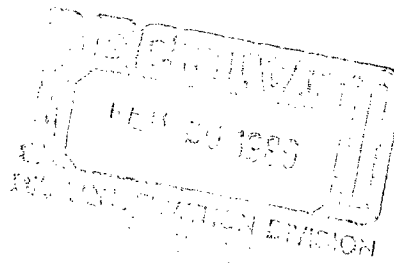




Union Texas Petroleum



375 U.S. Highway 64
Farmington, New Mexico 87401
Telephone (505) 325-3587

February 20, 1986

R. L. Stamets
Oil Conservation Division
P.O. Box 2088
State Land Office Bldg.
Santa Fe, New Mexico 87501

Re: Angel Peak B #24E
1680' FSL 850' FEL
Section 13, T28N-R11W
San Juan County, NM

Dear Mr. Stamets:

Union Texas Petroleum is applying for a downhole commingling order for the referenced well in the Armenta Gallup and Basin Dakota fields. The ownership of the zones to be commingled is common. The Bureau of Land Management and the offset operators indicated in the attached land plats will receive notification of this proposed downhole commingling.

The subject well was completed on January 31, 1983. The Gallup formation was fracture stimulated with 309,000# sand in 455,000 gallons 75 quality foam in three stages. The Dakota formation was fracture stimulated with 86,000# sand in 86,000 gallons nitrified water. CAOF of the Dakota zone (3/22/83) was 372 MCFD. Initial production of the Gallup formation (4/15/83) was 25 BOPD and 378 MCFD. Average first full months production was 10 MCFD and zero oil from the Dakota and 2 BOPD and 148 MCFD from the Gallup. The Gallup horizon is currently produced with a plunger lift system and the Dakota is flowing intermittently from below a packer. Two tubing strings are utilized. Most recent production (12/85) from the Dakota is 22 MCFD with negligible oil and 22 MCFD and less than 0.5 BOPD from the Gallup.

This well is marginally productive and continued production will be dependent on few or no additional expenses and additional recoverable reserves from a planned workover to test the Chacra formation in this wellbore. It is planned to stimulate and test the Chacra formation. If economic, the commingled Gallup-Dakota stream will be produced up one tubing string from below a packer and the Chacra stream up another tubing string. The proposed commingling will result in the

Page 2 of 2
Stamets/Katirgis
February 20, 1986

recovery of additional hydrocarbons from both the Gallup and Dakota formations, thereby preventing waste and will not violate correlative rights. Commingling the two zones will result in a more efficient operation by helping to lift the small amount of produced liquids from each zone without the aid of the plunger lift currently used on the Gallup.

The attached fluid analysis from the Gallup and Dakota zones of the subject well indicates the total value of the crude will not be reduced by the commingling. The reservoir characteristics of each of the zones are such that underground waste would not be caused by the proposed downhole commingling. The calculated static bottom hole pressure based on surface pressure and fluid level measurements is 238 psi in the Gallup and 472 psi in the Dakota; within the limits of Rule 303-C, Section 1(b), Part (6). The fluids from each zone are compatible and no precipitates will be formed as a result of commingling to damage either reservoir. Current flow tests (less than 0.5 BOPD and negligible water from the Gallup and negligible oil and water from the Dakota) indicate the daily production will not exceed the limit of Rule 303-C, Section 1(a), Parts (1) and (3).

The Division Aztec District office will be notified anytime the commingled well is shut in for seven consecutive days. To allocate the commingled production to each of the zones, Union Texas Petroleum will consult with the supervisor of the Aztec District office and determine an allocation formula for each of the producing zones.

Included with this letter are two plats showing ownership of offsetting leases, a production curve of each zone, Form C-116 (GOR Test), a Fluid Analysis Report and a wellbore diagram showing the proposed downhole configuration after commingling.

Yours truly,



S. G. Katirgis
Petroleum Engineer

SGK:tb

Attachments/6

cc: Frank Chavez, OCD Aztec Office
W. K. Cooper
M. R. Reisz
Well file

11W . 12W

T-29-N

T-28-N

CROWN CENTRAL PET. CORP.

