AMEND DHC 8/2/99

Houston Division
Production Operations, United States

Marathon Oil Company

P.O. Box 2490
Hobbs, New Mexico 88240
Telephone 505/393-7106

July 8, 1999

Mr. David Catanach
Oil Conservation Department
Energy and Minerals Department
P.O. Box 2088
Santa Fe, New Mexico 87501

RE: **Request for Exception to Rule 303-A**
Downhole Commingling
Lou Worthan Well No. 14
Unit Letter A, 520' FNL & 330' FEL
Section 11, T-22-S, R-37-E
Tubb Oil & Gas, Drinkard and Wantz Abo Pools
Drinkard Field
Lea County, New Mexico

Dear Mr. Catanach:

Marathon Oil Company request administrative approval to amend DHC-1019 permit for downhole commingling of production in the above subject well from the Tubb Oil & Gas, Drinkard and Wantz Abo pools in Lea County, New Mexico. The Tubb, Drinkard and Granite Wash have been downhole commingled since 1994 (DHC-1019). Marathon recently petition and received an amended DHC order to exclude the Granite Wash and add the Abo (pre-workover on Abo). The actual production allocation percentages are significantly different than the estimated ones used in the original application.

The Lou Worthan Well No. 14 was drilled and completed in 1976 as a Granite Wash oil well. In 1978, it was dually completed in the Granite Wash (oil) and Drinkard (gas). A single Tubb (oil) completion was performed in 1987, thus abandoning the Granite Wash and Drinkard. The Tubb, Drinkard and Granite Wash were downhole commingled in 1994 (DHC-1019). A recent workover on this well, the Granite Wash was abandon below a CIBP. The Abo was then perforated, acidized and tested. Next, the Tubb (upper most pool) was isolated and tested with rod pump equipment. After testing the Tubb for a week, the Tubb, Drinkard and Abo were DHC.

The Abo tested stronger than the original application estimates and the Tubb tested significantly lower than the pre-workover allocated volume. Rod pumping equipment is being utilized to keep the PBHP as low as possible, preventing crossflow when producing.

Enclosed is pertinent data supporting this application as outlined in Rule 303-A and Rule 104. If additional information is necessary, please contact me at (505) 393-7106, ext 201.

Sincerely,

Thomas P. Kacir

Thomas P. Kacir
Production Engineer

Enclosure

REQUEST FOR EXCEPTION TO RULE 303-A
Lou Worthan Well No. 14
Drinkard Field

A: Operator

Marathon Oil Company
P.O. Box 2490
Hobbs, New Mexico 88241

B: Lease Name and Well Number

Lou Worthan Well No. 14
Unit Letter "A", 520' FNL & 330' FEL
Section 11, T-22-S, R-37-E
Lea County, New Mexico
Drinkard: Tubb Oil & Gas, Drinkard, Wantz Abo Pools

C: Plats and Offset Operators

Attached

D: C-116's

Attached

E: Production Decline Curves

Attached

F: Estimated Bottomhole Pressures

	Current	Original
Tubb Oil & Gas	350 psi	1800 psi
Drinkard	450 psi	2000 psi
Wantz Abo	1000 psi	2400 psi

G: Product Characteristics

Previous commingling of these zones by Marathon and other operators in this area have shown that the produced fluids are compatible and commingling will not cause formation damage.

H: Value

Marathon receives the same price for product from these zones and value will not be adversely affected.

I: Production Allocation

POOL	BOPD	MCFD	BWPD	Estimated Methods
Tubb Oil & Gas	1.4	130	3.0	See Write up below
Drinkard	0.0	70	0.0	See Write up below
Wantz Abo	1.7	342	2.5	See Write up below
Total	3.1	542	5.5	

Allocated Percentages	Oil %	Gas %	Water %
Pre-workover Administrative Order No. DHC-1019			
Tubb Oil & Gas	45	68	50
Drinkard	0	14	0
Wantz Abo	N/A	N/A	N/A
Total	100	100	100
Post-workover utilizing above production			
Tubb Oil & Gas	45	24	55
Drinkard	0	13	0
Wantz Abo	55	63	45
Total	100	100	100

J: Ownership

Ownership of all zones is common and correlative rights will not be compromised.

K: Offset Operator Notification

By copy of this letter we are notifying all offset operators (see list, Item C) of the proposed commingling, by certified mail.

Workover Production Scenario
The Abo was perforated, acidized and tested up the tubing for approximately four weeks. During this time the Tubb and Drinkard were flowed up the tubing-casing annulus (fluid level was between the Tubb and Drinkard perforations). After testing Abo for four weeks, it was isolated below packer and plug. The Drinkard was isolated below a RBP. For the next week the Tubb was tested on rod pumped. After testing the Tubb, the RBP was pulled and tubing latched onto the packer above the Abo. A 4 point test was performed on the Abo. The well was then produced for approximately 10 days (Abo up tubing, Tubb & Drinkard up tubing-casing annulus) before DHC the three pools. Before releasing the packer an acid job was performed on the Tubb and Drinkard to remove any damage.

Abo Pool
A flowing bottom-hole pressure was obtained shortly before shut-in the Abo. This flowing BHP was used as a guide line for flowing bottom-hole pressure used in modeling this reservoir. The final shut-in tubing pressure, before 4 point test, was use to estimate static bottom-hole pressure. Obtained four weeks of test data. Shortly after DHC the three pools a fluid level was shot and used to estimate the flowing bottom-hole pressure.

With the above mention data, a permeability and skin factor for the gas was estimated using the line source solution to the radial diffusivity equation (constant terminal rate). The Abo gas test data was then forward modeled using a single homogeneous, isotropic layer reservoir and the real gas pseudo pressure multi-rate equation. A good match of the gas test data was obtained with this model (shown on Abo production plot). Average oil-gas and water-gas ratios from the test period were used in the forward modeling. For the last two week of June 1999, the model had an average gas rate of approximately 344 MCFPD.

Drinkard Pool
Allocated production gives this pool approximately 46 MCFPD. Fluid levels shot pre-workover, Abo testing during workover and post workover indicated a producing bottom-hole pressure of between approximately 100 psi to 60 psi. These flowing BHP represent 78% to 86% drawdown on the Drinkard.

The Drinkard in 1987 was flowing up the tubing-casing annulus. Production from this zone indicated a liquid loading problem at the time it was shut-in in 1987. The Drinkard was shut-in for seven years prior to the 1994 DHC with the Granite Wash and Tubb. After the 1994 DHC, damage was removed from the Tubb & Drinkard with a PPI acid job. Post acid job allocated production (early 1995) was approximately the same as when the well was shut-in seven years earlier (shown on Drinkard allocated production plot).

The Drinkard allocated production (post 1994) seem low when you consider that its drawdown increase significantly after the 1994 DHC (no liquid loading and a low fluid level). By using the early gas production data (1979 to 1983) and extending it to the time of shut-in yields approximately 175 MCFPD (high point) or 120 MCFPD (mid section). Using these value as the initial gas production after the 1995 acid job and declining it at the average gas decline rate (after DHC in 1994) of 13.5%/yr yields 100 or 70 MCFPD, respectfully.

Tubb Pool
Pre-workover allocated production and well test during the workover are significantly different at 222 and 94 MCFPD, respectfully. Fluid levels shot pre-workover, testing during workover and post workover indicated a producing bottom-hole pressure of between approximately 75 psi to 50 psi. These flowing BHP represent 78% to 86% drawdown on the Tubb.

