



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

GARREY CARRUTHERS
GOVERNOR

March 13, 1990

POST OFFICE BOX 1980
HOBBS, NEW MEXICO 88241-1980
(505) 393-6161

Amerada Hess Corporation
Drawer D
Monument, NM 88265

Re: E. Wood #7-A 22-22-37
Downhole Commingle -- DHC-744
Tubb Oil & Gas
Drinkard

Gentlemen:

The allocation formula submitted on gas/oil ratio test dated March 7, 1990, for the above-referenced well is acceptable.

Tubb Oil & Gas	oil - 100%	gas - 28%
Drinkard	oil - 0%	gas - 72%

Very truly yours,

OIL CONSERVATION DIVISION

Jerry Sexton
Supervisor, District I

ed

Send 2 copies to appropriate
State Office.

STRUCT I
2. Box 1900, Hobbs, NM 88240
STRUCT II
2. Drawer DD, Artesia, NM 88210
STRUCT III
20 Rio Grande Rd., Abec, NM 87410

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-116
Revised 1/1/89

OIL CONSERVATION DIVISION

P.O. Box 2088
Santa Fe, New Mexico 87504-2088

GAS - OIL RATIO TEST

Operator AMERADA HESS CORPORATION		Pool DRINKARD/TUBB		County LEA												
Section DRAWER D, MONUMENT, NM		88265		TYPE OF TEST - (X) ☐ Scheduled ☐ Completion ☐ Special ☒												
LEASE NAME	WELL NO.	LOCATION			DATE OF TEST	SIZE OF TEST	CHOKE SIZE	TBO. PRESS.	DAILY ALLOW-ABLE	LENGTH OF TEST HOURS	PROD. DURING TEST			GAS - OIL RATIO CU/FT/88L		
		U	S	T							R	WATER BEH.S.	GRAV. OIL		OIL BEH.S.	GAS M.C.F.
E. WOOD DOWNHOLE COMINGLING PERMIT NO. DHC-744	7	A	22	22	37	3-7-90	F	2"	85	MGW	24	1	--	7	70	10,000
GAS 28% TUBB GAS 72% DRINKARD GAS 100% TUBB OIL 0% DRINKARD OIL																

NOTES:

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 that well can be assigned increased allowables when authorized by the Division.
Gas volumes must be reported in MCF measured at a pressure base of 15.025 psia and a temperature of 60° F.
Life gravity base will be 0.60.
Report casing pressure in lieu of tubing pressure for any well producing through casing.

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

Signature

E.A. WODELL

MAINT. SPEC.

Printed name and title

3-8-90

505 393-2144

Date

Telephone No.

See Rule 301, Rule 1116 & appropriate pool rules.)



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

GABRIEL CARROLL
GOVERNOR

10-17-89

DO NOT WRITE IN THESE SPACES
OTHER THAN WHAT IS PRINTED HERE
UNLESS SPECIFIED

LHC - 744

OIL CONSERVATION DIVISION
P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

RE: Proposed:

MC _____
DHC X _____
NSL _____
NSP _____
SWD _____
WFX _____
PMX _____

Gentlemen:

I have examined the application for the:

Amerada Hess Corp, E. Wood #7-A 22-22-37
Operator Lease & Well No. Unit S-T-R

and my recommendations are as follows:

OK

Yours very truly,

Jerry Sexton
Supervisor, District 1

/ed

AMERADA HESS CORPORATION

Drawer "D"
Monument, New Mexico 88265

September 22, 1989

New Mexico Oil Conservation Commission
P.O. Box 2088
Santa Fe, New Mexico 87501

RE: E. Wood #7
Request to Downhole Commingle
the Tubb and Drinkard gas zones

Dear Sir;

Amerada Hess Corporation is requesting approval for an exception to rule 303-C to permit downhole commingling of the Tubb and Drinkard gas zones in the wellbore of the E. Wood #7. Presently the Drinkard zone is producing 7 mcfpd and the Tubb zone is CI due to zero production. The Tubb zone has proven uneconomical to produce due to fluid encroachment. If this application is approved, both gas zones will be turned together and placed on sucker rod pump so as to apply a continuous swabbing action in the wellbore and permit the flow of natural gas into the wellbore from both zones at an economical rate.

In the wellbore, the Tubb zone is perforated from 5886' to 6152' and the Drinkard zone is perforated from 6220'-6288'. Bottom hole pressures were calculated with the method documented in the following attachments.

The results of these calculations were:

TUBB:	340 psia @ 6019'	24 hour shut in
DRINKARD:	237 psia @ 6254'	24 hour shut in
	ADJUSTED TO A COMMON DATUM	
TUBB:	342 psia @ 6254'	
DRINKARD:	237 psia @ 6254'	

No formation precipitation which might damage the formation is anticipated based on previous experience. Assuming 300 mcfpd total production with 217 mcfpd allocated to the Drinkard and 83 mcfpd to the Tubb, the combined stream value of \$399/day would be equal to the two individual streams.

No secondary recovery project involving this wellbore is under consideration at this time. If future recovery projects were to be considered, no problems with this commingling prospect jeopardizing the efficiency of a secondary recovery operation is anticipated.

Amerada Hess Corporation will be the operator of the said well on Unit A, 732' FNL, 641' FEL. Sec. 22, T-22S, R-37E, Lea County, New Mexico. Amerada Hess Corporation has common ownership of both zones with a working interest of 100% and an income interest of 81.25%.

A plat of the area is attached at the end of this letter. A division form C-116 which shows the production from the Drinkard is included.

