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

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

Date: 9/3/91

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 8/28/91
for the Meridian Oil Inc. Nardic E #6
OPERATOR LEASE & WELL NO.

G-23-28N-8W and my recommendations are as follows:
UL-S-T-R

Approve

Yours truly,

MERIDIAN OIL

August 12, 1991

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

RE: Hardie E #6
Unit G, Section 23, T28N, R08W
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 South Blanco Pictured Cliffs and the Basin Fruitland Coal fields. The ownership of the zones to be commingled is common. The offset operator to the north, east, and west is Amoco and Meridian holds the acreage to the south of this well. The Bureau of Land Management and Amoco will receive notification of this downhole commingling.

The subject well was completed in the South Blanco Pictured Cliffs interval in August 1972 and gas sales commenced in November 1972. The well currently produces about 25 MCFD and has a cumulative production of 384 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 well has 2 7/8" casing which makes the option of a dual completion very difficult.

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 439 and 544 psi, respectively.

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 operator, wellbore diagrams, production history curves, pertinent data sheet, and an allocation formula.

Sincerely,

George T. Dunn
Regional Production Engineer

LKS:tt
attachments

cc: Frank Chavez - NMOCD/Aztec

Pertinent Data Sheet - Hardie E #6

Location: Unit G, Section 23, T28N, R08W, San Juan County, New Mexico

Field: South Blanco Pictured Cliffs

Elevation: 6231'GL
6255'KB

TD: 2926'

PBTD: 2916'

Completed: 8/72

Initial Potential: 1213 MCFD

Casing Record:

Csg. Size	Wt. & Grade	Depth Set	Top/Cement
8 5/8"	24# K-55	144'	Surface
2 7/8"	6.4# J-55	2926'	1820' (Temp. Survey)

Tubing Record: Tubingless

Formation Tops:

Ojo Alamo	1820'
Kirtland	1954'
Fruitland	2502'
Top/Coal	2634'
Base/Coal	2724'
Pictured Cliffs	2734'

Logging Record: Induction, Gamma Ray, Density, Temp. Survey

Stimulation: 8/72 - Perforated 2804' - 20', 2860' - 70' with 59 holes. Frac'd with slickwater and 30,000 pounds of 10/20 sand.

