DHC RELEASE 9·26·93

MERIDIAN OIL

OIL CONSERVATION DIVISION
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August 31, 1993

New Mexico Oil Conservation Division
Attn: Mr. Bill LeMay
P.O. Box 2088
310 Old Santa Fe Trail
Santa Fe, New Mexico 87501

RE: San Juan 28-4 Unit #226
Unit K, Section 17, T28N, R04W
Rio Arriba County, New Mexico
Downhole Commingling Request

Dear Mr. LeMay: ~~Chacra~~ GOBERNADOR

Meridian Oil Inc. is applying for an administrative downhole commingling order for the referenced well in the Pictured Cliffs and the Basin Fruitland Coal fields. The ownership of the zones to be commingled is common. All offsetting acreage in this case belongs to Meridian Oil Inc. A letter has been sent to the Bureau of Land Management notifying them.

The Fruitland Coal and Pictured Cliffs wells producing in this area operated by Meridian are marginally productive. Based on offset production in this area, drilling of separate wells and dual completions to produce the Fruitland Coal and Pictured Cliffs are not economically justified. The only economical way to recover the Fruitland Coal and Pictured Cliffs reserves in this drill block is to downhole commingle production from both zones in this well.

It is proposed to complete the Pictured Cliffs formation and test its production. It is then proposed to set a bridge plug above the Pictured Cliffs, perforate and stimulate the Fruitland Coal, and test its production. The bridge plug will then be removed, and both zones produced through a single string of tubing. The reservoir characteristics of each of the subject zones are such that underground waste will not be caused by the proposed commingling. Neither producing interval makes oil, and only minimal amounts of similar water are produced in the offset wells. The average shut-in pressures in the area for the Pictured Cliffs and Fruitland Coal are **960** and **859** psi, respectively.

The allocation of the commingled production will be calculated using the attached allocation formula. This formula is based on offset Pictured Cliffs production performance (material balance) and volumetrics, and uses accepted Reservoir Engineering methods to allocate the Pictured Cliffs reserves. This addresses the Fruitland Coal producing characteristics of early life inclining production rates.

Approval of this commingling application will allow for the prevention of wasted resources and protection of correlative rights. Included with this letter are plats showing ownership of offsetting leases for both the Pictured Cliffs and Fruitland Coal, a copy of the letter to the BLM and an allocation formula.

Sincerely,

Arden L. Walker, Jr.
Regional Production Engineer

KS:tg
Attachments

cc: Frank T. Chavez - NMOCD/Aztec

MERIDIAN OIL

August 31, 1993

Bureau of Land Management
1235 La Plata Highway
Farmington, New Mexico 87401

RE: San Juan 28-4 Unit #226
Unit K, Section 17, T28N, R04W
Rio Arriba County, New Mexico
Downhole Commingling Request

Gentlemen:

Meridian Oil, Inc. is in the process of applying for a downhole commingling order for the San Juan 28-4 Unit #226 well located in Unit K, Section 17, T28N, R04W, N.M.P.M., Rio Arriba County, New Mexico, in the Pictured Cliffs and the Basin Fruitland Coal fields.

The purpose of this letter is to notify you of such action. If you have no objections to the proposed commingling order, we would appreciate your signing this letter and returning it to this office.

Your prompt attention to this matter would be appreciated.

Yours truly,

Kurt A. Shipley
Production Engineering

KS/tg

The above downhole commingling request is hereby approved:

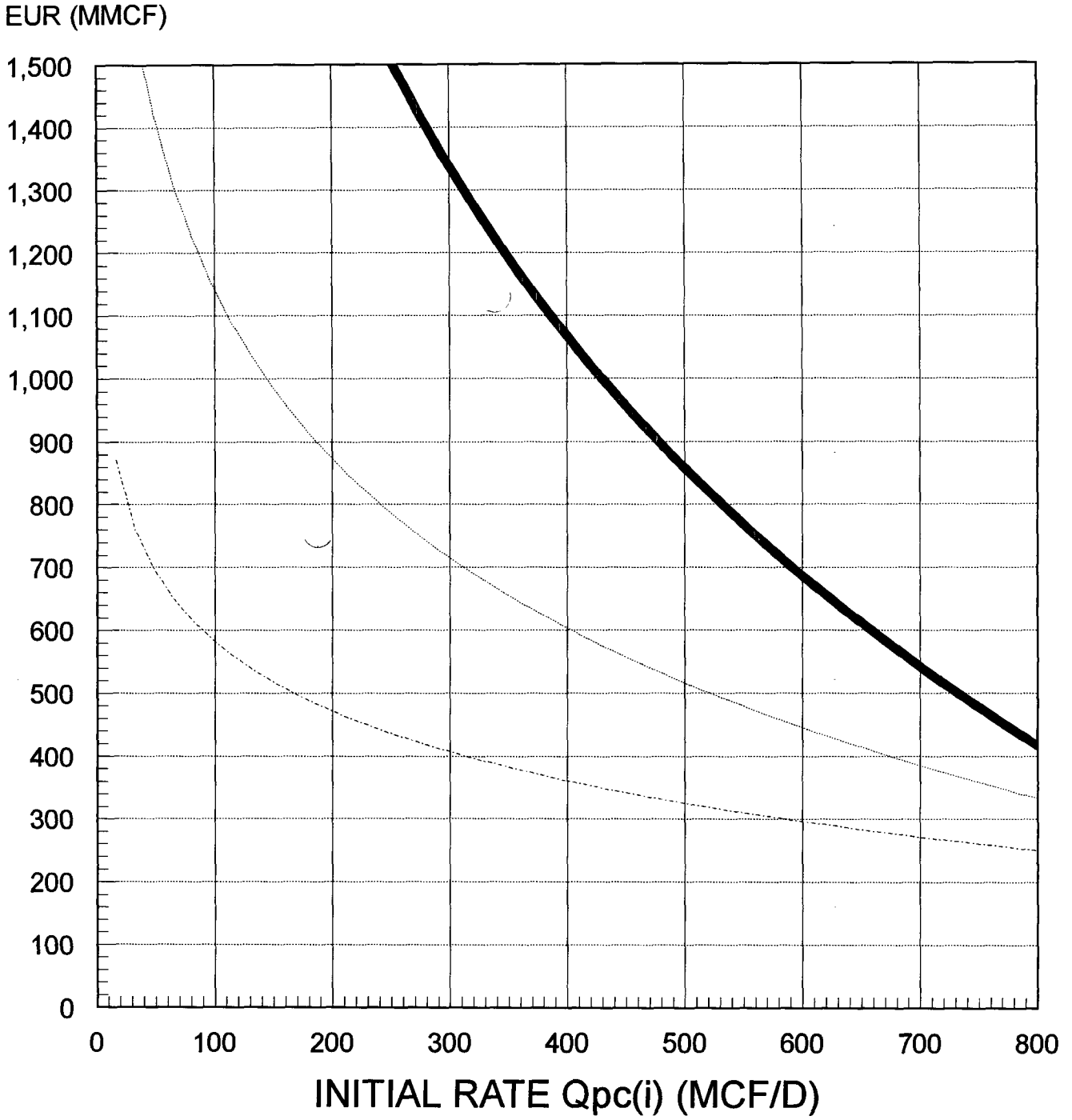
_____

Date: _____

SAN JUAN 28-4 UNIT #226

FRUITLAND COAL/ PICTURED CLIFFS

ECONOMIC EVALUATION: Qi vs EUR



SINGLE	DUAL	COMMINGLE
15% ROR	15% ROR	15% ROR

EST. FTC EUR: 757 MMCF EST. FTC QI: 190 MCFD

EST. PC EUR: 1111 MMCF EST. PC QI: 345 MCFD

SAN JUAN 28-4 UNIT #226

In order to facilitate an economic Pictured Cliffs completion three requirements must be met. It is the combination of these three requirements that determines the economic status and completion method (PC single completion, PC-FTC Dual, PC-FTC commingle) utilized. In some cases the Pictured Cliffs formation may be economic as a stand alone or dual completion. The Fruitland Coal, however, fails to meet economic criteria in all cases except commingling. These three requirements are as follows:

RESERVES Np(pc)

FLOW RATE (Qpci)

COSTS (Investment and Operating)

Shown in the following example are the parameters and calculations used to determine Pictured Cliffs initial rate (Qpci), Pictured Cliffs Estimated Ultimate Recovery (Np(pc)), and Pictured Cliffs decline rate (Dpc). Additionally, estimated costs associated with each completion method and economic sensitivities (figures 1-3) are attached to show the effects of PC reserves (Np(pc)), initial PC rates (Qpci), and completion method (costs).