Production decline curves have been supplied for both producing formations. Since the Tubb zone has not been produced since 1978, an actual estimate of anticipated decline could not be drawn therefore, a production decline for the Tubb zone is approximated to be 10%/year based on previous experience. A combined rate was calculated at 5.8%/yr.

Offset operators have been notified of this proposal by a copy of this letter.

If there are any questions regarding this proposal, please contact me at (505) 393-0087.

Sincerely,



Denise Ward-Wann
Senior Petroleum Engineer

Conoco, Inc.
P.O. Box 460
Hobbs, New Mexico 88240

Meridian
21 Desta Drive
Midland, Texas 79705

Exxon
P.O. Box 1600
Midland, Texas 79701

New Mexico Oil Conservation Commission
P.O. Box 1980
Hobbs, New Mexico 88240

Chevron
P.O. Box 670
Hobbs, New Mexico 88240

Mobil Exploration & Producing U.S Inc.
P.O. Box 1800
Hobbs, New Mexico 88240

Wagner & Brown
P.O. Box 1714
Midland, Texas 79702

Doyle Hartman Oil Operators
Drawer M
Jal, New Mexico 88252

Arch
777 Taylor Street
Suite II-A
Ft. Worth, Texas 76102

E. WOOD #7

Tubb Perfs - 5886'-6152' Avg. depth ($\bar{L}$) = 6019'

Drinkard Perfs - 6220'-6288' Avg. depth ($\bar{L}$) = 6254'

Tubb = .681
 G
 Drinkard = .728
 G

Assume Patm = 13.2 psia
 Assume temp. grad. = 0.4 F/100'
 Assume avg. surface temp. = 74 degrees F

BHT = $74^{\circ}\text{F} + 6019' (.4/100')$ = 98°F
 (Tubb)

BHT = $74^{\circ}\text{F} + 6254' (.4/100')$ = 99°F
 (Drinkard)

Psw = $280 + 13.2$ = 293.2 psia
 (Tubb)

Psw = $188 + 13.2$ = 201.2 psia
 (Drinkard)

TUBB ZONE

SBHP

Formula: $P_{sfs} = P_{whs} e^{c/z}$

$$\bar{T} = \frac{74^{\circ}\text{F} + 98^{\circ}\text{F}}{2} + 460^{\circ}\text{R} = 546^{\circ}\text{R}$$

$$C = \frac{\gamma_g \bar{L}}{53.34 \bar{T}} = \frac{(.681)(6019)}{53.34 (546)} = 0.141$$

Fig. 16-6

$$P_{pc} = 667 \text{ psia}$$

$$T_{pc} = 380^\circ \text{R}$$

$$T_r = \frac{\bar{T}}{T_{pc}} = \frac{546}{380} = 1.44$$

TRIAL & ERROR METHOD

$$\text{Assume: } P_{sfs} = 340 \text{ psia} \quad \bar{P} = \frac{340 + 293.2}{2} = 316.6 \text{ psia}$$

$$P_r = \frac{\bar{P}}{P_{pc}}$$

$$P_r = 316.6 \text{ psia} / 667 \text{ psia} = 0.47$$

$$T_r = 1.44$$

FIG. 16-4

$$Z = .955$$

$$P_{sfs} = P_{whs} e^{c/z}$$

$$P_{sfs} = 293 e^{.141/.955}$$

$$P_{sfs} = 340 \text{ psia}$$

DRINKARD ZONE

$$\bar{T} = \frac{74^{\circ} + 99^{\circ}}{2} + 460^{\circ} = 546^{\circ} \text{ R}$$

$$C = \frac{(.728)(6254)}{53.34 (546)} = .156$$

FIG. 16-6

$$P_{pc} = 664 \text{ psia}$$

$$T_{pc} = 390^{\circ} \text{ R}$$

$$Tr = \frac{\bar{T}}{T_{pc}} = \frac{546}{390} = 1.40$$

TRIAL & ERROR METHOD

$$\text{Assume: } P_{sfs} = 237 \text{ psia}$$

$$\bar{P} = \frac{237 + 201.2}{2} = 219 \text{ psia}$$

$$Pr = \frac{\bar{P}}{P_{pc}} = \frac{219}{664} = .33$$

$$Tr = 1.40$$

Fig. 16-4

$$Z = .962$$

$$P_{sfs} = P_{whs} e^{c/z}$$

$$P_{sfs} = 201 e^{.151/.962}$$

$$P_{sfs} = 237 \text{ psia}$$

TUBB SBHP @ 6019' = 340 psia
 DRINKARD SBHP @ 6254' = 237 psia

Adjusted to a common datum @ 6254'
 ∴ Tubb zone SBHP needs to be adjusted 235'

$$\bar{T} = \frac{98^{\circ} + 99^{\circ}}{2} + 460^{\circ} = 559^{\circ} \text{ R}$$

$$P_{pc} = 667 \text{ psia}$$

$$T_{pc} = 380^{\circ} \text{ R}$$

$$T_r = \frac{559}{380} = 1.47$$

$$C = \frac{(.681)(235)}{(53.34)(559)} = .0054$$

TRIAL & ERROR METHOD

$$\text{Assume: } P_{sfs} = 342 \text{ psia} \quad \bar{P} = \frac{342 + 340}{2} = 341$$

$$P_r = \frac{\bar{P}}{P_{pc}} = \frac{341 \text{ psia}}{667 \text{ psia}} = 0.51$$

$$T_r = 1.47$$

Fig. 16-4

$$Z = .952$$

$$P_{sfs} = 340 \text{ e} \quad .0054/.952$$

$$P_{sfs} = 342 \text{ psia}$$

∴ Psfs = 342 psia

Tubb adjusted to common datum of 6254'

TUBB ZONE	SBHP	= 342 psia @ 6254'
DRINKARD ZONE	SBHP	= 237 psia @ 6254'

50% of High Pressure Zone (Tubb) = 171 psia

Since low pressure zone 237 psia is greater than 50% of high pressure zone (171) psia no cross flow problem should exist.

