

STATE OF NEW MEXICO
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
AZTEC DISTRICT OFFICE

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

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

Date: 8/25/92

Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

RE: Proposed MC _____
Proposed NSL _____
Proposed WFX _____
Proposed NSP _____

Proposed DHC X _____
Proposed SWD _____
Proposed PMX _____
Proposed DD _____

Gentlemen:

I have examined the application received on 8/11/92
for the Meridian Cain #8
OPERATOR LEASE & WELL NO.

H-15-28N-10W and my recommendations are as follows:
UL-S-T-R

Approve

Yours truly,

J. S.

MERIDIAN OIL

August 7, 1992

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

RECEIVED
AUG 11 1992
OIL CON. DIV.
DIST. 3

Subject: Cain #8
Unit H, Section 15, T28N, R10W
San Juan County, New Mexico
Downhole Commingling Request

Dear Mr. LeMay:

Meridian Oil Inc. is applying for an administrative downhole commingling order for the referenced well in the Aztec Pictured Cliffs and the Basin Fruitland Coal fields. The ownership of the zones to be commingled is common. There are no offset operators to this well. The Bureau of Land Management will receive notification of this downhole commingling.

The subject well was completed in the Aztec Pictured Cliffs interval in April 1959 and gas sales commenced in May 1959. The well currently produces about 31 MCFD and has a cumulative production of 771 MMCF. This zone is still economic at the current rate and the well is not a candidate for plugging back the Pictured Cliffs and opening the Fruitland Coal.

The Fruitland Coal is proven to be productive in this area by Meridian and other operators producing wells. Based on offset production in this area, new well drilling is not economically justified. The only economical way to recover the Fruitland Coal reserves in this area is to commingle the production with an existing well.

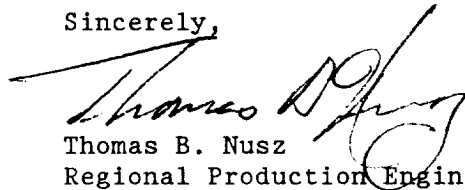
It is proposed to set a bridge plug above the Pictured Cliffs, perforate and stimulate the Fruitland Coal, then remove the bridge plug and produce both zones through a single string of tubing. The reservoir characteristics of each of the subject zones are such that underground waste will not be caused by the proposed commingling. Neither producing interval makes oil or water in the offset wells. The shut-in pressure for the Pictured Cliffs and Fruitland Coal is 190 and 250 psi, respectively.

New Mexico Oil Conservation Division
Mr. Bill LeMay
Cain #8
Downhole Commingling Request
Page Two

The allocation of the commingled production will be calculated using the attached allocation formula. This formula is based on the Pictured Cliffs production history for the last 19 years and uses accepted Reservoir Engineering methods to allocate the remaining Pictured Cliffs reserves. All additional reserves will be attributed to the Fruitland Coal reservoir. This addresses the Fruitland Coal producing characteristics of early life inclining production rates. The formula also addresses the possible situation of pipeline curtailment.

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 letters to the BLM and offset operators, wellbore diagrams, production history curves, pertinent data sheet, and an allocation formula.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas B. Nusz", is written over the typed name and title.

Thomas B. Nusz
Regional Production Engineer

KAS:tg
attachments

cc: Frank Chavez - NMOCD/Aztec

Pertinent Data Sheet - CAIN #8

Location: 1650' FNL, 1190' FEL, Section 15, T28N-R10W San Juan, New Mexico

Field: Aztec Pictured Cliffs

Elevation: 5837' TD: 2078'

Completed: 4/30/59

Initial Potential: 2968 MCF/D

Casing Record:

<u>Hole Size</u>	<u>Csq. Size</u>	<u>Wt.</u>	<u>Depth Set</u>	<u>Top/Cement</u>
12 1/4"	8 5/8"	24#	128'	130 sx circ
6 3/4"	4 1/2"	9.5#	2031'	75 sx
				TOC @ 1430' (temp surve

Tubing Record: 1"

1.7#

2008'

Formation Tops:

Pictured Cliffs 1970'

Logging Record: Induction-Electrical, Temperature Survey

Stimulation: Perforated Pictured Cliffs 2 SPF 1972'-2016'.
Frac'd w/60,000# sand and 990 bbls water.