Prior to the 1994 DHC, the Tubb was cleaned out and gas production returned to the highest level since bring on the Tubb at 190 MCFPD. The 1994 DHC damaged the Tubb and Drinkard, so a clean-up acid stimulation job was performed on these two zones. Tubb allocated production increase to 380 MCFPD, twice pre-DHC production, after this acid job. From all indication the Tubb was not damaged prior to the 1994 DHC. The DHC increased the drawdown by only 10 to 20%, so it is doubtful that production should have doubled.

The Tubb most likely increased approximately 15% from 190 MCFPD to 220 MCFPD. Since the 1995 the gas production has declined 13.5%/yr. This would indicate that the Tubb zone today (1999) should contribute approximately 130 MCFPD. Fluid levels gather during the testing of the Abo showed scattered liquid up above the Tubb perforations. The Tubb possibly had some damage when rod pump tested during the workover or had not completely cleaned up the load water.

DHC of Abo, Drinkard & Tubb

There are several possibilities from the above analysis of the Tubb, Drinkard and Abo production. The table below shows several gas production possibilities.

Abo (MCFPD)	Tubb (MCFPD)	Drinkard (MCFPD)	Total (MCFPD)	Comment
342	222	46	610	Pre-Workover Allocated Production High by 11%
342	130	100	572	High by 5%
342	130	70	542	* Best Fit *
342	94	100	536	Low by 2%
342	94	70	506	Low by 7%

The middle scenario above is the best when compared to test data from after DHC the three zones. This data will be used for the gas allocation percentages.

The Tubb and Drinkard liquid rates are averages from the pre-workover allocated production data. Liquid production for the Abo will use an average from well test during the workover.

OFFSETTING OPERATORS
Lou Worthan Well No. 14
UL "A", 520' FNL, 330' FEL
Section 11, T-22-S, R-37-E
Lea County, New Mexico
Drinkard Field

Section 1: John H. Hendrix Corporation
P. O. Box 3040
Midland, Texas 79702-3040

Section 2: Exxon Corporation
P.O. Box 4697
Houston, Texas 77210-4697

Section 11: Marathon Oil Company

Section 12: John H. Hendrix Corporation

Houston Division
Production Operations, United States

P.O. Box 2490
Hobbs, New Mexico 88240
Telephone 505/393-7106

July 8, 1999

Exxon Corporation
P. O. Box 4697
Houston, Texas 77210-4697

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Unit Letter A, 520' FNL & 330' FEL
Section 11, T-22-S, R-37-E
Tubb Oil & Gas, Drinkard and Wantz Abo Pools
Drinkard Field
Lea County, New Mexico

Ladies and/or Gentlemen:

Marathon Oil Company has filed an application with the New Mexico Oil Conservation division to down-hole commingle the Tubb, Drinkard and Abo. We also filed for a non-standard proration unit & location for the Tubb pool. Please find enclosed a copy of the application.

If you are in agreement and waive all objections to the above listed applications, please sign below and mail the original to the NMOCD in the enclosed addressed envelope. Also, please return one copy to Marathon at the letterhead address.

Sincerely,

Thomas P. Kacir
Production Engineer

TPK/
Enclosure

Agreed and accepted this _____ day of _____ 1999

by _____, as representative of

_____.

Houston Division
Production Operations, United States

Marathon Oil Company

P.O. Box 2490
Hobbs, New Mexico 88240
Telephone 505/393-7106

July 8, 1999

John H. Hendrix Corporation
P. O. Box 3040
Midland, Texas 79702-3040

RE: **Request for Exception to Rule 303-A**
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Lou Worthan Well No. 14
Unit Letter A, 520' FNL & 330' FEL
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Production Engineer

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by _____, as representative of

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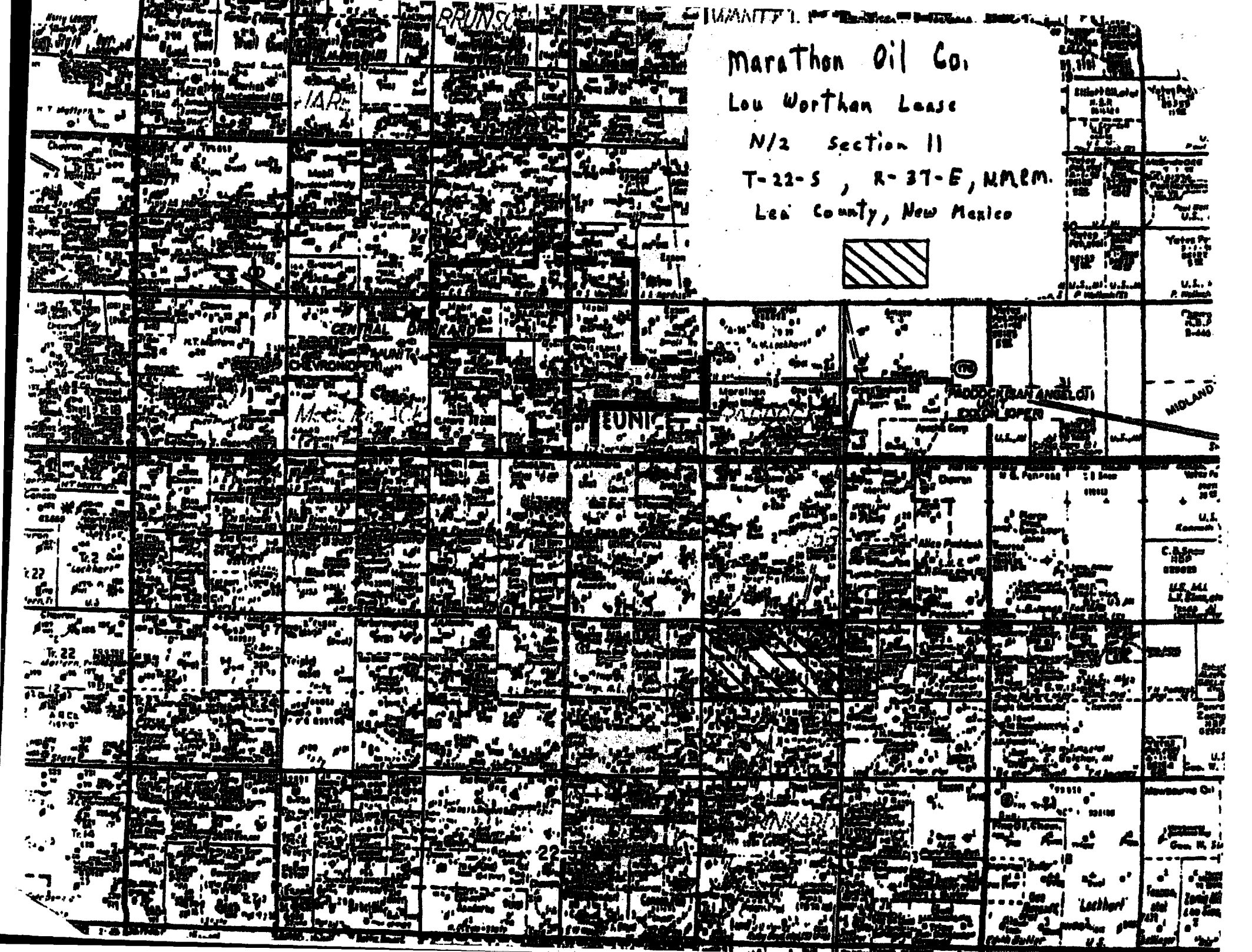