E.WOOD #7

GAS STREAM VALUES

Gas Price as of AUGUST 1989

Drinkard - \$1.33 /mcf
*Tubb - \$1.33 /mcf

Assuming 300 mcfpd total production:

Drinkard production	-	(217 mcfpd) (\$1.33 mcf)	= \$288.61
Blaine production	-	(83 mcfpd) (\$1.33 mcf)	= \$110.39

\$399.00 /day

Combined stream value = (300 mcfpd) (\$1.33 /mcf) = \$399.00 /day

Values are equal.

*Estimated price, no sales.

DRINKARD DECLINE RATE

$$\begin{aligned} Q_i &= 255 \text{ MCFPM} \\ Q &= 245 \text{ MCFPM} \\ t &= 1 \text{ yr} \end{aligned}$$

$$a = \frac{\ln 255}{\frac{245}{1}}$$

$$\begin{aligned} a &= .040 \\ a &= 4.0\%/yr \end{aligned}$$

TUBB DECLINE RATE

$$\begin{aligned} Q_i &= 100 \text{ MCFPM} \\ Q &= 90 \text{ MCFPM} \\ t &= 1 \text{ yr} \end{aligned}$$

$$a = \frac{\ln 100}{\frac{90}{1}}$$

$$\begin{aligned} a &= .10.5 \\ a &= 10.5\%/yr \end{aligned}$$

COMBINED DECLINE RATE

$$\begin{aligned} Q_i &= 355 \text{ MCFPM} \\ Q &= 335 \text{ MCFPM} \\ t &= 1 \text{ yr} \end{aligned}$$