The monthly gas production allocaton formula presented is similar to the allocation formula presented by Meridian Oil in previous commingle hearings.

SAN JUAN 28-4 UNIT #226

MONTHLY GAS PRODUCTION ALLOCATION FORMULA

GENERAL EQUATION

Qt = Qftc + Qpc

WHERE: Qt = TOTAL MONTHLY PRODUCTION (MCF/MONTH)

Qftc = FRUITLAND COAL (ftc) MONTHLY PRODUCTION
Qpc = PICTURED CLIFFS (pc) MONTHLY PRODUCTION (MCF/MONTH)

REARRANGING THE EQUATION TO SOLVE FOR Qftc:

Qftc = Qt - Qpc

ANY PRODUCTION RATE OVER WHAT IS CALCULATED FOR THE PICTURED CLIFFS (PC) USING THE APPLIED FORMULA IS FRUITLAND COAL (FTC) PRODUCTION.

PICTURED CLIFFS (PC) FORMATION PRODUCTION FORMULA IS:

Qpc = Qpci X e^{-(Dpc) X (t)}

WHERE: **Qpci** = INITIAL PC MONTHLY FLOW RATE (CALCULATED FROM FLOW TEST)

Dpc = PICTURED CLIFFS MONTHLY DECLINE RATE CALCULATED FROM:
Dpc = (Qpci-Qpcabd)/Np(pc)
See Determination of Qpci and PC Estimated Ultimate Recovery (Np(pc))
Qpcabd = 300 MCF/M

WHERE: **Np(pc)** = PICTURED CLIFFS ESTIMATED ULTIMATE RECOVERY (EUR)
Np(pc) = P X 1.22 MMCF/PSI X Rf**
P* = INITIAL RESERVOIR PRESSURE (SIBHP)
RF = RECOVERY (FIELD ANALOGY): = 0.95
** DETERMINED FROM MATERIAL BALANCE (FIELD ANALOGY) AND VOLUMETRIC RESERVES (LOG ANALYSIS)

By calculating Np(pc) from SIBHP and determining Qpci, Dpc can then be calculated utilizing the previously described parameters. See derivation of Dpc, item (c) on page 4.

THUS: **Qftc = Qt - Qpci X e^{-(Dpc) X (t)}**
WHERE: **(t) IS IN MONTHS**

REFERENCE: Thompson, R. S., and Wright, J. D., "Oil Property Evaluation", pages 5-2, 5-3, 5-4.

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DETERMINATION OF Qpci:
(INITIAL PICTURED CLIFFS MONTHLY PRODUCTION)

$$Qpci = Qt(1) \times Qpc(p) / \{Qpc(p) + Qftc(p)\}$$

WHERE:

Qt(1) = FIRST MONTH TOTAL PRODUCTION (MCF)

Qpc(p) = FINAL PICTURED CLIFFS FLOW TEST (MCFPD)

Qftc(p) = FINAL FRUITLAND COAL FLOW TEST (MCFPD)

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EXAMPLE DETERMINATION OF:

(a) Np(pc)	PC EUR
(b) Qpci	INITIAL PC MONTHLY FLOW RATE
(c) Dpc	PC MONTHLY DECLINE RATE

(a) DETERMINATION OF Np(pc)

(see page 5 for Np(pc) derivation)

Np(pc) = 1.22 (MMCF/PSI) X P*(PSI) X Rf

P* = 960 PSI (FROM SIBHP)

Np(pc) = 1.22 MMCF/PSI X 960 PSI X 0.95

Np(pc) = 1,111 MMCF

(b) DETERMINATION OF Qpci

Qpci = Qt(1) X {Qpc(p)/(Qpc(p) + Qftc(p))}

Qt(1) =	15,000 MCF	1ST MONTH TOTAL PRODUCTION
Qpc(p) =	500 MCF/D	PC FLOW TEST
Qftc(p) =	400 MCF/D	FTC FLOW TEST

Qpci = 15,000 MCF/M X {500 MCF/D/(500 MCF/D + 400 MCF/D)}

Qpci = 8,333 MCF/M

(c) DETERMINATION OF Dpc

Dpc = (Qpci - Qpcabd)/Np(pc)

Qpcabd = 300 MCF/M

Dpc =(8,333MCF/M - 300MCF/M)/(1,111,000 MCF)