Marathon Oil Co.
Lou Worthan Lease
N/2 Section 11
T-22-S, R-37-E, NMPM.
Lea County, New Mexico
MIDLAND

District I
PO Box 1980, Hobbs, NM 88241-1980
District II
811 S. 1st Street, Artesia, NM 88210-2834
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

Form C-102
Revised October 18, 1994
Instructions on back
Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
30-025-25255	86440	Tubb Oil & Gas (Gas)

[4] Property Code	[5] Property Name	[6] Well Number
006488	Lou Worthan	14

[7] OGRID No.	[8] Operator Name	[9] Elevation
14021	Marathon Oil Company	3350' GL

[10] Surface Location

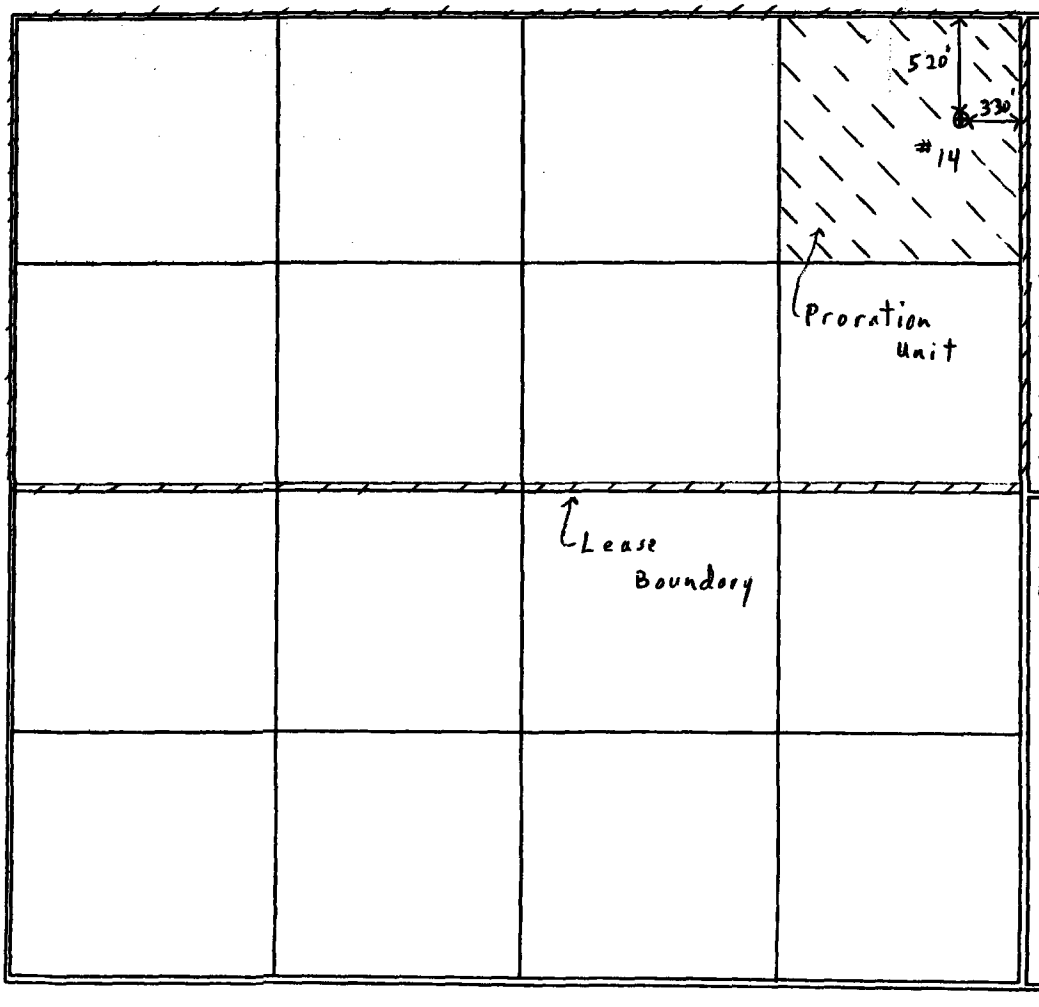
UL or lot no.	Section	Township	Range	Lot. Idn	Feet from the	North/South Line	Feet from the	East/West line	County
A	11	22-S	37-E		520	North	330	East	Lea

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot. Idn	Feet from the	North/South Line	Feet from the	East/West line	County

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
40			DHC-1019

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



[17] OPERATOR CERTIFICATION

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

T Thomas P. Kacir
Signature
Thomas P. Kacir
Printed Name
Production Engineer
Title
4-12-99
Date

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date of Survey

Signature and Seal of Professional Surveyer:

Certificate Number

District I
PO Box 1980, Hobbs, NM 88241-1980
District II
811 S. 1st Street, Artesia, NM 88210-2834
District III
1000 Rio Brazos Rd., Aztec, NM 87410
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WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number	2 Pool Code	3 Pool Name
30-025-25255	19190	Drinkard

4 Property Code	5 Property Name	6 Well Number
006488	Lou Worthan	14

7 OGRID No.	8 Operator Name	9 Elevation
14021	Marathon Oil Company	3350' GL

10 Surface Location

UL or lot no.	Section	Township	Range	Lot. Idn	Feet from the	North/South Line	Feet from the	East/West line	County
A	11	22-S	37-E		520	North	330	East	Lea

11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot. Idn	Feet from the	North/South Line	Feet from the	East/West line	County

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40			DHC-1019

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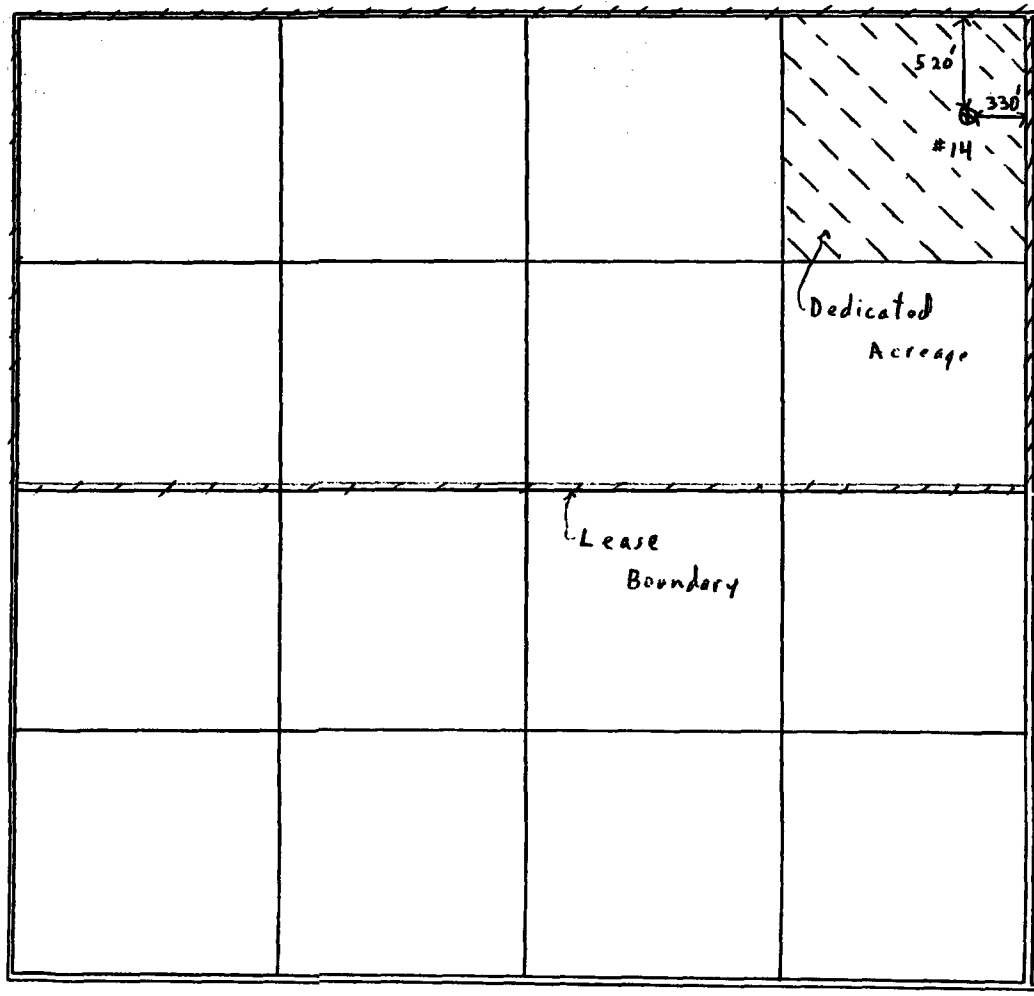