$$a = \frac{\ln 355}{\frac{335}{1}}$$

$$\begin{aligned} a &= .579 \\ a &= 5.8\%/yr \end{aligned}$$

ALLOCATION BASES ON DECLINE RATES

If: x = Tubb
 $1-x$ = Drinkard

$$a_c = x(a)_{\text{Tubb}} + 1-x(a)_{\text{Drinkard}}$$

$$.058 = .105(x) + 1-x(.040)$$

$$.058 = .105x + .040 - .040x$$

$$.058 - .040 = .105x - .040x$$

$$.018 = .065$$

$$x = .277$$

$$1 - x = .723$$

Tubb Allocation = 27.7%

Drinkard Allocation = 72.3%

FIG. 16-4

Compressibility factors at low reduced pressures

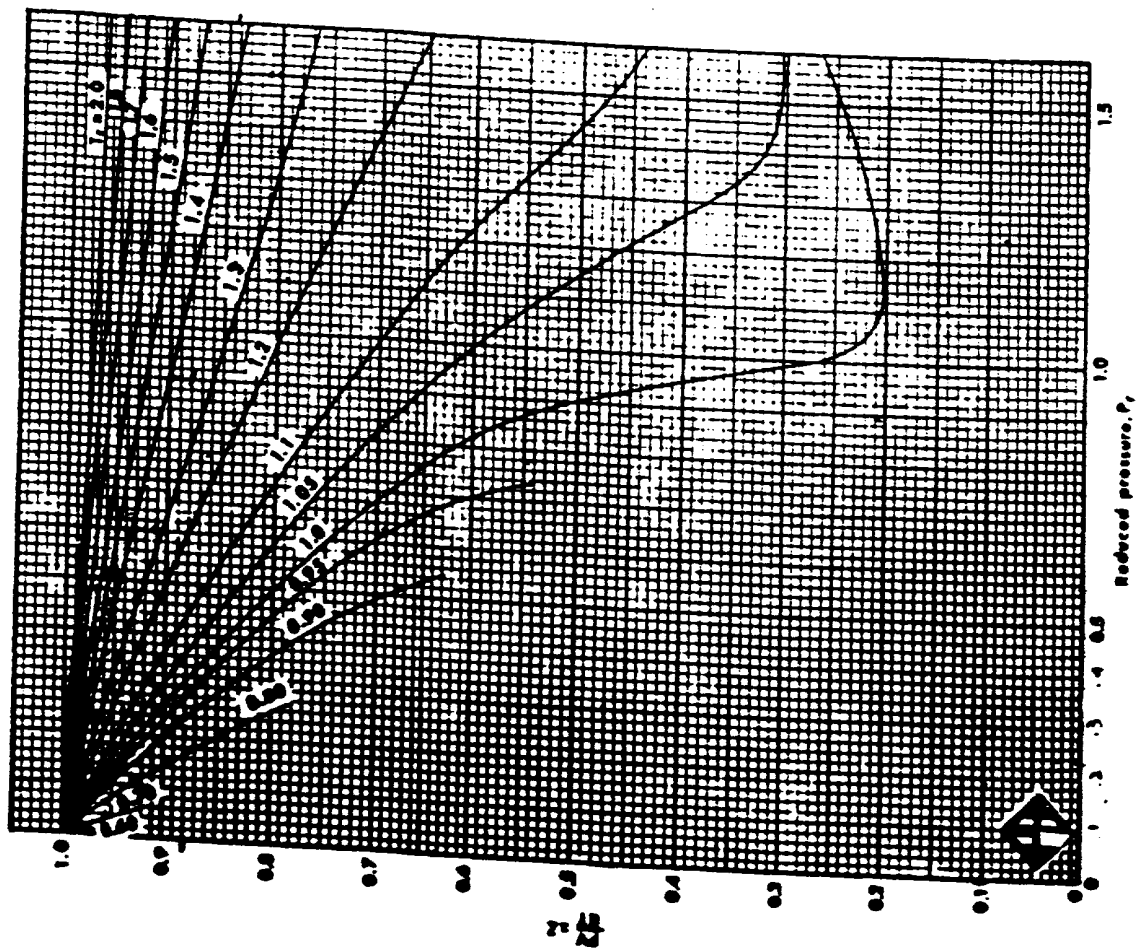
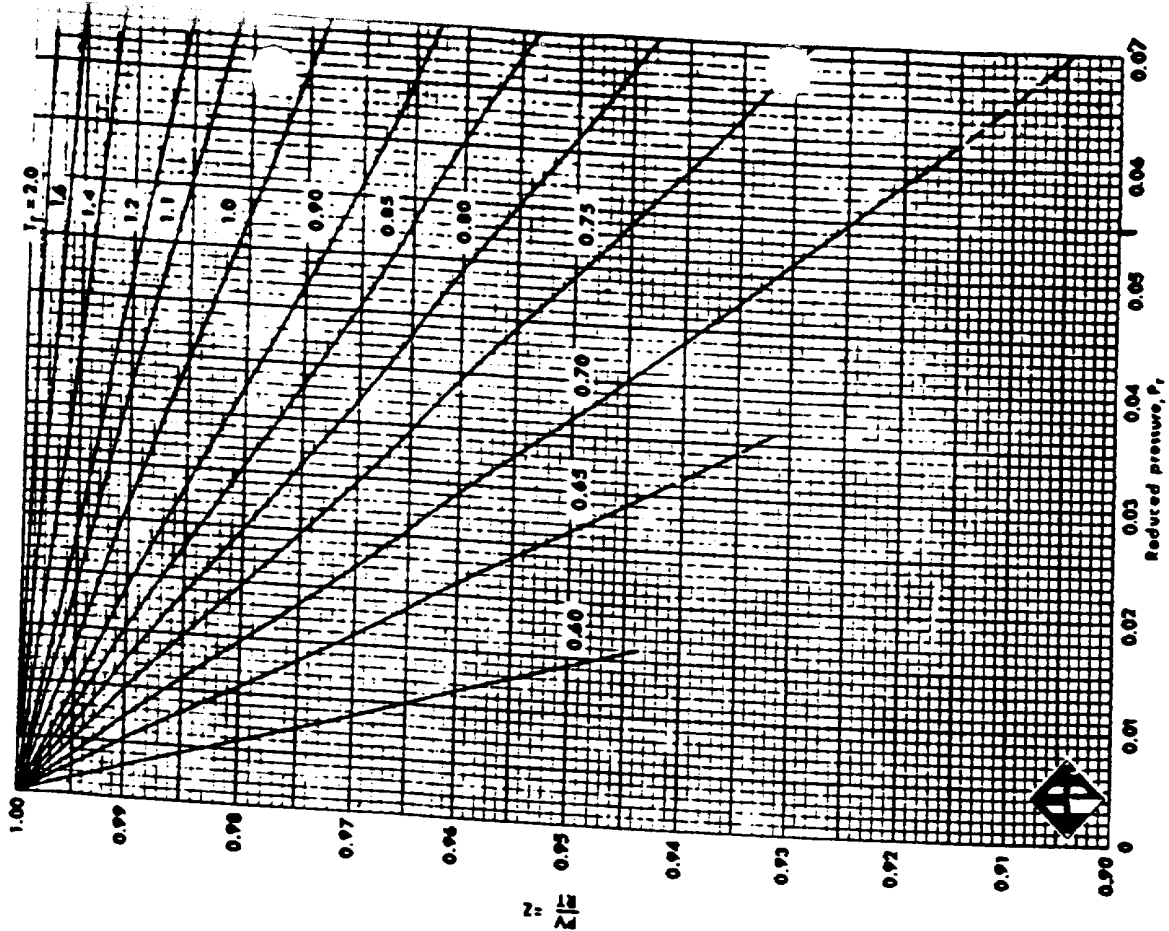


FIG. 16-5

Compressibility factors for gases near atmospheric pressure



vapors. For example for propane at 300 psia and 140°F., turn to the Mollier chart for propane, Fig. 17-6, locate the 300 psia and 140°F point, and interpolate on the constant specific volume lines to obtain 0.33 cu ft. lb. Dividing this into 1 gives 3.03 lb/cu ft as the density, D_T . If the compressibility is required,

$$Z = \frac{M P}{10.73 T D_T}$$

Symbols have been defined previously. Then

$$Z = \frac{(44.09) (300)}{(10.73) (460 + 140) (3.03)} = 0.68$$

ACID GASES

Natural gases which contain H_2S and/or CO_2 frequently exhibit different compressibility factor behavior than do sweet gases. Wichert and Aziz (Gas Processing, Canada, pp 20-25, January February 1971; Hydrocarbon Processing, pp 119-122, May 1972) present a simple easy to use calculational procedure to account for these differences. The method uses the standard gas compressibility factor chart (Figure 16-3) and provides accurate sour gas compressibili-

ties for gas compositions that contain as much as 80% total acid gas.