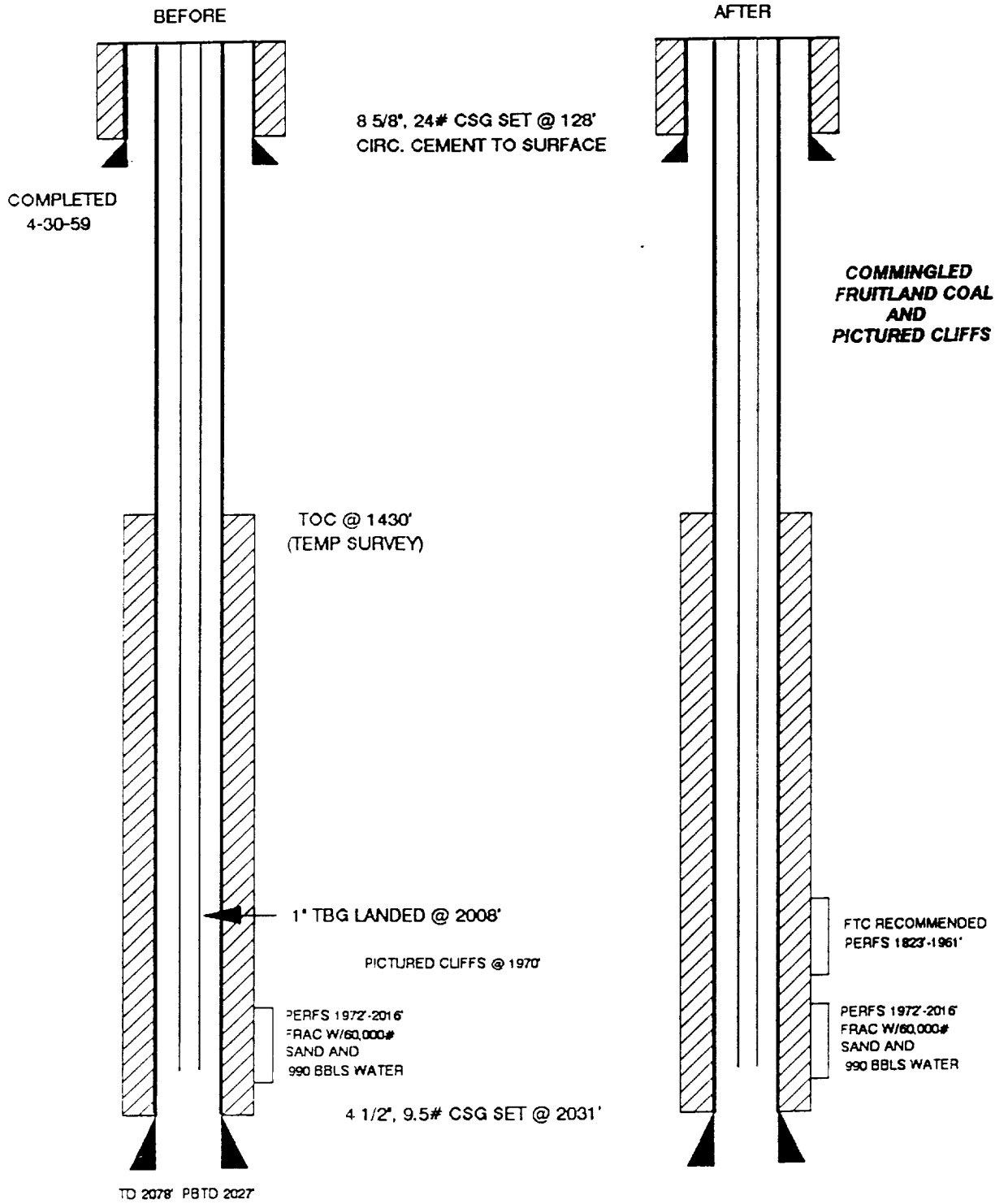
Workover History: NONE

Production History: Initial Deliverability - 379 MCF/D

Transporter: Sunterra Gas Gathering Company

CAIN #8

AZTEC PICTURED CLIFFS