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WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number	2 Pool Code	3 Pool Name
30-025-25255	62700	Wantz Abo

4 Property Code	5 Property Name	6 Well Number
006488	Lou Worthan	14

7 OGRID No.	8 Operator Name	9 Elevation
14021	Marathon Oil Company	3350' GL

10 Surface Location

UL or lot no.	Section	Township	Range	Lot. Idn	Feet from the	North/South Line	Feet from the	East/West line	County
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UL or lot no.	Section	Township	Range	Lot. Idn	Feet from the	North/South Line	Feet from the	East/West line	County

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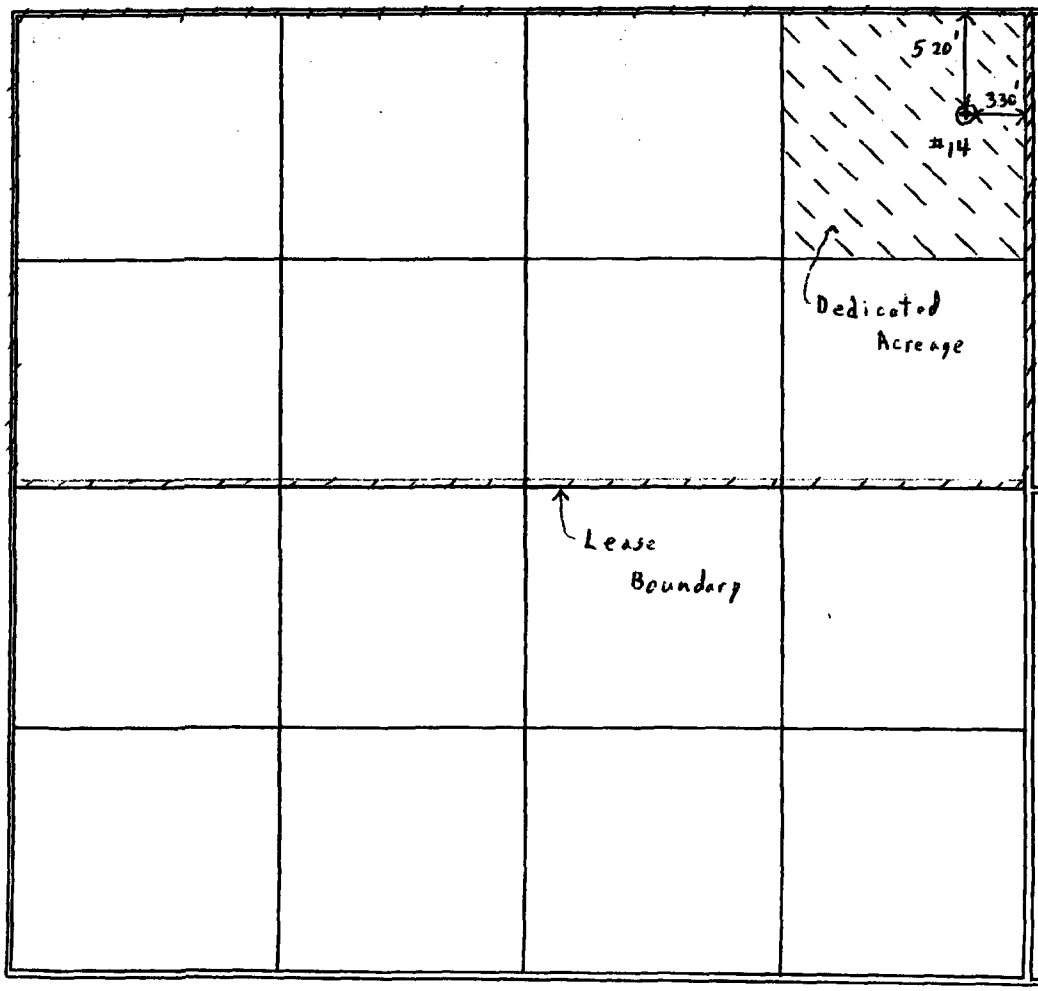

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DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION

2040 Pacheco St.
Santa Fe, NM 87505

Form C-116
Revised 1/1/89

GAS - OIL RATIO TEST

Operator	Pool	County
Marathon Oil Company	Tubb Oil & Gas / Drinkard	Lea

Address	TYPE OF TEST - (X)	Scheduled	Completion	Special
P.O. Box 2490 Hobbs, NM 88241		[ ]	[ ]	[X]

LEASE NAME	WELL NO.	LOCATION U	S	T	R	DATE OF TEST	STATUS	CHOKE SIZE	TBG. PRESS.	DAILY ALLOW-ABLE	LENGTH OF TEST HOURS	PROD. DURING TEST WATER BBLS.	GRAV. OIL	OIL BBLS.	GAS M.C.F.	GAS-OIL RATIO CU.FT/BBL
Lou Worthan	14	A	11	22S	37E	03/06/99	P		200		24	6.0		3.0	326	108,667
DHC #1019 % Oil % Gas																
Tubb (Oil) 45 68												3.0		1.4	222	158,571
Drinkard 0 14												0		0	46	N/A
Granite Wash 55 18												3.0		1.6	58	36,250

For Information only
(Pre-Workover)

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 lieu 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.

Thomas P. Kacir
Signature

Thomas P. Kacir Production Engineer
Printed name and title

4-12-99 505-393-7106
Date Telephone No.