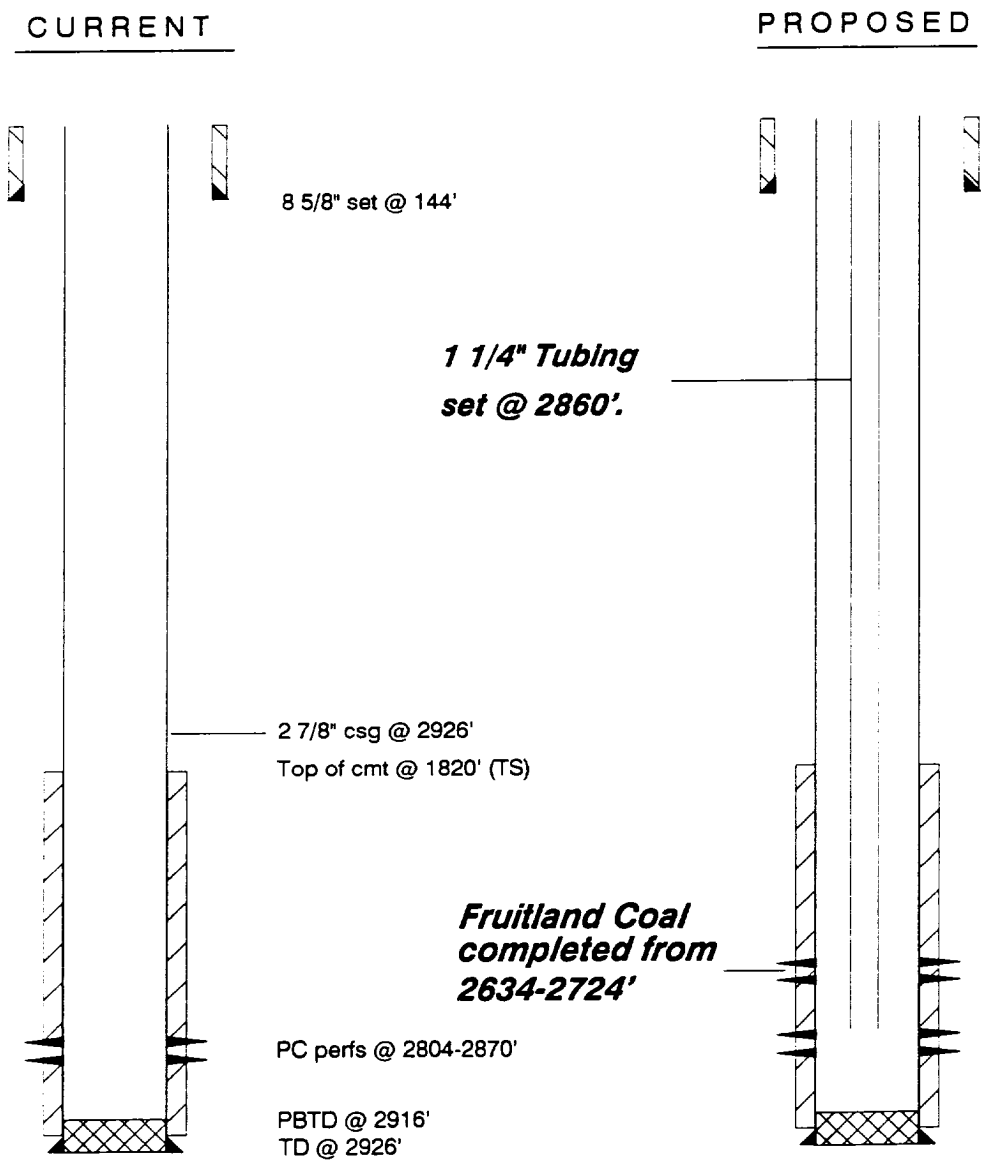
Workover History: None

Production History: Initial deliverability - 6/51 - 300 MCFD
Latest deliverability - 1/91 - 25 MCFD
Cumulative production - 1/91 - 384 MMCF