LAND PLAT-DAKOTA FORMATION

DAKOTA PRODUCTION DATA

WELTNAME

FIRST PRODUCTION DATE (YEAR-MONTH-DAY)

85 AVE. OIL(BOPD)/GAS(MCFPD) (STATUS)

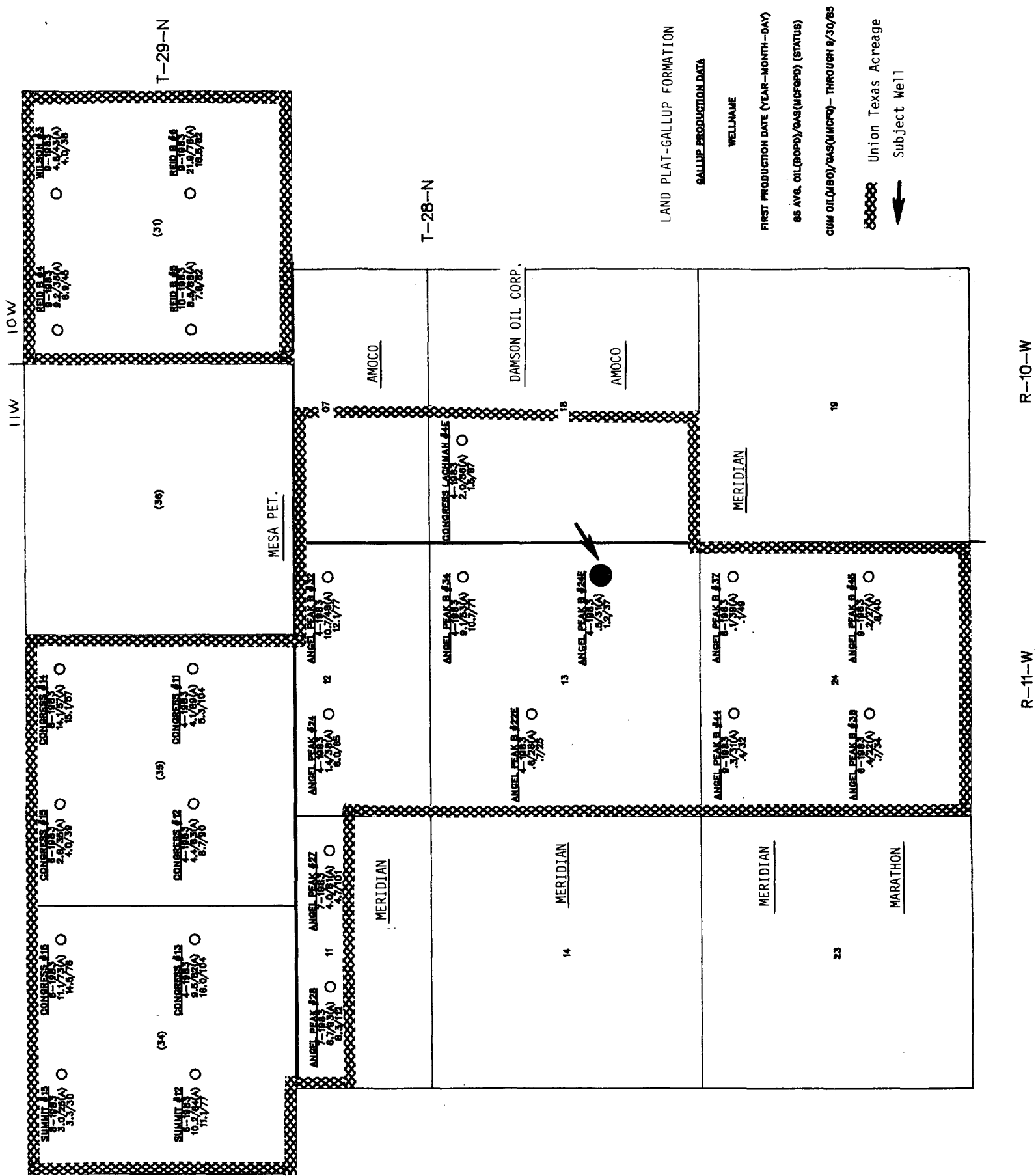
CUM OIL(MBO)/GAS(MMOFG) - THROUGH 9/30/85