Submit 2 copies to Appropriate District Office.
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P.O. Box 1980, Hobbs, NM 88240
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811 S. 1st Street, Artesia, NM 88210-2834
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State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION

2040 Pacheco St.
Santa Fe, NM 87505

Form C-116
Revised 1/1/89

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Operator	Pool	County
Marathon Oil Company	Tubb Oil & Gas / Drinkard / Abo	Lea

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TYPE OF TEST - (X): Scheduled [ ] Completion [ ] Special [X]

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Lou Worthan	14	A	11	22S	37E											
Abo (Workover Test)						4/26/99	F	48	50		24	3.0		3.0	439	146,333
Abo (Workover Test)						5/04/99	F	48	55		24	0		0	392	130,667
Abo (Workover Test)						5/10/99	F	48	50		24	3.0		3.0	360	120,000
Tubb (Workover Test)						5/19/99	P		36 Csg		24	3.0		0	94	NA
Tubb (Workover Test)						5/20/99	P		36 Csg		24	2.0		0	93	NA
Abo (Workover Test)						5/29/99	F		40		24	0		3.0	373	124,333
Abo (Workover Test)						6/02/99	F		40		24	3.0		0	342	NA
Tubb, Drinkard & Abo (Post WO)						6/22/99	P		30 Csg		24	7.0		3.0	546	182,000
For Information only																

Instructions:

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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.

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(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.

Thomas P. Kacir
Signature

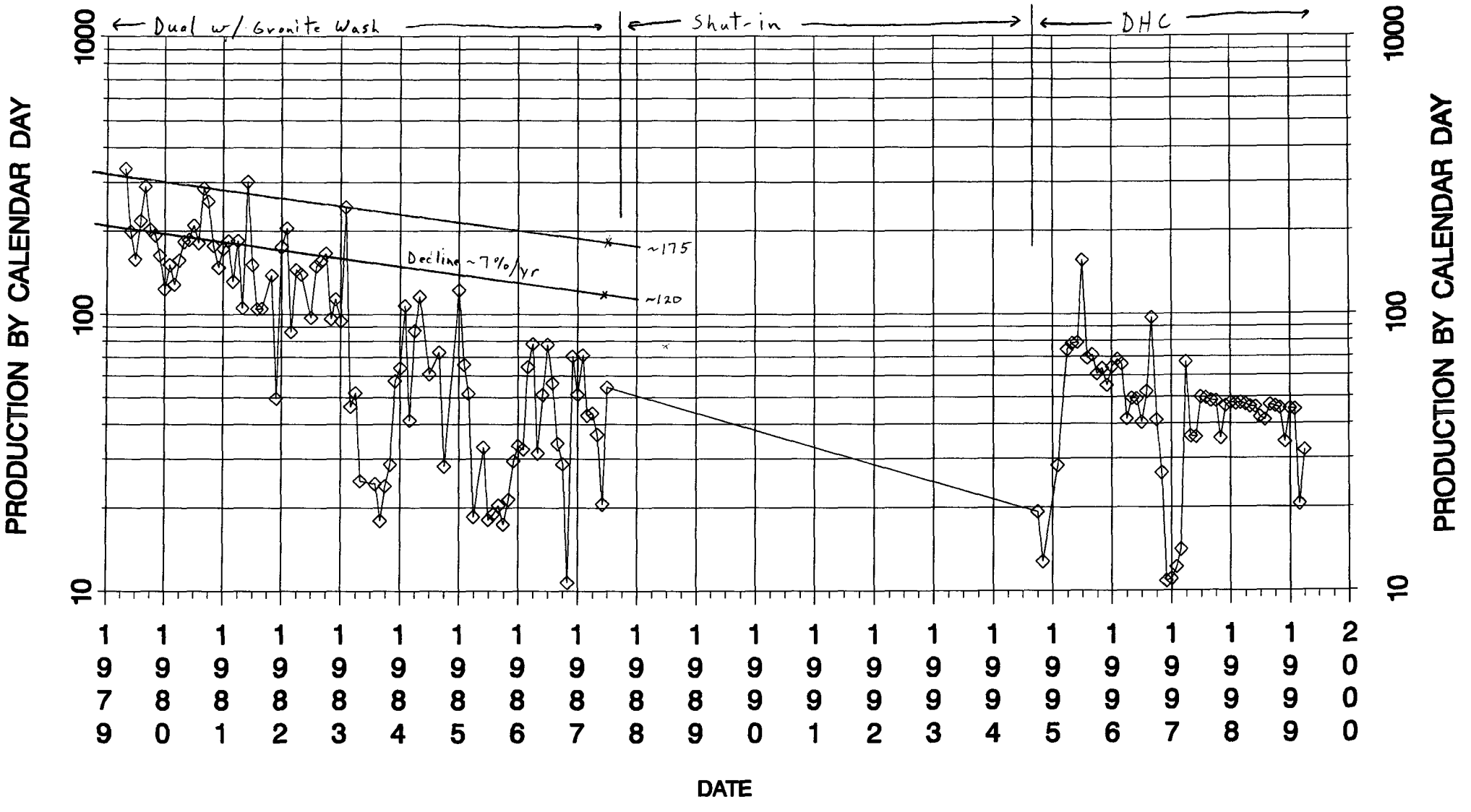
Thomas P. Kacir Production Engineer
Printed name and title

7-09-99 505-393-7106
Date Telephone No.

Midland Operations

Allocated Production Data – DrinKard

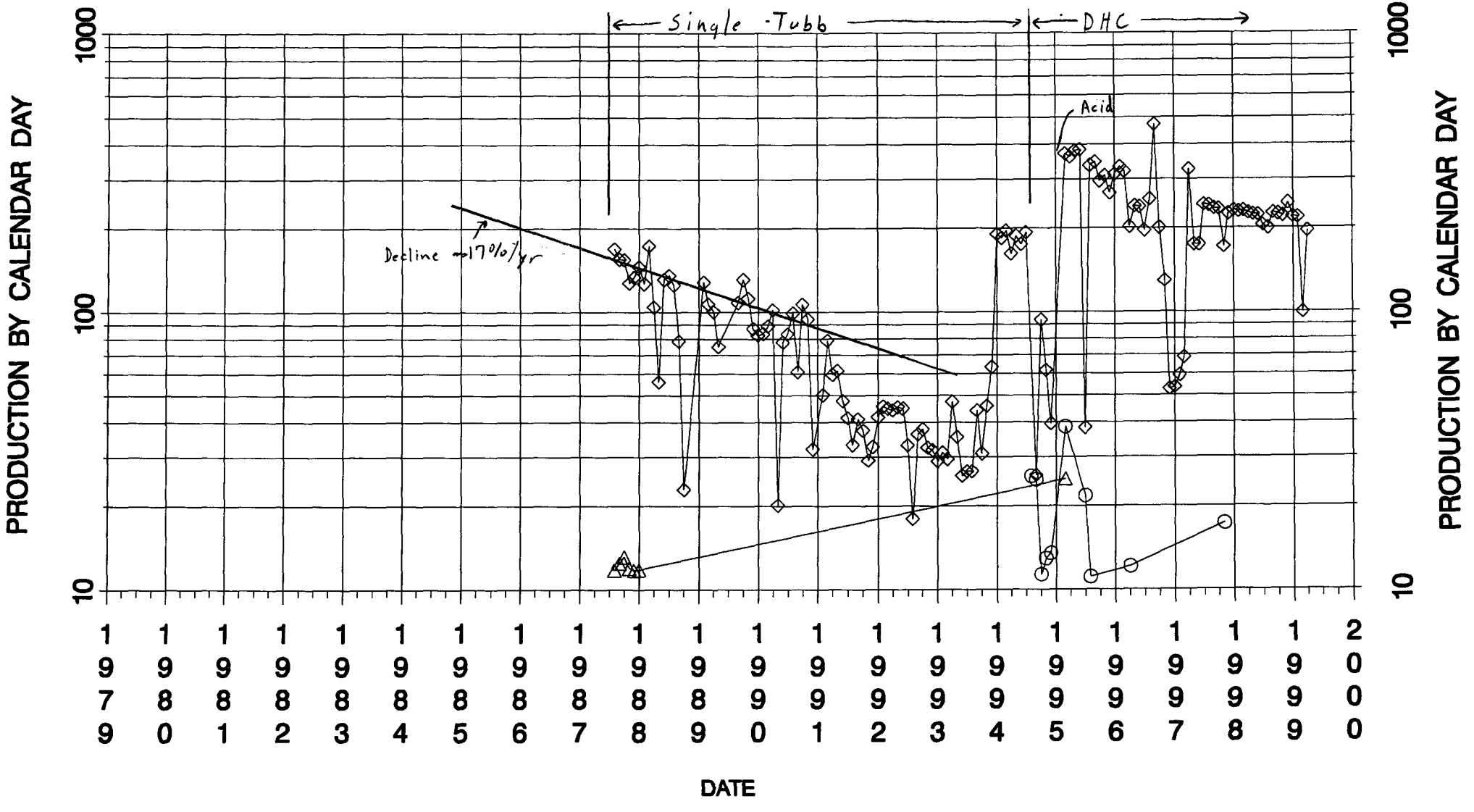
WORTHAN, LOU Well Compl No. = 1231402 LOU WORTHAN – NO. 14(2)