Wichert and Aziz define a "Critical temperature adjustment factor" which is a function of the concentrations of CO_2 and H_2S in the sour gas. This correction factor is then used to adjust the pseudo critical temperature and pressure of the sour gases according to the equations:

$$T_c^I = T_c - \epsilon$$

$$P_c^I = \frac{P_c T_c^I}{[T_c + B(1-B)\epsilon]}$$

Where:

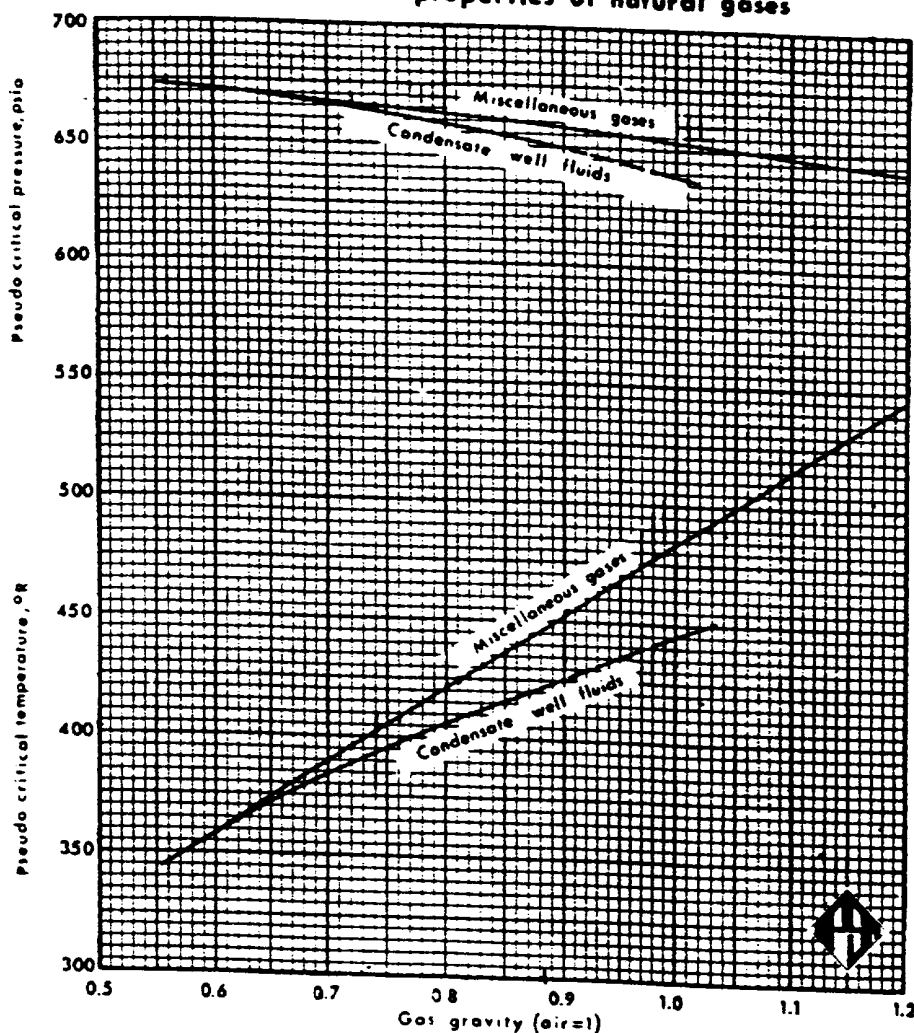
T_c = Mole Fraction average pseudo critical temperature