Union Texas Acreage

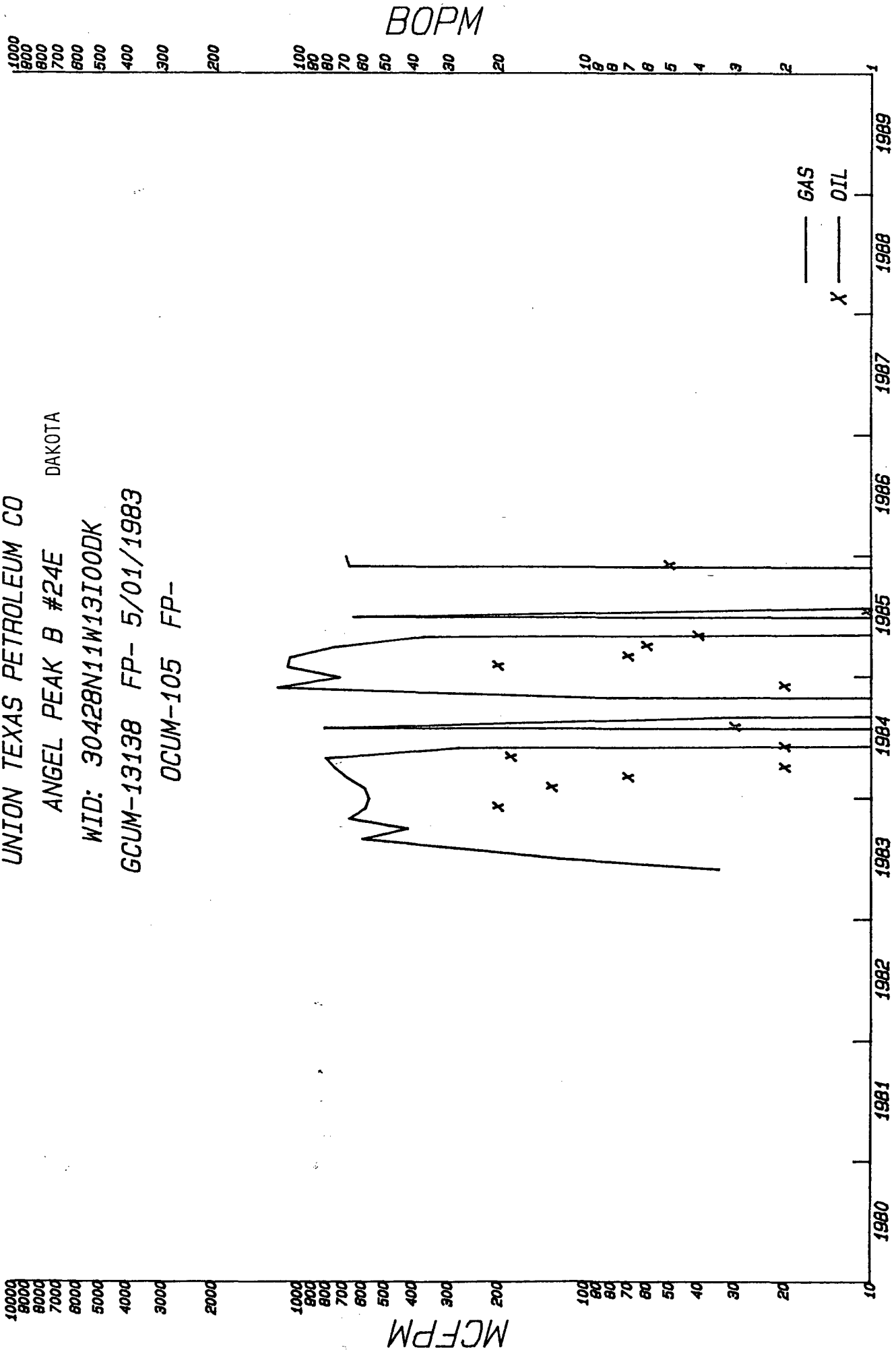
Subject Well

R-11-W

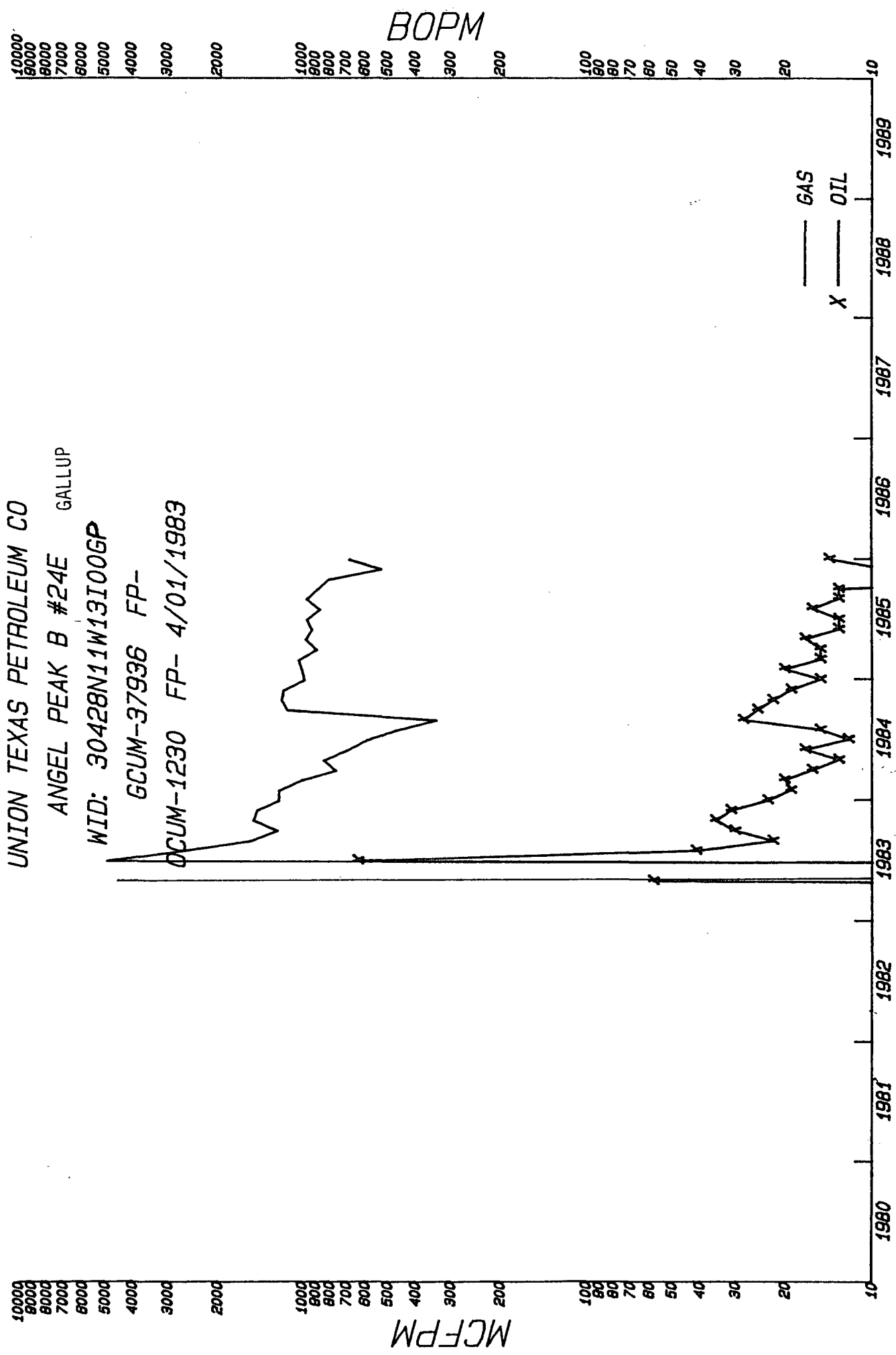
R-10-W



UNION TEXAS PETROLEUM CO
 ANGEL PEAK B #24E DAKOTA
 WID: 30428N11W13I00DK
 GCUM-13138 FP- 5/01/1983
 OCUM-105 FP-



PRODUCTION YEAR



UNION TEXAS PETROLEUM CO
ANGEL PEAK B #24E GALLUP
WID: 30428N11W13I00GP
GCUM-37936 FP-
GCUM-1230 FP- 4/01/1983

NEW MEXICO OIL CONSERVATION COMMISSION
GAS-OIL RATIO TESTS

Oil
Production Report

County		San Juan												
City		Armenta Gallup/Basin Dakota												
Address		375 U.S. Hwy 64, Farmington, NM 87401												
LEASE NAME	WELL NO.	LOCATION			DATE OF TEST	CHOKE SIZE	TBG. PRESS.	DAILY ALLOWABLE	LENGTH OF TEST HOURS	PROD. DURING TEST				GAS - OIL RATIO CU.FT./BBL.
		U	S	T						R	WATER BBLs.	GRAV. OIL	OIL BBLs.	
Angel Peak B (Gallup)	24E	I	13	28N	11W	12/26/85	85		24	0	44	.7	22	31,428
Angel Peak B (Dakota)	24E	I	13	28N	11W	12/26/85	226		24	0	53	0	15	N/A

Special ☒

Conj. letion ☐

Sub. letion ☐

TYPE OF TEST - (X)

No well will be assigned an allowable greater than the amount of oil produced on the official test.

During gas-oil ratio test, each well shall be produced at a rate not exceeding the top unit allowable for the pool in which well is located by more than 25 percent. Operator is encouraged to take advantage of this 25 percent tolerance in order that well can be assigned increased allowables when authorized by the Commission.

Gas volumes must be reported in MCF measured at a pressure base of 15.025 psia and a temperature of 60° F. Specific gravity base will be 0.60.

Report casing pressure in lieu of tubing pressure for any well producing through casing.

Mail original and one copy of this report to the district office of the New Mexico Oil Conservation Commission in accordance with Rule 301 and appropriate pool rules.

I hereby certify that the above information is true and complete to the best of my knowledge and belief.

