skinner

Re: Exemption from Shut-In
→ State UTP Well No. 3, Unit P
Section 16, T-15-S, R-32-E
Feather Morrow Pool
Lea County, New Mexico

AUG 1985

Land _____
Geol. _____ Acct. _____

Dear Mr. Skinner:

As requested in your letter of July 31, 1985, you will be permitted to produce the subject well, which has been ordered shut in for over-production of casinghead gas, at a reduced rate until the overage has been made up, or until the overage has been adjusted by a favorable ruling on your request for an increased gas-oil ratio limit in the Feather Morrow Pool.

You will be required, however, to curtail gas production from the well to no more than half the top casinghead gas allowable for the pool. Since the top allowable is 820 MCFGPD, your well will be limited to no more than 410 MCFGPD.

Yours very truly,

OIL CONSERVATION DIVISION

Jerry Sexton

Jerry Sexton
Supervisor, District 1

MC
cc-OCD, Santa Fe