Dpc = 0.0072/M

THUS: Qftc = Qt(MCF/M) - 8,333(MCF/M) X e^{-(0.0072(1/M)) X t(M)}

SAN JUAN 28-4 UNIT #226

A. DETERMINATION OF PC RESERVES Np(pc)= (HCPV X Bg X Rf)

Volumetric Evaluation (averages are for subject 160 acre drill block)

a.	(t)	thickness	=	34.0	ft
b.	(phi)	porosity	=	14.0	%
c.	(Sw)	H2O saturation	=	44.0	%
d.	(Rf)	Recovery Factor	=	95.0	%
e.	(rcf)	Reservoir Cubic Feet	@ reservoir conditions		
f.	(scf)	Standard Cubic Feet	@ standard conditions		

1. HCPV = HYDROCARBON PORE VOLUME (rcf)

= t (ft) X a (ft^2) X phi X (1-Sw)
= 34 (ft) X 160 (acres) X 43,560 (ft^2/acre) X 0.14 X (1-0.44)
= 18,569,000 ft^3 1mmrcf = 1,000,000 ft^3

HCPV = 18.569 mmrcf

2. Bg = FORMATION VOLUME FACTOR (scf/rcf)

UTILIZING THE REAL GAS LAW TO DETERMINE THE FORMATION VOLUME FACTOR (Bg):

REAL GAS LAW states: $PV = ZnRT$

Rearranging to solve for n: $n = PV/ZRT$

assuming: $nr = ns$

WHERE: nr = NUMBER OF MOLES OF GAS AT RESERVOIR CONDITION

ns = NUMBER OF MOLES OF GAS AT SURFACE CONDITIONS

THUS: Pr Vr/ Zr Tr R = Ps Vs / Zs Ts R

Rearranging: Vs/Vr = Bg = Zs Ts Pr / Zr Tr Ps

assuming:

Zs	=	1.00	
Zr	=	0.94	
Ts	=	60 *F	or 520 *R
Tr	=	100 *F	or 560 *R
Ps	=	15.025 psia	
Pr	=	Determined from build-up test	

Bg = FORMATION VOLUME FACTOR (scf/rcf)= Zs Ts Pr / Zr Tr Ps

= (scf/rcf) {1.00 X 520 (*R) X Pr (psia)}/ {0.94 X 560 (*R) X 15.025 (psia)}

Bg = 0.0657 {scf/ (rcf psia)} X Pr (psia)

3. EUR = HCPV X Bg X Rf

= 18.569 (mmrcf) X 0.0657 {scf/(rcf psia)} X Pr (psia) X 0.95

Np(pc) = 1.22 (mmscf/psia) X Pr (psia) X 0.95

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B. PICTURED CLIFFS DRILLING /COMPLETION COST SUMMARY

1. STAND ALONE SINGLE PC COMPLETION

ESTIMATED COSTS:	TANGIBLE (M$)	INTANGIBLE (M$)	TOTAL (M$)
	115.00	209.75	324.75

2. FTC/PC DUAL COMPLETION*

ESTIMATED COSTS:	TANGIBLE (M$)	INTANGIBLE (M$)	TOTAL (M$)
	127.20	144.34	271.54

3. FTC/PC COMMINGLE COMPLETION*

ESTIMATED COSTS:	TANGIBLE (M$)	INTANGIBLE (M$)	TOTAL (M$)
	58.90	141.45	200.35

*PICTURED CLIFFS COSTS ONLY

C. ECONOMIC SUMMARY

THE FIGURE INCLUDED DEPICTS RESERVES (EUR) VS INITIAL RATE (MC

THREE CASES PER FIGURE (FTC/PC COMMINGLE, FTC/PC DUAL, PC SINGLE) @ 15 % ROR

SAN JUAN 28-4 UNIT #226

Expected Reservoir Pressures

Pictured Cliffs - Average of the closest PC completions is 960 psi SICP. All of the completions are within 4 miles of the subject location. The initial pressure at the subject location is expected to be the offsetting PC average of 960 psi.

Fruitland Coal - Average of the closest FTC completions is 1070 psi SICP. All of the completions are within 4-5 miles of the subject location. The pressure at the subject location is expected to be the offset FTC average of 859 psi.

PC - 960 psi, FTC - 859 psi. Within limits of pressure requirements for commingling.