UNIT H SECTION 15, T28N-R10W



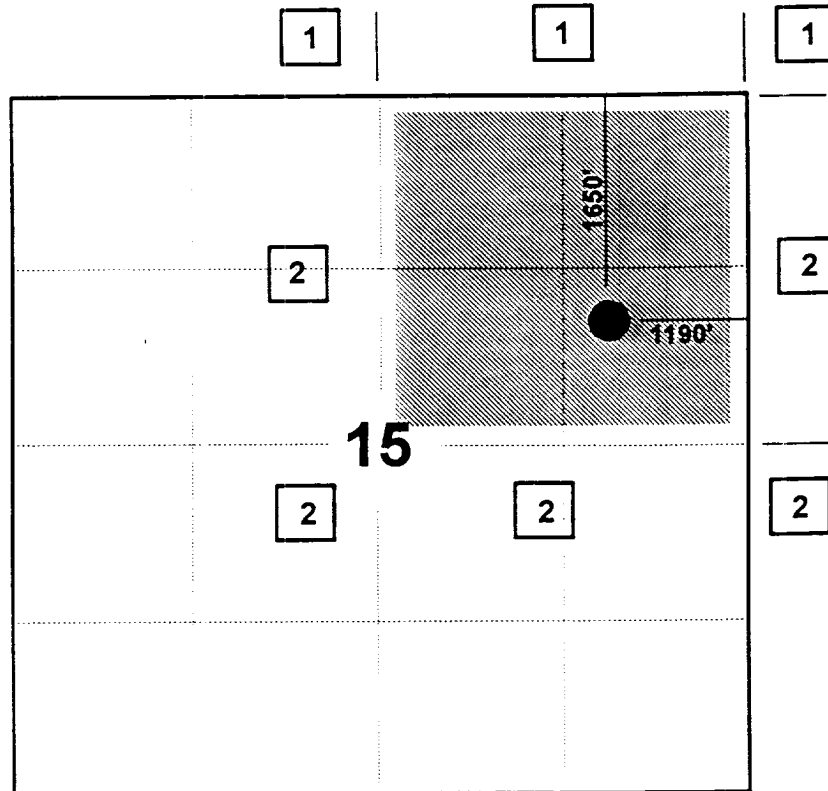
MERIDIAN OIL INC

OFFSET OPERATOR \ OWNER PLAT

CAIN #8

Fruitland Coal \ Pictured Cliffs Commingle

Township 28 North, Range 10 West