S. G. Karpis
(Signature)

Petroleum Engineer

(Title)

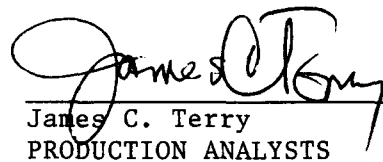
UNION TEXAS PETROLEUM
ANGEL PEAK B24E
LEASE FLUIDS

LABORATORY INVESTIGATION
OF
ANGEL PEAK GALLUP AND DAKOTA FLUIDS COMPATABILITY
JANUARY 22, 1986

PREPARED FOR:

UNION TEXAS PETROLEUM
Serg Katirgis
Petroleum Engineer

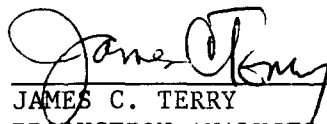
PREPARED BY:


James C. Terry
PRODUCTION ANALYSTS

LABORATORY INVESTIGATION
ANGEL PEAK B24E
LEASE FLUIDS

SUMMARY OF RESULTS

1. No precipitation of materials was observed from either admixture of fluids.
2. Emulsion testing was performed. There is no concern over emulsion effects.
3. The cloud point of oil mixtures dropped or remained the same upon mixing of fluids.
4. According to calculations not enough cool down from gas expansion will occur to alter paraffin deposition significantly.



JAMES C. TERRY
PRODUCTION ANALYSTS
Farmington, New Mexico

LABORATORY INVESTIGATION
ANGEL PEAK B24E
LEASE FLUIDS

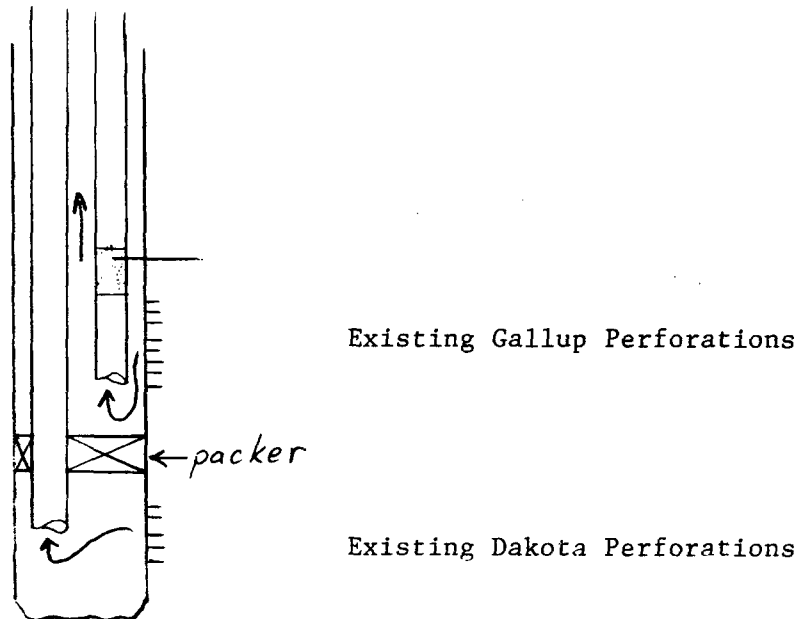
On Monday, January 13, 1986, a request for laboratory work was place by Sterg Katirgis, Petroleum Engineer of Union Texas Petroleum Corporation.

PURPOSE

Two oil samples were received of Mr. Katirgis with the request we investigate the concern of potentially detrimental effects due to comingling of Gallup and Dakota fluids in the Angel Peak B24E.

INVESTIGATION

1. Background Information- *current Wellbore*
a)



- b) BHST Gradient: 1.375° F/100 ft. depth.
c) Current production problems are primarily due to paraffin deposition from surface down to \approx 1000' depth.

LABORATORY INVESTIGATION
ANGEL PEAK B24E
LEASE FLUIDS

d) Commingling Order Mixture Requirements:

The commingling requests present the mixing of Angel Peak B24E Dakota oil with Angel Peak B24E Gallup fluids (oil/water).

The tests performed simulated the mixture of fluids that may result from this commingling action. Each oil component was analyzed for API gravity, paraffin, pour point, and cloud point. Each water component was analyzed for dissolved solids, pH, specific gravity and resistivity. The mixture of oils addressed the potential increase in precipitation of materials and the potential increase in paraffin content by a synergistic effect of mixing oils of different constitution. Emulsion tests simulated the mixing environment of the wellbore where the water component of a fluid could be tied up in a resulting emulsion without the ability to break out and allow separation of the oil and water constituents. The emulsion test results present the number of ml (% of mixture) of water breakout at listed time intervals. The volume of test sample (mixture) used in the emulsion tests is 100 ml.

LABORATORY INVESTIGATION
ANGEL PEAK B24E
LEASE FLUIDS

2. Concerns to address in analysis.

- a) The precipitation of materials produced by the admixture of oils of potentially different constitution.
- b) The creation of emulsions due to the admixture of different fluids.
- c) Increased paraffin deposition by additive properties of oils.
- d) Increased paraffin deposition due to the reduction of temperature accompanying gas expansion.