Fluid Compatibility

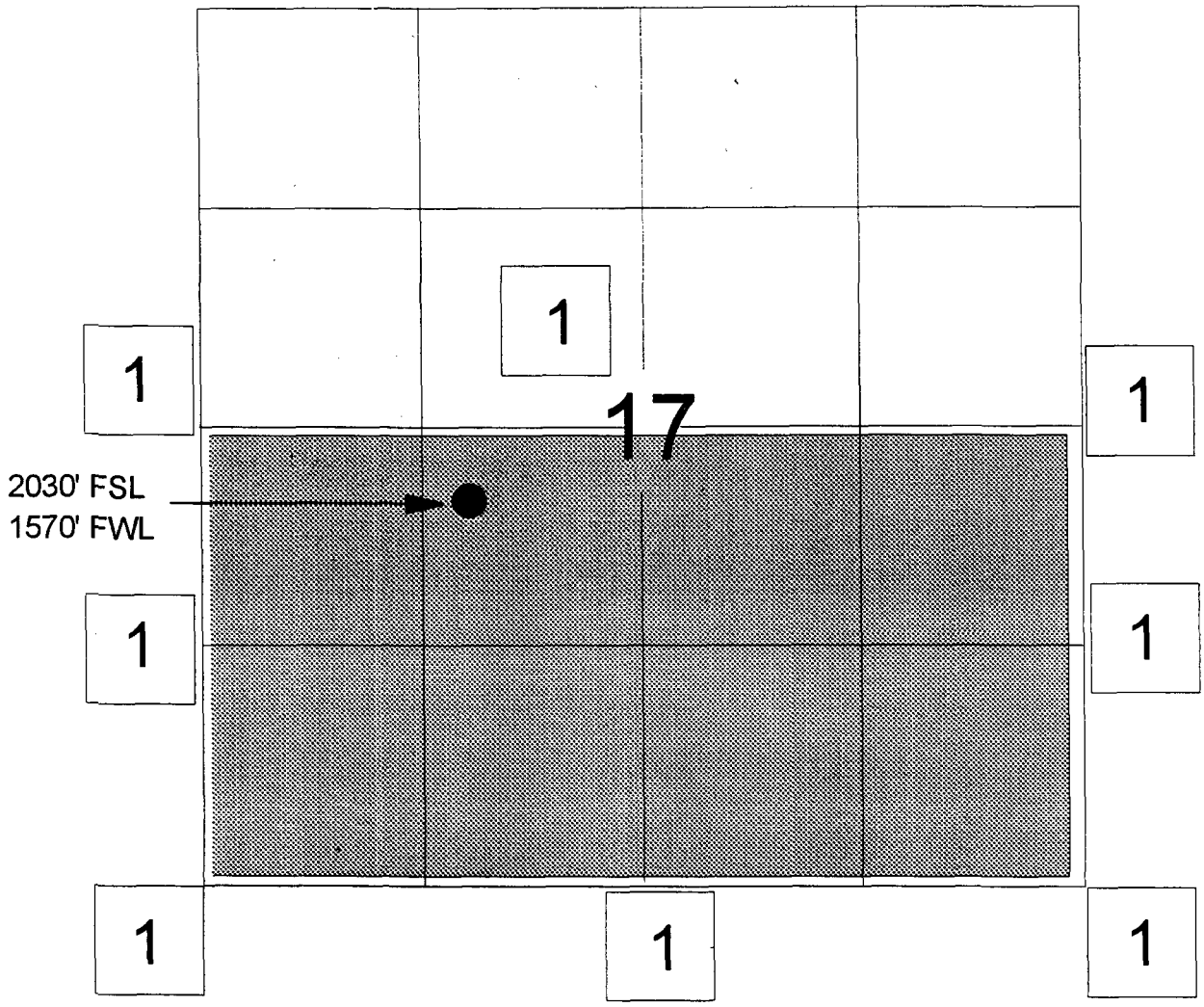
Neither producing formation makes oil or water in existing wells in the area. Both formations are very dry gas producers and no fluid production is anticipated in this well.

PC - dry gas production , FTC - dry gas production. Only natural gas will be produced so fluids are compatible.

MERIDIAN OIL INC.

OFFSET OPERATOR/OWNER PLAT

Pictured Cliffs-Fruitland Commingle
San Juan 28-4 Unit #226
NE SW Section 17, T28N, R4W
Rio Arriba County, New Mexico



1) Meridian Oil Inc., Operator, 3535 East 30th St., P.O. Box 4289, Farmington, New Mexico 87499-4289