P_c = Mole Fraction average pseudo critical pressure

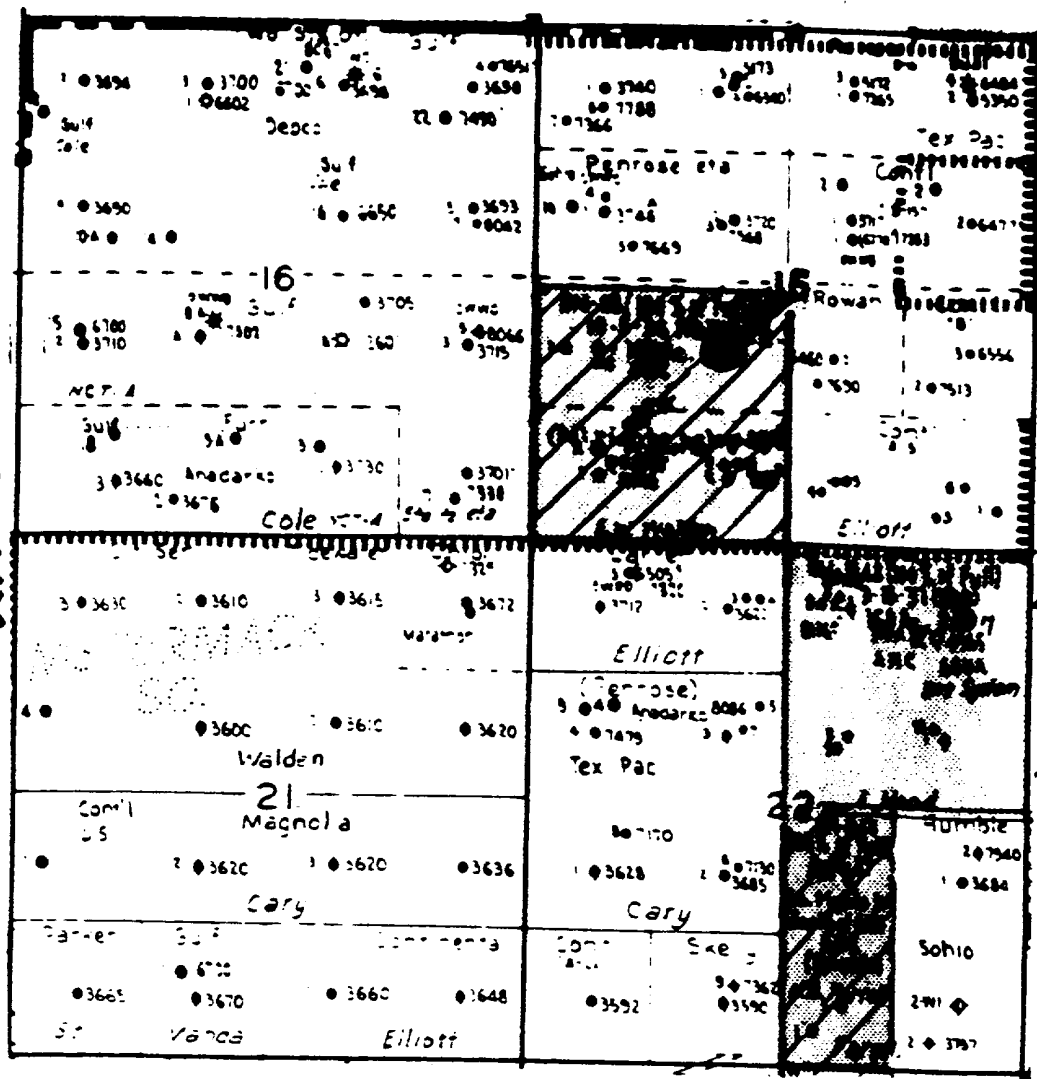
T_c^I = Pseudo critical temperature adjusted for acid gas composition

(Text cont'd. p. 16-15)