3. Steps taken in analysis

- a) API Analysis of oils including: API Gravity
Pour Point
Cloud Point
Paraffin Content
B S & W
- b) Discussion with Mr. Katirgis regarding the well bore production environment; e.g., mode of hydrocarbon production, pump type and operation, water components of production fluids, current paraffin problems, etc.
- c) Mixing of oils in appropriate cases with additional cloud point testing to determine resulting fluid characteristics.
- d) API Water Analysis
- e) Emulsion tendency testing via mixing of fluids in appropriate cases.

LABORATORY INVESTIGATION
ANGEL PEAK B24E
LEASE FLUIDS

DATA

Sample #1

Zone:	Dakota
API Gravity @ 60°F	53.0
Cloud Point	22°F
Pour Point	-1°F
Paraffin Content	7.98% (weight)

Sample #2

Zone:	Gallup
API Gravity @ 60°F	44.1
Cloud Point	2°F
Pour Point	<-12°F
Paraffin Content	14.19% (weight)

Sample #3

Zone:	50/50 Mix
API Gravity @ 60° F	48.9
Cloud Point	24°F
Pour Point	<-10°F
Paraffin Content	11.89% (weight)

Analysis No. 1

Date 1-22-86

PRODUCTION ANALYSTS

Oil Analysis

Operator Union Texas Petroleum

Date Sampled 1-10-86

Well Angel Peak B24E

Date Received 1-13-86

Field -

Submitted By Sterg Katirgis

Formation Dakota

Worked By Clay Terry

Depth -

Sample Description Brownish, clear oil

County San Juan

sample. No water phase or emulsion.

State New Mexico

Small bottom solids component.

API Gravity 53.0 ° at 60°F

SAMPLE COMPOSITION:

Paraffin Content 7.98 % by weight

H₂O 0

Asphaltene Content n/a % by weight

Emulsion 0

Pour Point -1 °F

Oil 780

Cloud Point 22 °F

Total 780 ml

Comments:

B S & W Test Results:

Oil 99.9
Water 0
Solids <0.1
Emulsion 0

Analyst Clay Terry

Analysis No. 2

Date 1-22-86

PRODUCTION ANALYSTS

Oil Analysis

Operator Union Texas Petroleum

Date Sampled 1-10-86

Well Angel Peak B24E

Date Received 1-13-86

Field -

Submitted By Sterg Katirgis

Formation Gallup

Worked By Clay Terry

Depth -

Sample Description Oil/Water/Emulsion sample.

County San Juan

Oil phase is yellowish-brown, opaque.

State New Mexico

Emulsion phase not serious.

API Gravity 44.1 ° at 60°F

Sample Composition:

Paraffin Content 14.19 % by weight

H₂O 103

Asphaltene Content N/A % by weight

Emulsion 16

Pour Point <-12 °F

Oil 807

Cloud Point 2 °F

Total 926ml

Comments:

B S & W Test Results:

Oil 95.5%
Water 0.8%
Solids <0.1%
Emulsion 3.7%

Analyst Clay Terry

Analysis No. 3

Date 1-22-86

PRODUCTION ANALYSTS

Oil Analysis

Operator Union Texas Petroleum

Date Sampled 1-10-86

Well Angel Peak B24E

Date Received 1-13-86

Field -

Submitted By Sterg Katirgis

Formation Gallup/Dakota

Worked By Clay Terry

Depth -

Sample Description 50/50 mix of oils from

County San Juan

Gallup and Dakota intervals.

State New Mexico

API Gravity 48.9 ° at 60°F

Paraffin Content 11.89 % by weight

Asphaltene Content n/a % by weight

Pour Point <-10 °F

Cloud Point 24 °F

Comments:

B S & W Test Results:

Oil	96.0%
Water	0.4%
Solids	<0.1%
Emulsion	3.6%

Analyst Clay Terry

API WATER ANALYSIS REPORT FORM

Company Union Texas Petroleum		Sample No. 2B		Date Sampled 1-10-86	
Field Angel Peak Gal/Dak		Legal Description -		County or Parish San Juan	
Lense or Unit Angel Peak B		Well 24E		Depth -	
Formation Gallup		Water, B/D H ₂ O		State NM	
Type of Water (Produced, Supply, etc.) Produced			Sampling Point Separator		Sampled By SK

DISSOLVED SOLIDS

CATIONS	mg/l	me/l
Sodium, Na (calc.)	218	9.5
Calcium, Ca	-0-	-0-
Magnesium, Mg	29	2.4
Barium, Ba		
Potassium, K	180	4.6

ANIONS

Chloride, Cl	383	10.8
Sulfate, SO ₄	25	0.5
Carbonate, CO ₃	-0-	-0-
Bicarbonate, HCO ₃	319	5.2
Hydroxide, OH	-0-	-0-

Total Dissolved Solids (calc.)