1) Meridian Oil Inc

2) Southland Royalty Company

PICTURED CLIFFS FORMATION

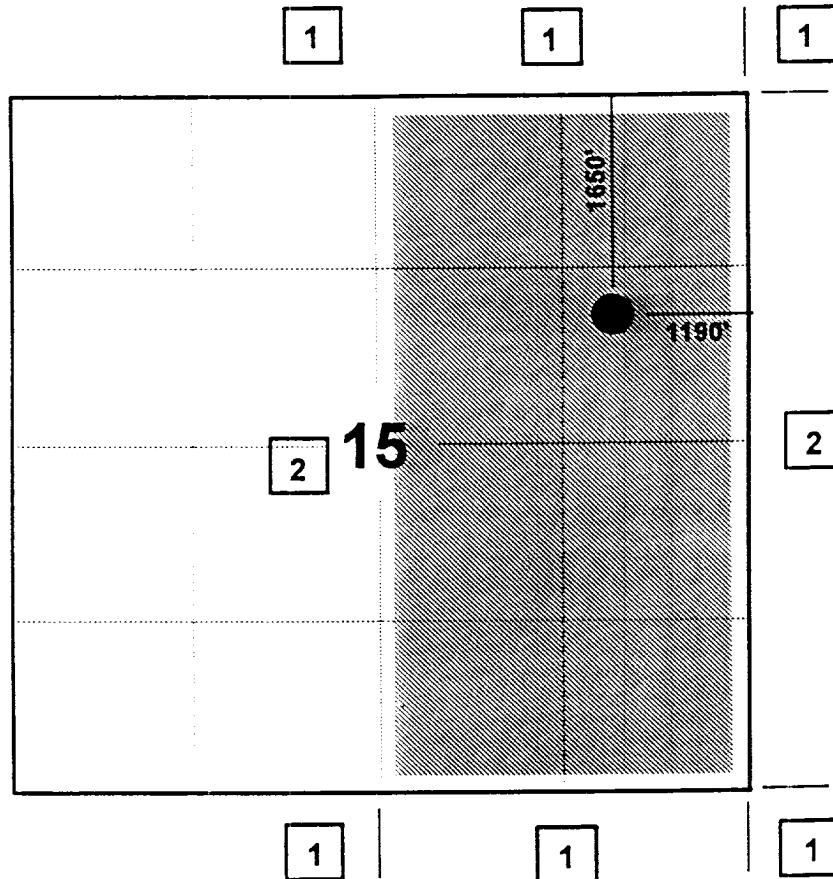
MERIDIAN OIL INC

OFFSET OPERATOR \ OWNER PLAT

CAIN #8

Fruitland Coal \ Pictured Cliffs Commingle