FIG.16-6
Pseudocritical properties of natural gases



22 SOUTH



37 EAST

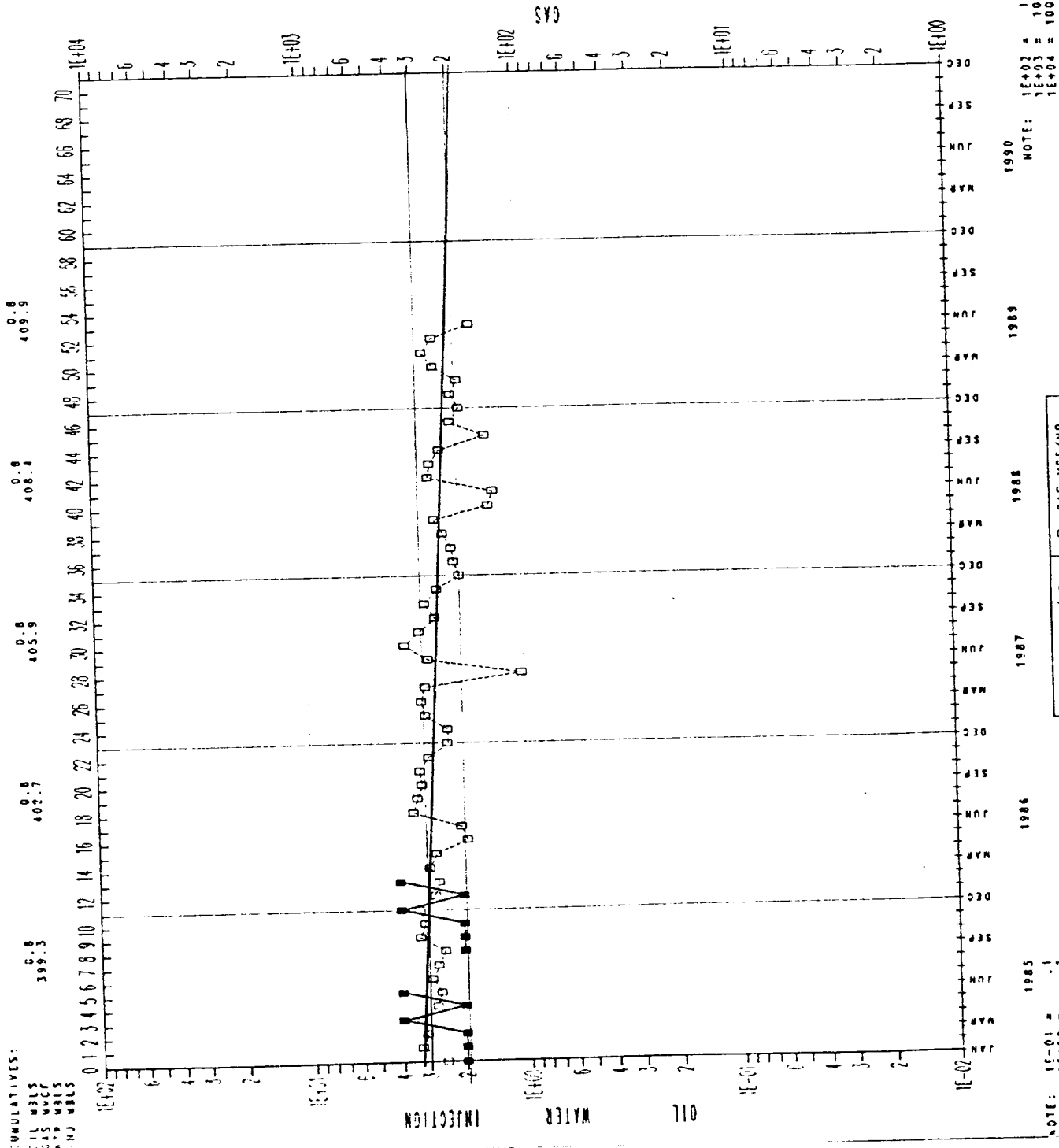
PLUT DATE: 8/9/89
PLUT NO.: 1065

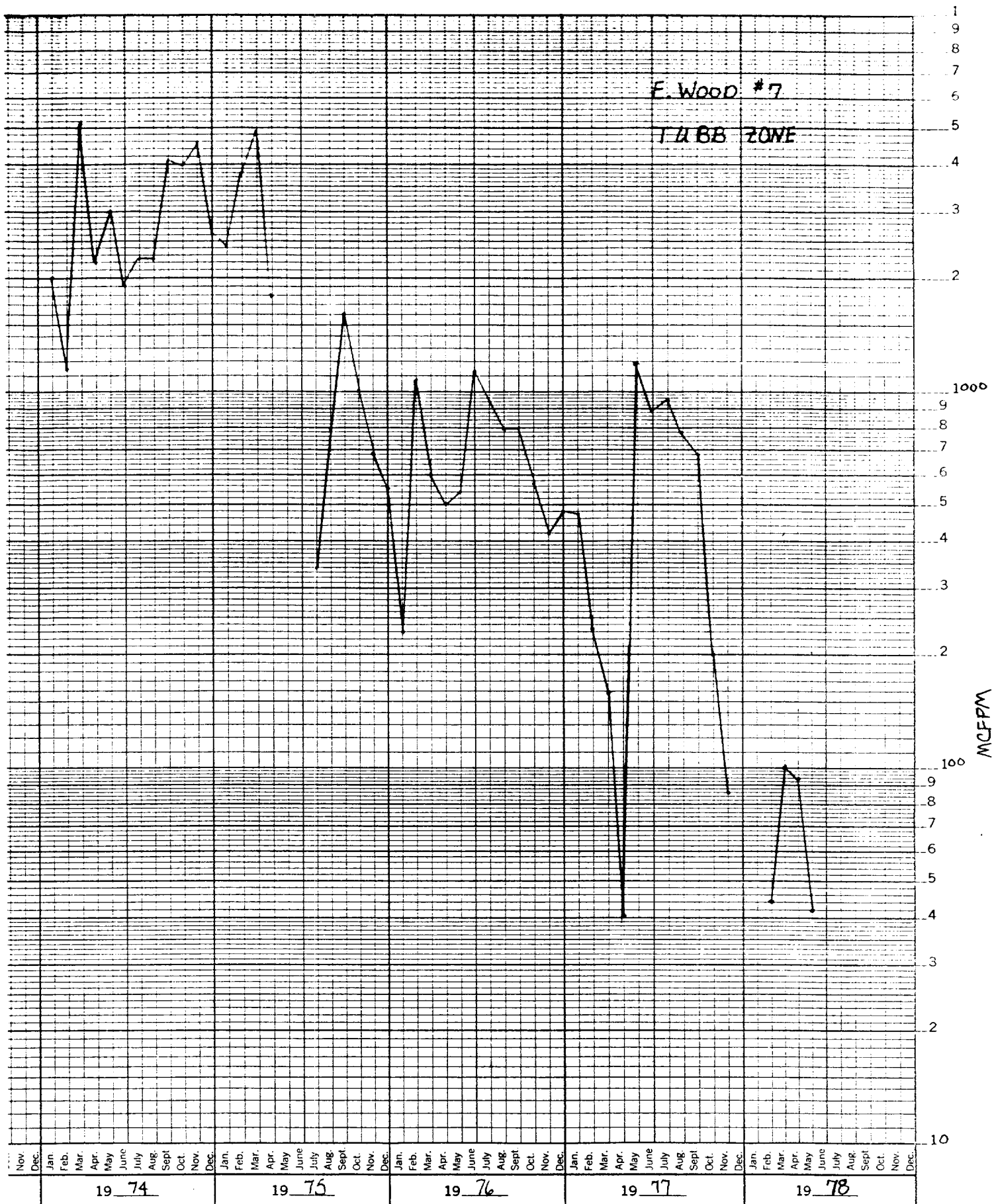
REGION: SOUTHWEST REGION PRO
FIELD: CENSICE FIELD
POOL: 72610000/
LEASE: 62771 WDA, CUSCE
WELL: 71
STATE CODE: 39 NEW MEXICO
POB CODE: 623

STATUS:
41 ON 6/16/89

GAS
FLUORINE

$$\ln \frac{265}{245} = 4.0\% / yr$$





Submit 2 copies to Appropriate
District Office.

DISTRICT I

P.O. Box 1960, Hobbs, NM 88240

DISTRICT II

P.O. Drawer DD, Aramis, NM 88210

DISTRICT III

1000 Rio Grande Rd., Aztec, NM 87410

State of New Mexico

Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION

P.O. Box 2088

Santa Fe, New Mexico 87504-2088

Form C-1116
Revised 1/1/89

GAS - OIL RATIO TEST

Operator		Pool		County												
AMERADA HESS CORPORATION		Drinkard		Lea												
Address		TYPE OF TEST - (X)		Completion		Special										
Drawer D, Monument, New Mexico 88265						☒										
LEASE NAME	WELL NO.	LOCATION			DATE OF TEST	CHOKE SIZE	TBQ. PRESS.	DAILY ALLOW-ABLE	LENGTH OF TEST HOURS	PROD. DURING TEST			GAS - OIL RATIO CU.FT/BBL.			
		U	S	T						R	WATER BBL.S.	GRAV. OIL		OIL BBL.S.	GAS M.C.F.	
E. WOOD	7	A	22	22S	37E	10-12-89	F	W0	40#	MGW	24	0	0	0	10	10,000

Instructions:

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 Division.