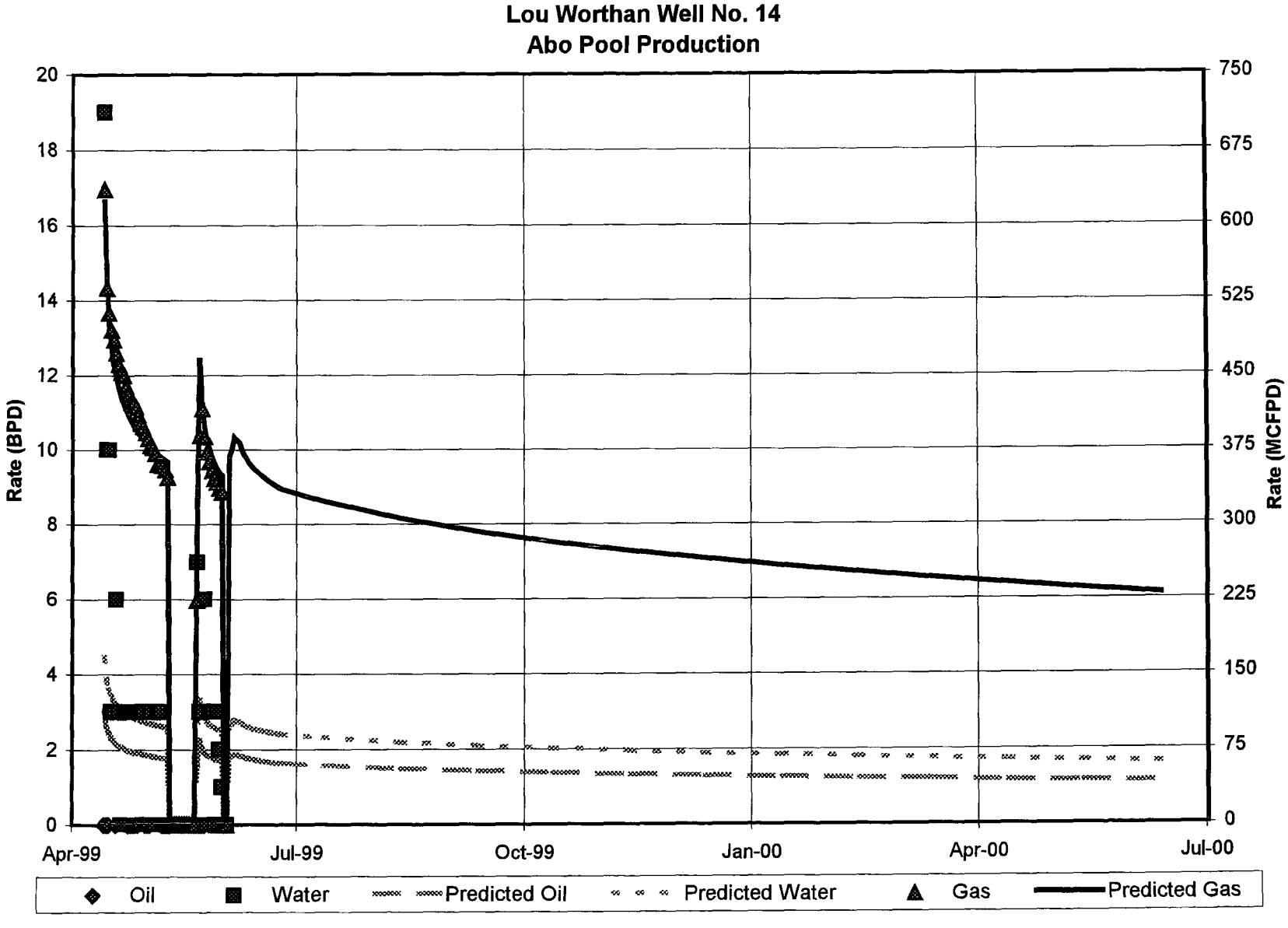


Midland Operations

Allocated Production Data - Tubb

WORTHAN, LOU Well Compl No. = 1231403 LOU WORTHAN – NO. 14(3)