Transporter: EPNG

Hardie E #6
Unit G Sect 23-T28N-R8W
San Juan County, New Mexico

Wellbore Schematic

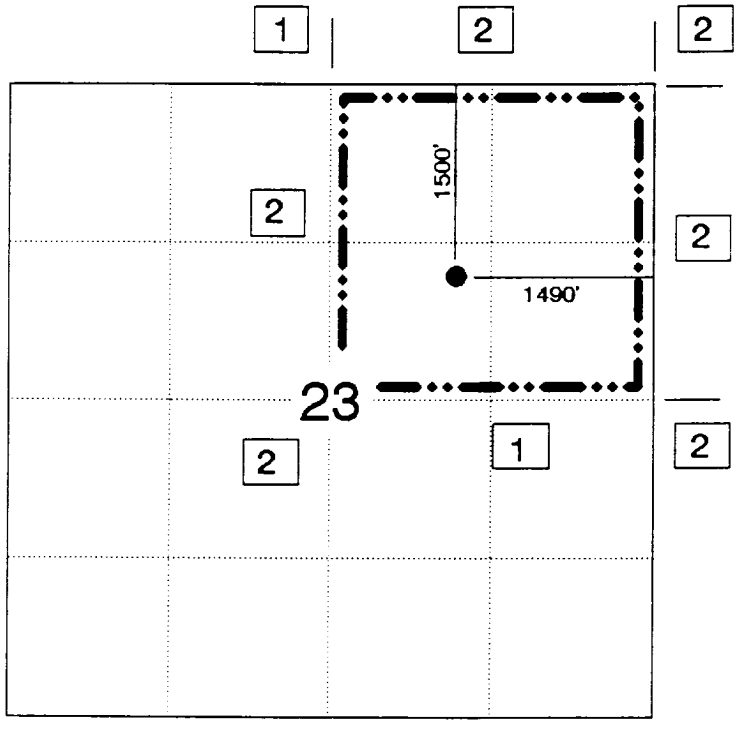


MERIDIAN OIL INC

OFFSET OPERATOR PLAT

HARDIE E #6

Township 28 North, Range 8 West



1) Meridian Oil Inc

2) Amoco Production Company

COMMINGLE PICTURED CLIFFS AND FRUITLAND COAL

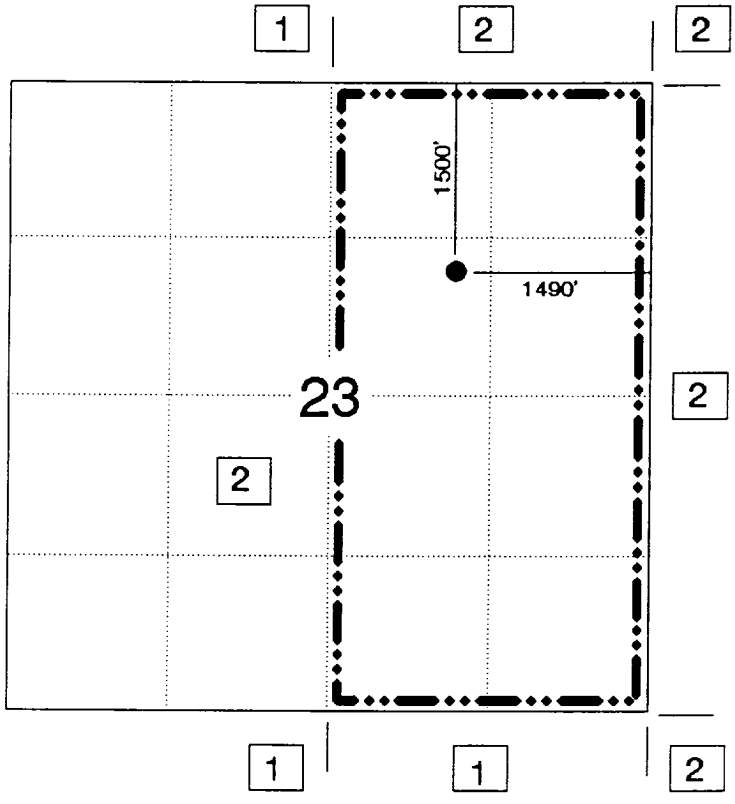
Pictured Cliffs Formation Ownership

MERIDIAN OIL INC

OFFSET OPERATOR PLAT

HARDIE E #6

Township 28 North, Range 8 West

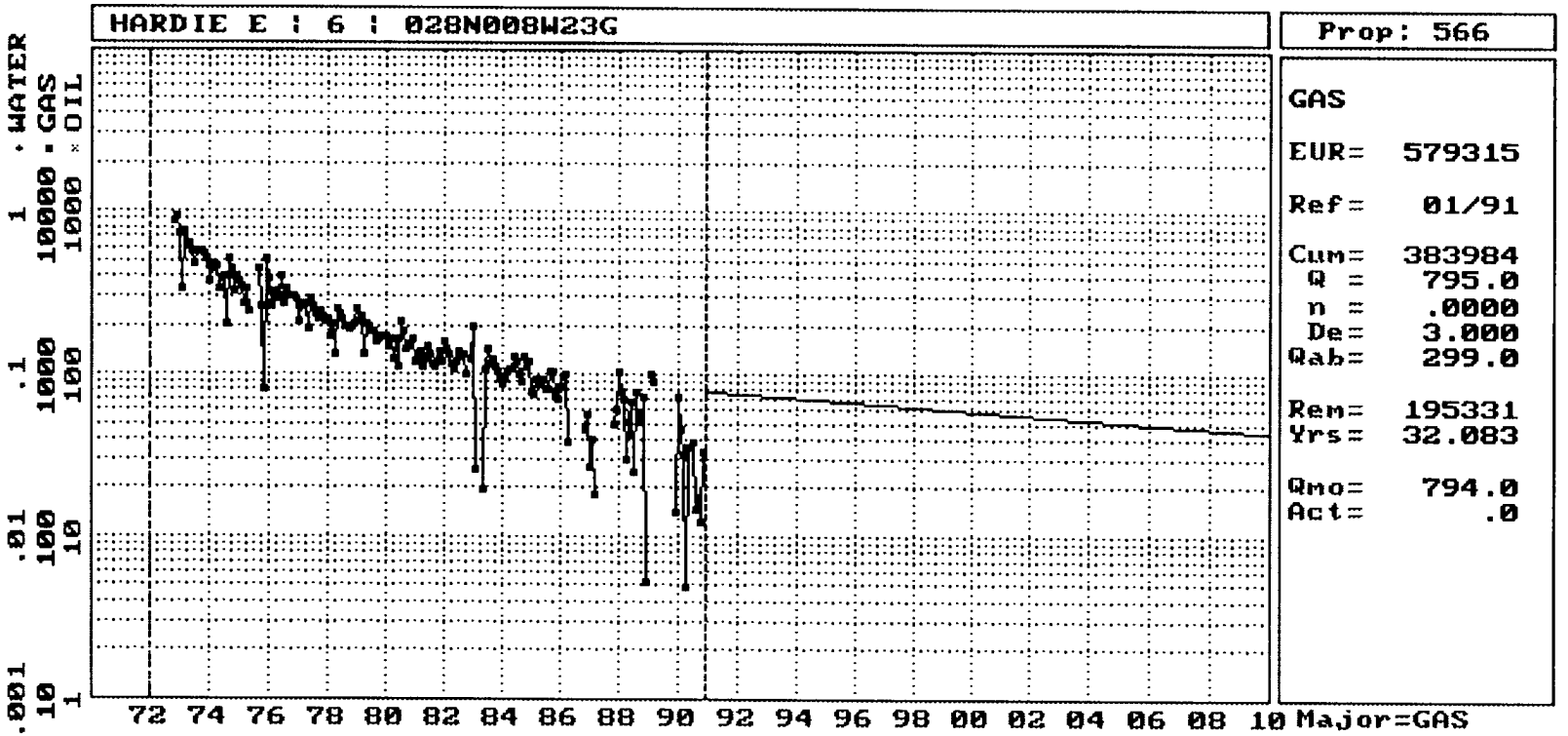


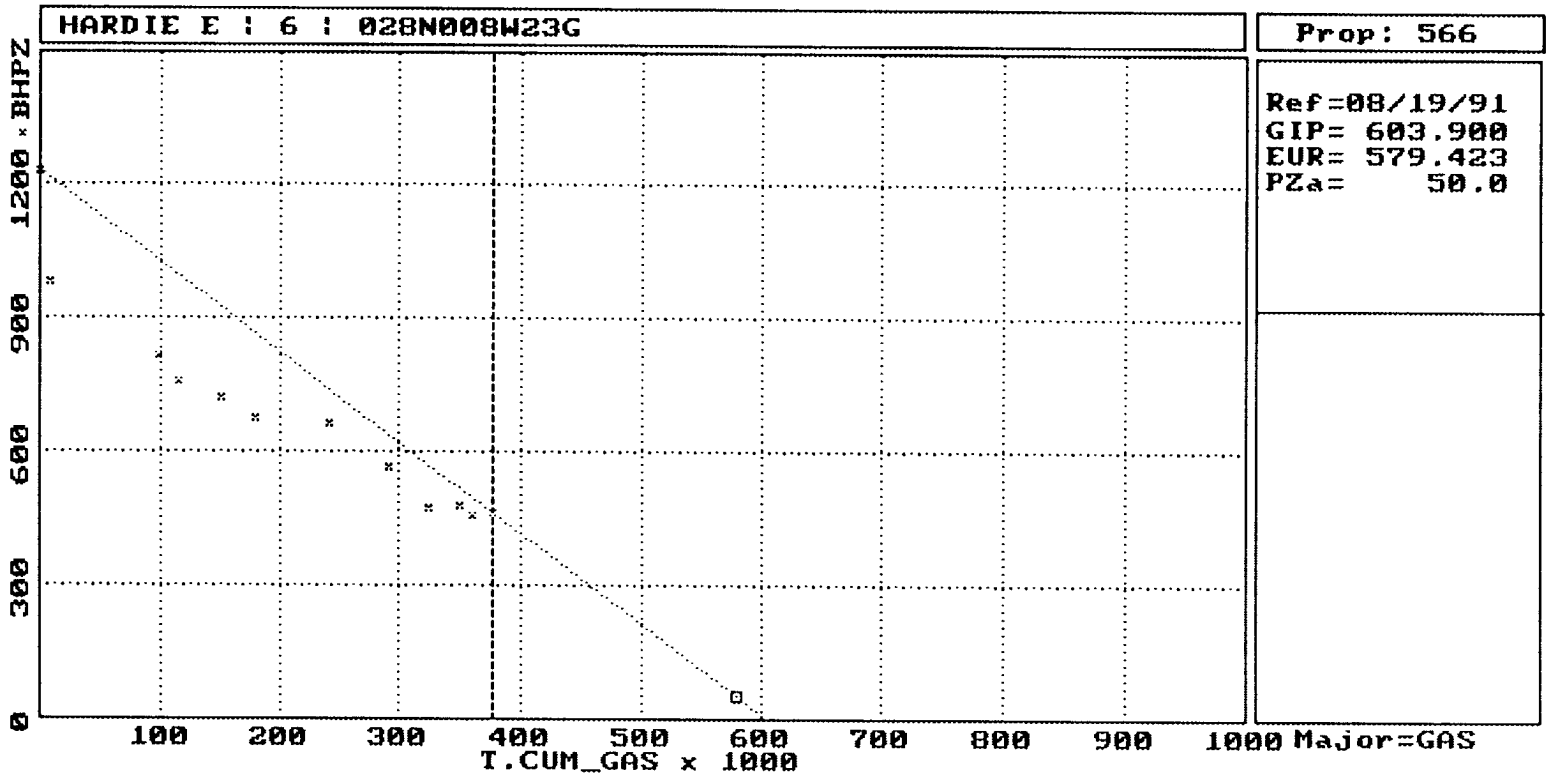
1) Meridian Oil Inc

2) Amoco Production Company

COMMINGLE PICTURED CLIFFS AND FRUITLAND COAL

Fruitland Coal Formation Ownership


HARDIE E : 6 : 028N008W23G
Prop: 566
GAS
EUR= 579315
Ref= 01/91
Cum= 383984
Q = 795.0
n = .0000
De= 3.000
Qab= 299.0
Rem= 195331
Yrs= 32.083
Qmo= 794.0
Act= .0
1 . WATER
10000 * GAS
1000 * OIL
.1 1000 100
.01 100 10
.001 10 1
72 74 76 78 80 82 84 86 88 90 92 94 96 98 00 02 04 06 08 10
Major=GAS


HARDIE E : 6 : 028N008W23G
Prop: 566
Ref=08/19/91
GIP= 603.900
EUR= 579.423
PZa= 50.0
1200 * BHPZ
900
600
300
0
100
200
300
400
500
600
700
800
900
1000
T.CUM_GAS x 1000
Major=GAS

Hardie E #6 Allocation Formula

Equation Derivation

Given the exponential decline curve analysis formula*:

$$De = 1-(Q_2/Q_1)^{(1/yr)}$$

Where: DE - Effective Decline in %/yr