1154

Iron, Fe (total)

-0-

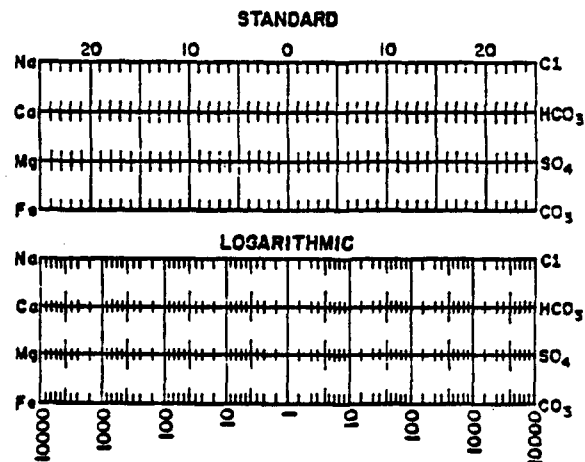
Sulfide, as H₂S

-0-

OTHER PROPERTIES

pH	6.3
Specific Gravity, 60/60 F.	1.003
Resistivity (ohm-meters) 75 F.	∞
Total Hardness	120

WATER PATTERNS — me/l



REMARKS & RECOMMENDATIONS:

DATE:

Fig. 1
EMULSION TESTS DATA SHEET

OPERATOR: UNION TEXAS SUBMITTED BY: S. KATIRGIS TYPE & CONC. OF FLUID: 50/50 MIX OF
 WELL: ANGEL PEAK B24E SOURCE OF SAMPLE: GALLUP/DAKOTA FLUIDS
 FIELD: Angel Peak Gal/B DATE SAMPLED: 1-10-86 TYPE & CONC. OF SOLIDS:
 FORMATION: Gallup/Dakota DATE RECEIVED: 1-13-86 TEST TEMPERATURE: 75°F
 DEPTH: Unknown API GRAVITY OF OIL: 48.9 FLUID RATIO: 50/50
 COUNTY: San Juan ANALYSIS BY: C. Terry

PERCENTAGE OF ORIGINAL H₂O SEPARATED AT VARIOUS TIME INTERVALS AFTER EMULSIFYING

Test Number	1															
Elapsed Time	Time	Vol	Time	Vol	Time	Vol	Time	Vol	Time	Vol	Time	Vol	Time	Vol	Time	Vol
1 min	1	4	2		3		4		5		6		7		8	
2	2	6	3		4		5		6		7		8		9	
3	3	7	4		5		6		7		8		9		10	
4	4	7	5		6		7		8		9		10		11	
5	5	7	6		7		8		9		10		11		12	
6	6	7	7		8		9		10		11		12		13	
7	7	7	8		9		10		11		12		13		14	
8	8	7	9		10		11		12		13		14		15	
9	9	7	10		11		12		13		14		15		16	
10	10	7	11		12		13		14		15		16		17	
20	20	7	21		22		23		24		25		26		27	
30	30	7	31		32		33		34		35		36		37	
Total Vol (ml)		100														
Vol. Emulsion / Sludge		0														
Solids*																
Interface**																
OIL		93														

REMARKS:

* Preferential wetting of solids: OB=oil-wet bottom; OO=oil-wet oil phase; WB=water-wet bottom; WO=water-wet oil phase
 OI=oil-wet interface; WI=water-wet interface

** Interface: F=Fluid; S=Solid; V=Viscous

**The mixture of fluids was constructed to reflect proper proportions of the various fluids within each sample. Therefore, the mix was 50 ml Dakota oil, 43 ml Gallup oil, 6 ml Gallup H₂O, 1 ml Gallup Emulsion

LABORATORY INVESTIGATION
ANGEL PEAK B24E
LEASE FLUIDS

CALCULATIONS

Cool down effects due to gas expansion:

Reference: Perry's Handbook of Chemical Engineering

RE: Adiabatic Expansion of Ethane, Methane

$$T_s = T_r \left(\frac{P_s}{P_r} \right)^{\left(\frac{K-1}{K} \right)}, \text{ where}$$

T_s = Surface Temperature

T_r = Reservoir Temperature

P_s = Surface Pressure

P_r = Reservoir Pressure

K = $\frac{\text{Specific heat at constant pressure}}{\text{Specific heat at constant volume}}$

Assumed values for maximum cool down due to gas expansion:

T_s = Unknown

T_r = 160° F

P_s = 500 psi

P_r = 2000 psi

K = 1.2

$T_s = 160 \left(\frac{500}{2000} \right)^{0.1667}$

T_s = 127° F

NOTE:

A total cooldown of 33°F would be expected

UNION TEXAS PETROLEUM CORP.
WELLBORE DIAGRAM
DOWNHOLE COMMINGLE

WELL NAME Angel Peak B #24E
LOCATION 1680' FSL; 850' FEL SECTION 13 T 28N R 11W
COUNTY San Juan STATE New Mex LEASE SF047017 B

GLE 5838'
KBE 5850'
KB 12'

SURFACE CASING

Hole size: 17"
Casing: 13-3/8"
Casing set @ 280'
Top of Cement: Surface

INTERMEDIATE CASING

Hole Size: 12-1/4"
Casing: 9-5/8"
Casing set @ 5390'
Top of Cement: 0

LINER HANGER

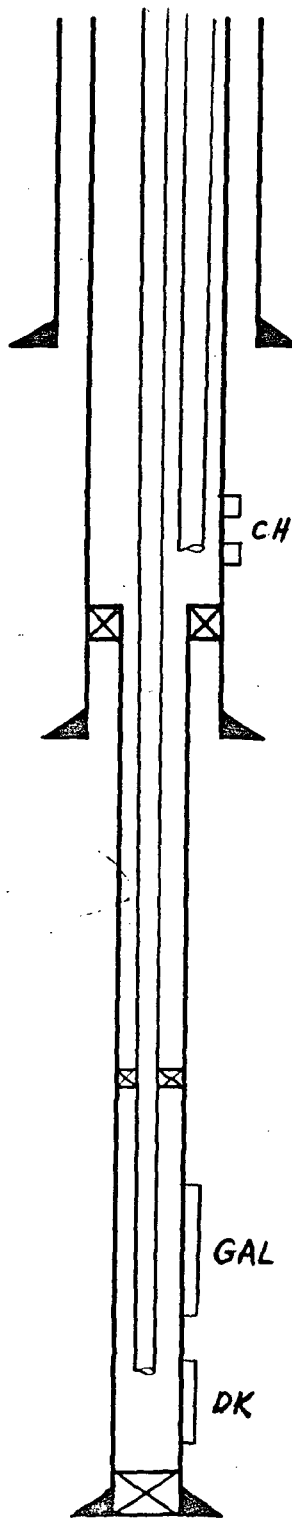
Hanger Type: _____
Hanger Top @ 5211'

FORMATION TOPS

Ojo Alamo 775'
Kirtland Shale 885'
Pictured Cliffs 1872'
Lewis Shale _____
Chacra 2450'
Cliffhouse 3450'
Point Lookout 4207'
Mancos Shale _____
Gallup 5428'
Greenhorn _____
Graneros 6262'
Dakota 6295'

PRODUCTION LINER

Hole Size: 8-1/2"
Liner: 7"
Liner set @ 6569'
Top of Cement: Liner Hanger



WELL HISTORY

Spud date: 12-20-82
Original owner: _____
IP: MCFD _____ BOPD _____ BWPD _____
GOR _____
Completion treatment: _____

CURRENT DATA

Pumping Unit: _____
Tubing: Gal/Dk: 2-3/8" EUE 4.7# @ ±6350
CH: 2-3/8" EUE 4.7# @ ±3000'
Rod string: _____
Well Head: _____
Remarks: DV tool @ 2077' & 5211'
Model D pkr @ ±4000'

PERFORATIONS

Gallup: 5431'-6051' (89 holes)
Dakota: 6300'-6419' (31 holes)
Proposed Chacra: 2880'-90', 2985'-3005'
Date of Last Revision: _____

PBTD 6518'



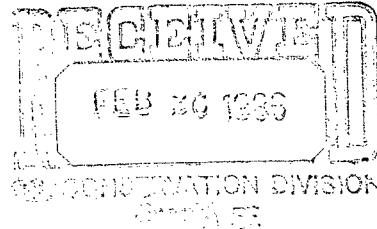
STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
AZTEC DISTRICT OFFICE

1000 RIO BRAZOS ROAD
AZTEC, NEW MEXICO 87410
(505) 334-6178

OIL CONSERVATION DIVISION
BOX 2088
SANTA FE, NEW MEXICO 87501

DATE 2/24/86

RE: Proposed MC _____
Proposed DHC ✓ _____
Proposed NSL _____
Proposed SWD _____
Proposed WFX _____
Proposed PMX _____



Gentlemen:

I have examined the application dated 2/21/86
for the Union Tex. Pet Corp. Angel Peak #24E I-13-28W-11W
Operator Lease and Well No. Unit, S-T-E

and my recommendations are as follows:

Approve

Yours truly,

J. D. [Signature]