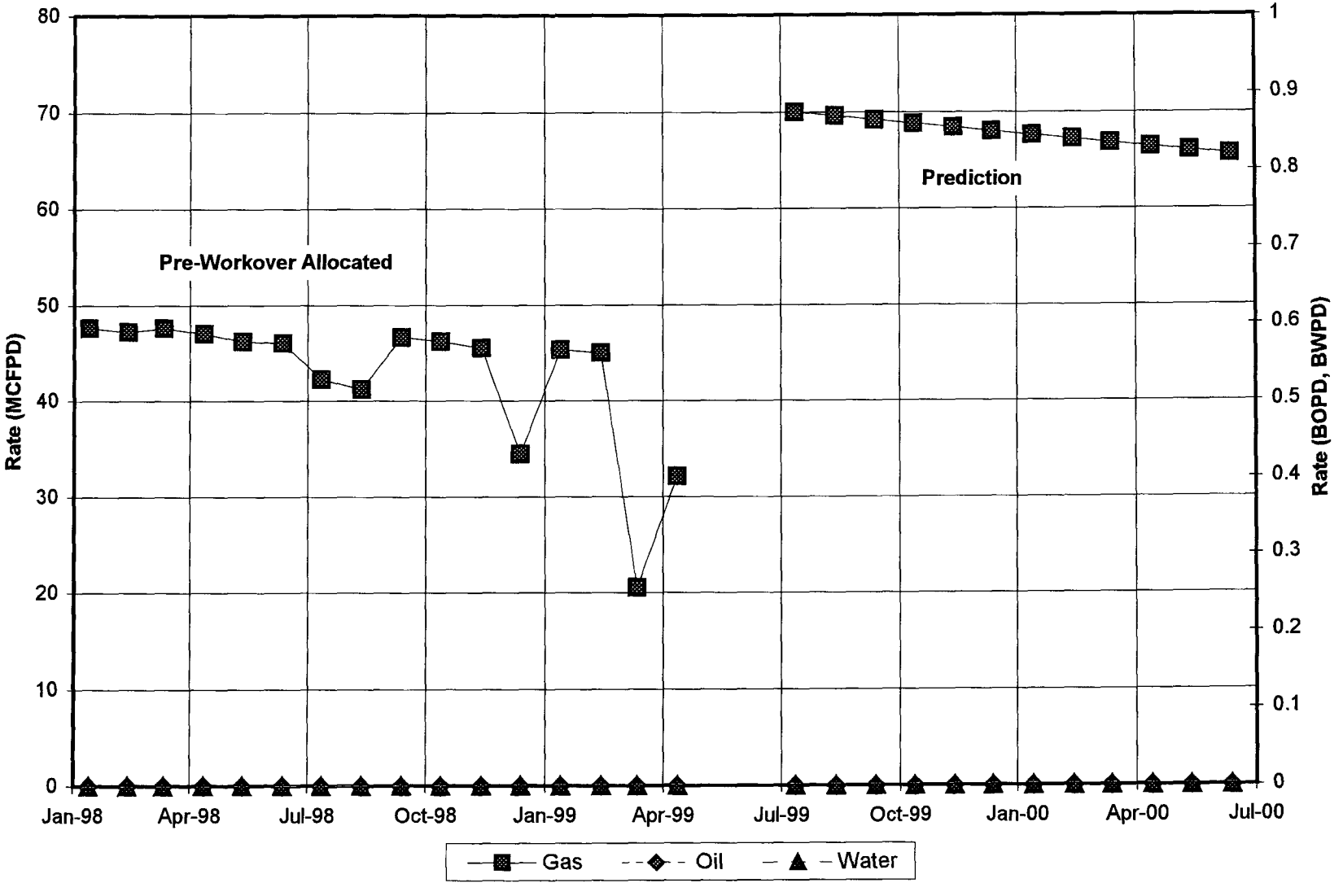


Sec 11, T-22-S, R-37-E
520' FNL, 330' FEL

Tubb, Drinkard, Abo
DHC Application

7/8/99

Lou Worthan Well No. 14
Drinkard Pool Production

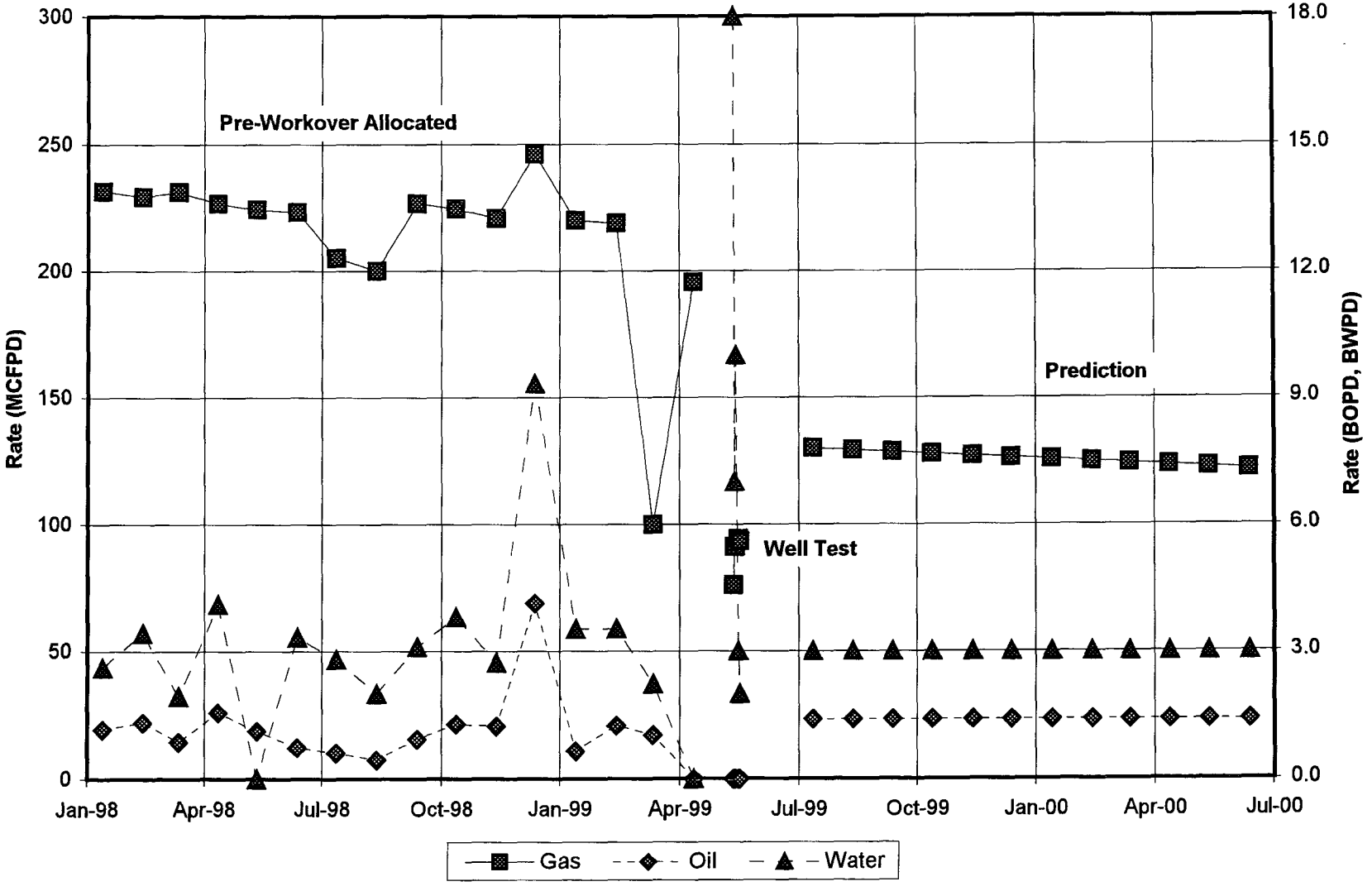


Sec 11, T-22-S, R-37-E
520' FNL, 330' FEL

Tubb, Drinkard, Abo
DHC Application

7/8/99

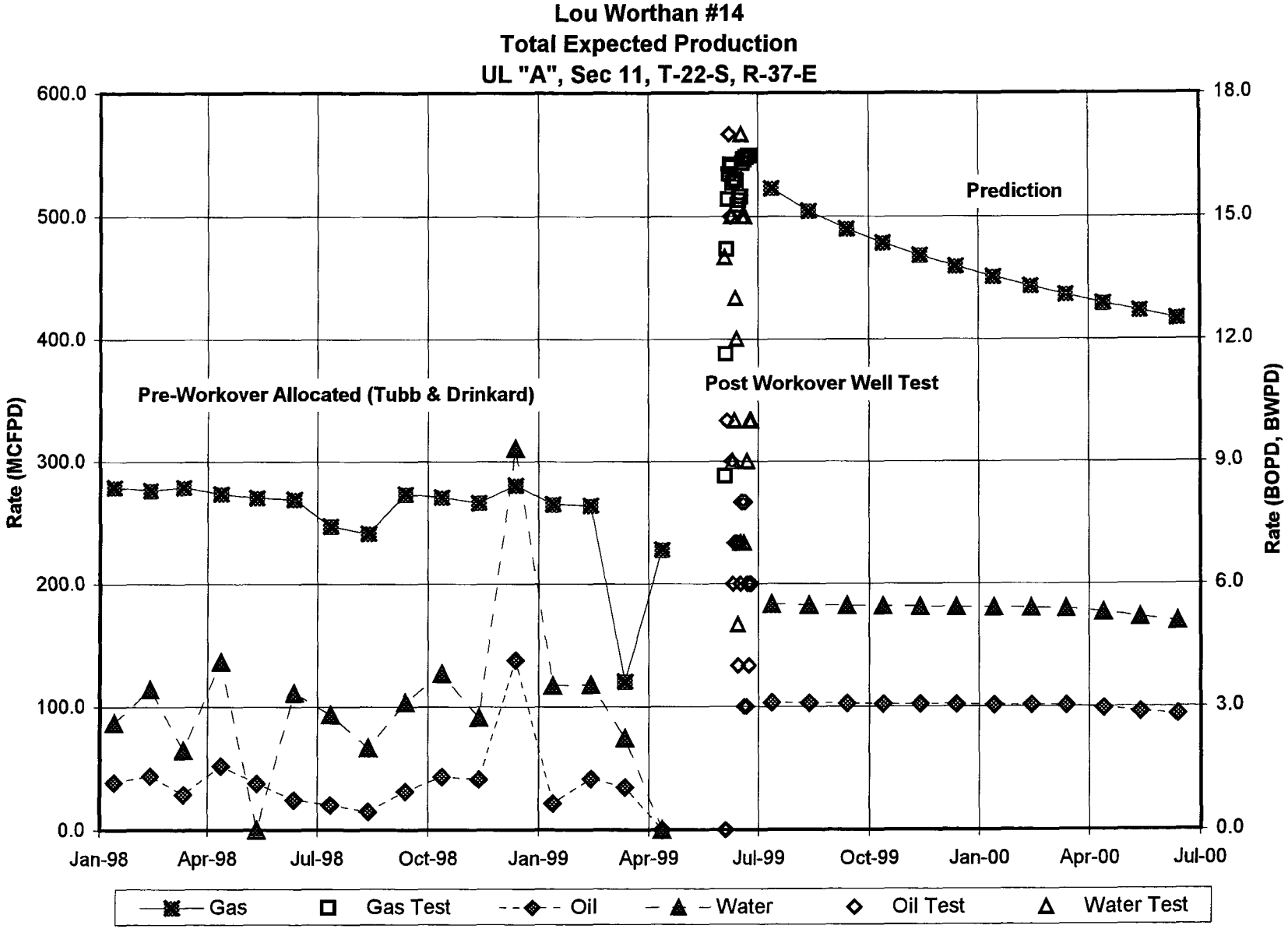
Lou Worthan Well No. 14
Tubb Oil & Gas Pool Production



Sec 11, T-22-S, R-37-E
520' FNL, 330' FEL

Tubb, Drinkard, Abo
DHC Application

7/8/99



Sec 11, T-22-S, R-37-E
520' FNL, 330' FEL

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DHC Application

7/8/99

EXHIBIT "B" - CASE NO. 11353, ORDER NO. R-10470-A

DISTRICT I
P.O. Box 1980, Hobbs, NM 88240
DISTRICT II
811 South First St., Artesia, NM 88210
DISTRICT III
1000 Rio Brazos Rd, Aztec, NM 87410

State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION

2040 S. Pacheco
Santa Fe, New Mexico 87505-6429

Form C-107-A
New 3-12-96

APPROVAL PROCESS:
__ Administrative __ Hearing

EXISTING WELLBORE
X YES __ NO

APPLICATION FOR DOWNHOLE COMMINGLING

Marathon Oil Company (Operator) PO Box 2490 (Address) Hobbs, NM 88240

Lou Worthan (Lease) 14 (Well No.) UL A, Sec.11, T-22-S, R-37-E (Unit Ltr. - Sec - Twp - Rge) Lea (County)

Spacing Unit Lease Types: (check 1 or more)

OGRID NO. 14021 Property Code 6488 API NO. 30-025-25255 Federal ___, State ___, (and/or) Fee X

The following facts are submitted in support of downhole commingling:	Upper Zone	Intermediate Zones	Lower Zone
1. Pool Name and Pool Code	Tubb Oil & Gas (OIL) 86440 142 OIL 2000 GOR 28% GAS	Drinkard OIL 19190	Wantz Abo (OIL) 62700
2. Top and Bottom of Pay Section (Perforations)	5788 - 5898'	6224 - 6294'	6556 - 7054'
3. Type of production (Oil or Gas)	Gas	Gas	Gas
4. Method of Production (Flowing or Artificial Lift)	Artificial Lift	Artificial Lift	Artificial Lift
5. Bottomhole Pressure Oil Zones - Artificial Lift: Estimated Current Gas & Oil - Flowing: Measured Current All Gas Zones: Estimated Or Measured Original	a. (Current) 350 psi	a. 450 psi	a. 1000 psi
	b. (Original) 1800 psi	b. 2000 psi	b. 2400 psi
6. Oil Gravity (°API) or Gas BTU Content	1225	1240	1192
7. Producing or Shut-In?	Producing	Producing	Producing
Production Marginal? (yes or no)	Yes	Yes	Yes
• If Shut-In, give date and oil/gas/ water rates of last production Note: For new zones with no production history, applicant shall be required to attach production estimates and supporting data	Date: 3/6/99 Rates: 1.4/222/3 (Pre-Workover)	Date: 3/6/99 Rates: 0/46/0 (Pre-Workover)	Date: N/A Rates:
• If Producing, give date andoil/gas/ water rates of recent test (within 60 days)	Date: 5/19/99 Rates: 0/94/3 (Workover Test)	Date: None Rates:	Date: 6/2/99 Rates: 0/342/3 (Workover Test)
8. Fixed Percentage Allocation Formula -% for each zone	Oil: 45 % Gas: 24 %	Oil: 0 % Gas: 13 %	Oil: 55 % Gas: 63 %

9. If allocation formula is based upon something other than current or past production, or is based upon some other method, submit attachments with supporting data and/or explaining method and providing rate projections or other required data.

10. Are all working, overriding, and royalty interests identical in all commingled zones? X Yes __ No
If not, have all working, overriding, and royalty interests been notified by certified mail? __ Yes __ No
Have all offset operators been given written notice of the proposed downhole commingling? X Yes __ No

11. Will cross-flow occur? X Yes __ No If yes, are fluids compatible, will the formations not be damaged, will any cross-flowed production be recovered, and will the allocation formula be reliable. X Yes __ No (If No, attach explanation)

12. Are all produced fluids from all commingled zones compatible with each other? X Yes __ No

13. Will the value of production be decreased by commingling? __ Yes X No (If Yes, attach explanation)

14. If this well is on, or communitized with, state or federal lands, either the Commissioner of Public Lands or the United States Bureau of Land Management has been notified in writing of this application. __ Yes __ No N/A

15. NMOCD Reference Cases for Rule 303(C) Exceptions: ORDER NO(S). DHC No. 1019

16. ATTACHMENTS:
* C-102 for each zone to be commingled showing its spacing unit and acreage dedication.
* Production curve for each zone for at least one year. (If not available, attach explanation.)
* For zones with no production history, estimated production rates and supporting data.
* Data to support allocation method or formula.
* Notification list of all offset operators.
* Notification list of working, overriding, and royalty interests for uncommon interest cases.
* Any additional statements, data, or documents required to support commingling.

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

SIGNATURE Thomas P. Kacir TITLE Production Eng. DATE 5/9/99

TYPE OR PRINT NAME Thomas P. Kacir TELEPHONE NO. (505) 393-7106