Q_2 = Rate two (at some future date) MCFD
Q_1 = Rate One (current rate) MCFD
Yr = years into the future from current date

Rearranging the equation to solve for $Q/_2$:

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

Hardie E #6 Formula

Using Production plot (attached):

Estimated production rate = Q_1 = 795 M̃CFM = 26 MCFD
De = 3.0% from plot

$$Q_{2_{pc}} = 26 \ (1 - 0.03)^{\ yr} \text{ MCFD}$$

$$\mathbf{Q_{2_{pc}} = 26 \ (0.97)^{\ yr} \text{ MCFD}} \quad \textbf{FORMULA FOR FUTURE PC RATES}$$

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:

$$Q_{2_{pc}} = 26 \ (0.97)^{\ (yr \ - \ \text{cumulative curtailment time})}$$

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

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

The total amount of PC gas produced will be the EUR calculated through decline curve and P-Cum analysis (see plots).

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

Example: Date Now = 1/1/91

Assuming the well produces steadily in 1991. On 1/1/92, the well produces 200 MCFD.

Q_1 = 26 MCFD De = 3.0 %

$Q_{PC} = 26\ (0.97)^{(yr\ -\ cumulative\ curtailment\ time)}$

$Q_{PC} = 26\ (0.97)^{(1-0)} = 25$ MCFD

$Q_{TOT} = 200$ MCFD $= Q_{PC} + Q_{FTC}$

$Q_{FTC} = 200 - 25 = 175$ MCFD

Then on 1/2/92, the well gets shut in for 1 month:

On 2/2/92, assume that the PC stream will come back on line at the same rate it left off. Or:

1 month curtailment = 1/12 = 0.0833

Tot. Time = 1 yr + 1 month = 1 1/12 = 1.0833

$Q_{PC} = 26\ (0.97)^{(1.0833\ -\ .0833)} = 25$ MCFD

$Q_{TOT} = 200$ MCFD

$Q_{FTC} = 175$ MCFD

MERIDIAN OIL

August 12, 1991

Amoco Production Company
Attn: Mr. Larry Emmons
P.O. Box 800
Denver, Colorado 80201

RE: Hardie E #6
Unit G, Section 23, T28N, R08W
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 Hardie E #6 well located in Unit G, Section 23, T28N, R08W, N.M.P.M., San Juan County, New Mexico, in the South Blanco 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 the attached copy of this letter and returning it to this office.

Your prompt attention to this matter would be appreciated.

Yours truly,

George T. Dunn
Regional Production Engineer

LKS:tt

The above downhole commingling request is hereby approved:

_____

Date: _____

MERIDIAN OIL

August 12, 1991

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

RE: Hardie E #6
Unit G, Section 23, T28N, R08W
San Juan County, New Mexico
Downhole Commingling Request

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Yours truly,

George T. Dunn
Regional Production Engineer

LKS:tt

The above downhole commingling request is hereby approved:

_____

Date: _____

Meridian Oil Inc., 3535 East 30th St., P.O. Box 4289, Farmington, New Mexico 87499-4289, Telephone 505-327-0251