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 lbs of tubing pressure for any well producing through casing.

(See Rule 301, Rule 1116 & appropriate pool rules.)

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

Dorise Ward-Horn

Signature

Senior Petroleum Engineer

Printed name and title

October 13, 1989

505-393-0087

Date

Telephone No.

TYPE COMPLETION

☐ SINGLE

☒ DUAL

☐ OTHER

LOCATION

Unit A 732' FNL, 641' FEL, Sec. 22, T-22S, R-37E

TD 6440'

PBD 6288'

KB

DF 3360'

COD

DOD

GL

GL

NO. PROD. WELLS ON LEE.

FLOWING

PUMPING

ZONE TO BE WORKED ON

Tubb/Drinkard

CURRENT COMPLETION ZONE

CSG. PERFS. OR OH INTERVAL

Tubb - 5886'-6152'

Drinkard 6220'-6288'

CURRENT TEST (SHOW DATE)

PRESENT ALLOW.

TOP FIELD ALLOW.

GOR LIMIT

SPACING

	SIZE		DEPTH	TOP CEMENT
CASING: Surface	13"	40#	192'	Circ.
CASING: Intermediate	8-5/8"	28#	2,758'	Circ.
CASING: Production	5-1/2"	17# 15.5#	6,440	3,192'

SUMMARY OF PREVIOUS WORKOVERS

- 1/48 Supdded. Perforated 6402'-6438' (144 holes)
- 3/54 Dolofrac w/5000 gals. gel & 2500# sand. Perf. 5945'-6110' (660 holes). Acid 5945'-6110' w/5000 gals. 15%. Dolofrac 5945'-6110' w/5000 gals. gel & 2500# sand. Acid 6402'-6438' w/500 gals. 6%.
- 3/56 Sand oil frac 5945'-6110' w/25,000 gals. oil & 20,000# sand.
- 3/63 Perf. 5886'-5900' & 6102'-6152'. Acid 5886'-5900' w/5 gals. 15%. Acid 6128'-6152' w/1000 gals. 15%. Sand oil frac 5886'-6152' w/20,000 gals. oil & 40,000# sand.
- 4/75 Tagged fill at 6296'. Dumped 1-1/2 sks. cmt. on top to +6288'. Perfs. 6220'-6288' (38 holes) Acid w/ 1500 gals. 15% w/64 balls. Frac w/30,000 gals. gel, 46,500# sand, 700# salta & 350# Benzoic flakes. Set Model D at 6200'.

RECOMMENDATION AND JUSTIFICATION

SUBMITTED BY

RECEIVED
OCT 17 1989
OCD
HOBBS OFFICE

RECEIVED
OCT 17 1989
OCD
HOBBS OFFICE

NEW MEXICO OIL CONSERVATION COMMISSION
 SOUTHEAST NEW MEXICO Packer Leakage Test

Operator Amerada Hess Corp.			Lease E. Wood		Well No. 7	
Location of Well	Unit A	Sec 22	Twp 22S	R2E 37E	County Lea	
Name of Reservoir or Pool			Type of Prod (Oil or Gas)	Method of Prod Flow, Art Lift	Prod. Medium (Tbg or Csg)	Choke Size
Upper Zone	Tubb		Gas	Flow	Csg.	2"
Lower Zone	Drinkard		Gas	Flow	Tbg.	2"

FLOW TEST NO. 1

Both zones shut-in at (hour, date): 9:00 A.M. 3-6-89

Well opened at (hour, date): 9:00 A.M. 3-7-89

	Upper Completion	Lower Completion
Indicate by (X) the zone producing.....		X
Pressure at beginning of test.....	280	188
Stabilized? (Yes or No).....	YES	YES
Maximum pressure during test.....	280	188
Minimum pressure during test.....	280	45
Pressure at conclusion of test.....	280	45
Pressure change during test (Maximum minus Minimum).....	--	143
Was pressure change an increase or a decrease?.....	--	decrease

Well closed at (hour, date): 9:00 A.M. 3-8-89

Oil Production During Test: 0 bbls; Grav. 0; Gas Production During Test: 7 MCF; GOR --

Remarks

FLOW TEST NO. 2

	Upper Completion	Lower Completion
Well opened at (hour, date):		
Indicate by (X) the zone producing.....		
Pressure at beginning of test.....		
Stabilized? (Yes or No).....		
Maximum pressure during test.....		
Minimum pressure during test.....		
Pressure at conclusion of test.....		
Pressure change during test (Maximum minus Minimum).....		
Was pressure change an increase or a decrease?.....		

Well closed at (hour, date):

Oil Production During Test: bbls; Grav. ; Gas Production During Test: MCF; GOR

Remarks Tubb Zone Temporarily abandoned.

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

Approved MAR 16 1989
 New Mexico Oil Conservation Commission

By ORIGINAL SIGNED BY JERRY SEXTON
 Title DISTRICT SUPERVISOR

Operator Amerada Hess Corp.
 By Linda Johnson
 Title Production Technician
 Date 3-14-89