Township 28 North, Range 10 West



1) Meridian Oil Inc

2) Southland Royalty Company

Fruitland Coal Formation

FIGURE 1

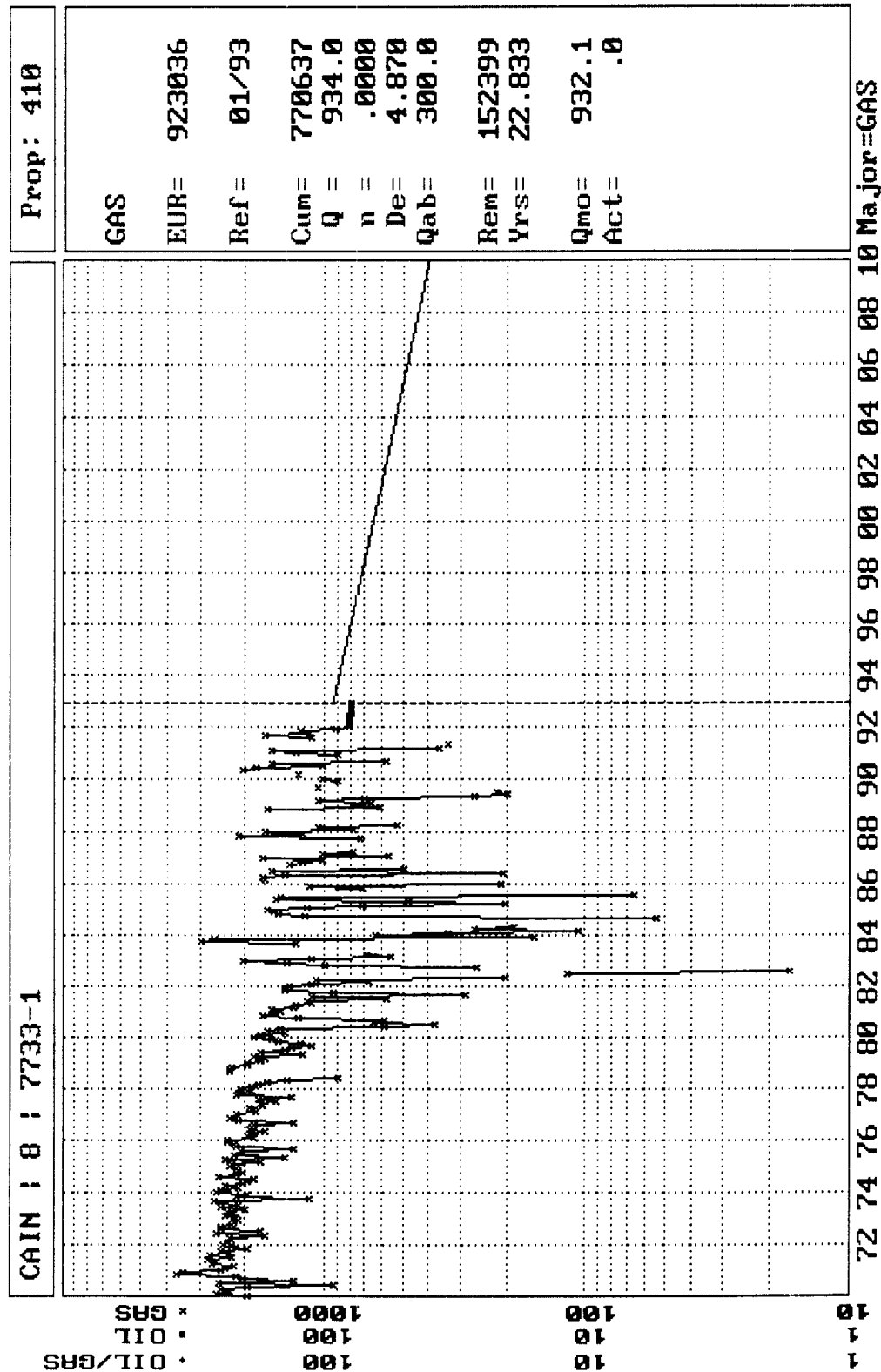
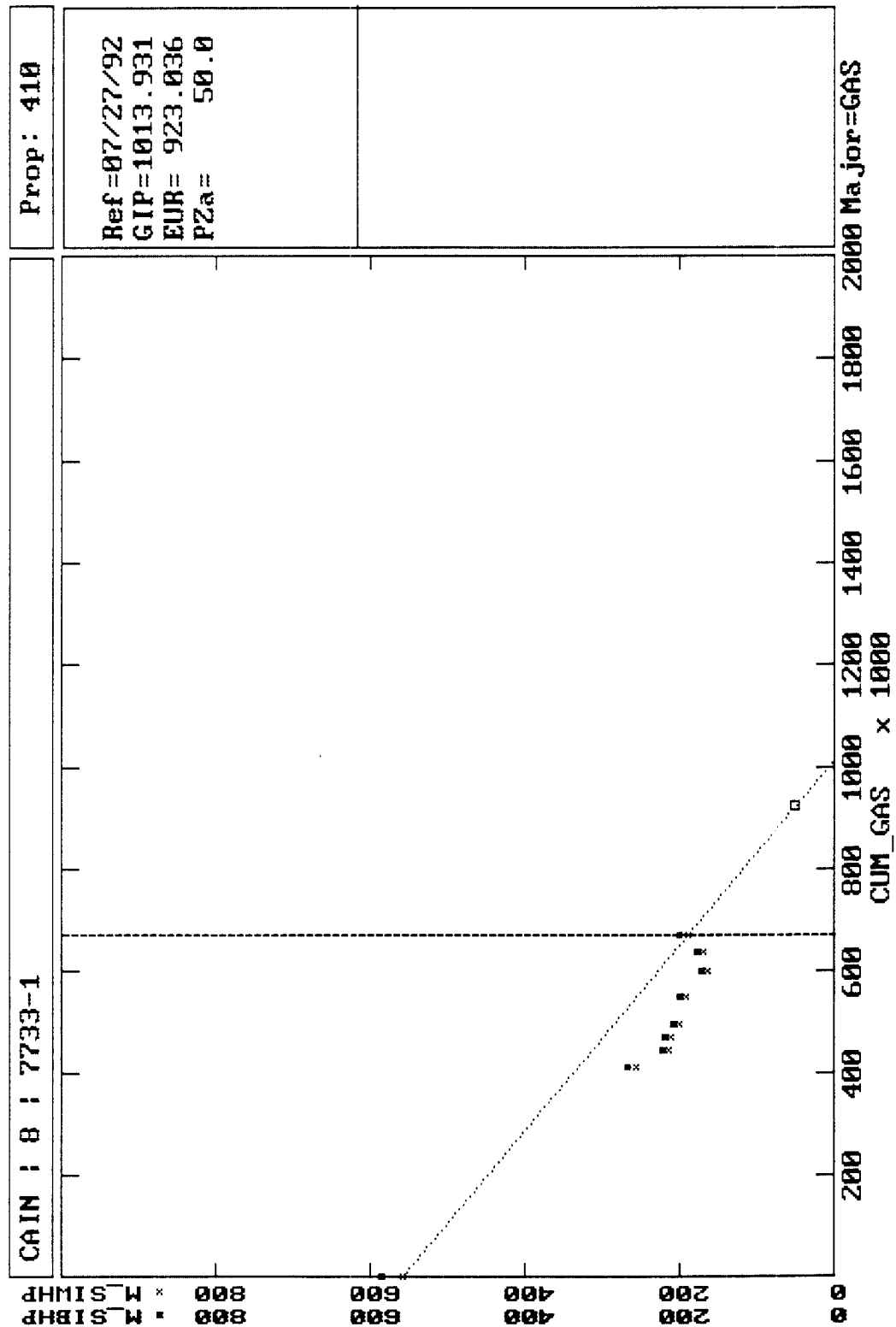


FIGURE 2



Cain #8 Allocation Formula

Equation Derivation

Given the exponential decline cure analysis formula*:

$$De = 1 - (Q_2/Q_1) (1/yr)$$

Where: De = Effective Decline in %/yr

Q₂ = Rate two (at some future date) MCFD

Q₃ = Rate one (current rate) MCFD

Rearranging the equation to solve for Q₂:

$$Q_2 = Q_1 (1 - De)^{Yr} \text{ MCFD}$$

Cain #8 Formula

Using Production plot (fig 1):

Last production rate = Q₁ = 934 MCFM $\cong$ 31 MCFD

De = 4.87% from plot

$$Q_{2PC} = 31 (1 - 0.0487) \text{ MCFD}$$

$$Q_{2PC} = 31 (0.9513)^{Yr} \text{ MCFD} \quad \text{FORMULA FOR FUTURE PC RATES}$$

Any production rate over what is calculated using the above PC formula on a specific date is Fruitland Coal.

Curtailment Situations

If any curtailment occurs, both streams will be affected the same and go to 0 MCFD.

When production resumes, the rates will equate to those when the well was shut in:

$$Q_{2PC} = 31 (0.9513)$$

$$Q_{FTC} = Q_{TOT} - Q_{PC}$$

$$Q_{TOT} = Q_{FTC} + Q_{PC}$$

The total amount of PC gas produced will be the EUR calculated through decline curve and P-Sum analysis (see figs 1 & 2).

*Reference: pg. 5-46 Oil Property Evaluation
by R. S. Thompson & J. D. Wright

Cain #8 Allocation Formula, page 2

Example: Date Now = 1/1/93

Assuming the well produces steadily in 1993. On 1/1/94, the well produces 400 MCFD.

$$Q_1 = 31 \text{ MCFD} \qquad \qquad \qquad De = 4.87\%$$

$$Q_{PC} = 31 (0.9513) \quad (\text{yr} - \text{curtailment time})$$

$$Q_{PC} = 31 (0.9513) (1 - 0) = 30 \text{ MCFD}$$

$$Q_{TOT} = 400 \text{ MCFD} = Q_{FTC} + Q_{PC}$$

$$Q_{FTC} = 400 - 30 = 370 \text{ MCFD}$$

Then on 1/2/94, the well gets shut in for 1 month:

On 2/2/94, assume that the PC stream will come back on line at the same rate it left off. Or:

$$1 \text{ month curtailment} = 1/12 = 0.0833$$

$$\text{Tot. Time} = 1 \text{ yr} + 1 \text{ month} = 1 + 1/12 = 1.0833$$

$$Q_{PC} = 31 (0.9513) (1.0833 - 0.0833) = 30 \text{ MCFD.}$$

$$Q_{TOT} = 400 \text{ MCFD}$$

$$Q_{FTC} = 370 \text{ MCFD}$$

MERIDIAN OIL

August 7, 1992

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

Subject: Cain #8
Unit H, Section 15, T28N, R10W
San Juan County, New Mexico
Downhole Commingling Request

Gentlemen:

Meridian Oil, Inc. is in the process of applying for a downhole commingling order for the Cain #8 well located in Unit H, Section 15, T28N, R10W, N.M.P.M., San Juan County, New Mexico, in the Aztec Pictured Cliffs and 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,


Keith A. Swainson
Production Engineer

KAS:tg

The above downhole commingling request is hereby approved:

Date: _____