

MERIDIAN OIL

January 19, 1994

Recd 1-24-94

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

RE: Jicarilla 98 Lease
• Jicarilla 98 #2A SE/4, Section 19, T26N, R03W
• Jicarilla 98 #3A SE/4, Section 20, T26N, R03W
Rio Arriba County, New Mexico
Downhole Commingling Request

Dear Mr. LeMay:

Meridian Oil Inc. is applying for an administrative downhole commingling order for the referenced wells in the Tapacito Pictured Cliffs and the Blanco Mesaverde fields. The ownership of the zones to be commingled is common. All offset interest owners shown on the attached plat and the Bureau of Land Management will receive notice of this commingling application.

The Mesaverde and Pictured Cliffs wells in this area are marginal economic producers based on current rates of 10-90 MCFD for each zone. A reserve study in the area predicts an ultimate recovery of 775 MMCF for the Mesaverde and 700 MMCF for the Pictured Cliffs wells. These reserves and the low current producing rates are uneconomic as separate zone projects. The projects are economic when commingled due to savings realized on surface facilities and tubulars. The only economical way to recover the Mesaverde and Pictured Cliffs reserves identified on the lease is to downhole commingle production from both zones in the wells proposed.

It is proposed to complete the Mesaverde formation and test its production. It is then proposed to set a bridge plug above the Mesaverde, perforate and stimulate the Pictured Cliffs, 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. The fluids in the two reservoirs are compatible and no precipitates will be formed to cause damage to either reservoir (see attached fluid analyses and compatibility tests). The shut-in pressure for the Mesaverde and Pictured Cliffs are 550 and 490 psi, respectively.

The allocation of the commingled production will be calculated using flow tests from the Mesaverde and Pictured Cliffs during completion operations, and the surrounding production history from both producing intervals. Meridian will consult with the district supervisor of the Aztec NMOC office for approval of the allocation.

Mr. Bill LeMay
Page 2
January 19, 1994

Approval of this commingling application will allow for the prevention of wasted resources and the protection of correlative rights. The Mesaverde and Pictured Cliffs are commingled in eight other wells in this township as per NMOCD Order #'s R-5350 (01/17/77), R-6004 (05/02/79), DHC-923, 926, 927, 928, 929, 930 (09/27/93). Six of these wells (DHC-) are completed, waiting on hook-up while two (R-5350, -6004) are producing with no adverse affects from the commingling. Included with this letter are plats showing ownership of offsetting leases for both formations, copies of letters to offset operators and the Bureau of Land Management, and a detailed report of fluid compatibility.

Sincerely,

A handwritten signature in black ink, appearing to read "B. P. Ault", with a stylized flourish at the end.

Brian P. Ault
Production Engineer

BPA/rjp

Attachments

xc: Frank T. Chavez - NMOCD/Aztec

DATE: January 17, 1994
 NAME: JIC. 98 #S 2A, 3A
 FORM: PICTURED CLIFFS
 LOCATION
 UNIT: A
 SEC: 19.20
 TWN: 26N
 RNG: 03W

T
26
N

MERIDIAN	CONSOLIDATED	CONSOLIDATED	JEROME P. MCHUGH
7/64 * JICARILLA 98 #7 47/850	[18]	4/69 * JICARILLA 98 #9 57/859	11/57 * JICARILLA 98 #6 30/1102
		[17]	12/72 * TRIBAL #4 81/655
			[16]
		9/71 * TRIBAL #3 22/184	9/71 * TIGER #1 49/436
4/69 * JICARILLA 98 #8 31/574	[19]	JEROME P. MCHUGH DUGAN PROD. MERIDIAN	JEROME P. MCHUGH DUGAN PROD. 12/70 * TIGER #2 44/284
6/61 * JICARILLA 98 #2 72/858		10/57 * JICARILLA 98 #5 79/697	[21] 12/70 * TIGER #2 44/284
9/55 * JICARILLA 98 #1 5/1338	JICARILLA 98 #2A *	9/57 * JICARILLA 98 #3 40/740	JICARILLA 98 #3A *
11/74 * JICARILLA D #15 22/289	8/56 * JICARILLA D #4 29/1226	11/72 * JICARILLA D #11 73/556	7/57 * JICARILLA 117E #7 34/652
8/56 * JICARILLA D #5 7/2871	[30]	11/73 * JICARILLA D #12 16/328	[28]
11/74 * JICARILLA D #16 95/309		5/55 * JICARILLA D #2 22/1352	
		11/74 * JICARILLA D #14 31/432	
		7/57 * JICARILLA 117E #5 98/1479	

R-03-W

LEGEND
 COMPLETION DATE
 WELL NAME
 MCFD-CUM (MMCF)

DATE: January 17, 1994
 NAME: JIC. 98 #S 2A, 3A
 FORM: MESAVERDE
 LOCATION
 UNIT: A
 SEC: 19.20
 TWN: 26N
 RNG: 03W

T
26
N

<p>[18]</p>	<p>11/57 * JICARILLA 98 #6 0/8 0/0 INA</p>	<p>[19]</p>
<p>10/56 * JICARILLA 98 #2 29/1337 0/1</p> <p>[19]</p> <p>10/57 * JICARILLA 98 #2A 1/350 0/7 3/279 0/0</p>	<p>10/57 * JICARILLA 98 #5 11/330 0/6</p> <p>[20]</p> <p>9/77 * JICARILLA 98 #3A 11/111 0/2</p> <p>8/58 * JICARILLA E #1 35/907 1/2</p>	<p>[21]</p>
<p>10/79 * JICARILLA D #18 86/535 3/2</p> <p>[30]</p>	<p>NA * JICARILLA D #17 46/224 5/1</p> <p>[29]</p> <p>11/72 * JICARILLA D #11 71/598 1/3</p>	<p>7/82 * JICARILLA #5A 71/201 4/1</p> <p>[28]</p> <p>7/57 * JICARILLA 117E #5 48/993 5/4</p> <p>7/57 * JICARILLA 117E #7 0/36 0/3 INA</p>

R-03-W

LEGEND
 COMPLETION DATE
 WELL NAME
 MCF/D-CUM (MCMCF)
 BOP/D-CUM(MBO)

**PICTURED CLIFFS/MESAVERDE COMMINGLE
TOWNSHIP 26 NORTH, RANGE 3 WEST
OFFSET OPERATORS**

1. Meridian Oil Inc.
P.O. Box 4289
Farmington, NM 87499-4289
2. Consolidated Oil & Gas Inc.
410 17th Street, Suite 2300
Denver, CO 80202
3. Jerome P. McHugh
650 S. Cherry Street, Suite 1225
Denver, CO 80222
4. Dugan Production Corp.
P.O. Box 420
Farmington, NM 87499-0420

MERIDIAN OIL

January 19, 1994

Bureau of Land Management
1235 La Plata Highway
Farmington, NM 87401

RE: Jicarilla 98 Lease
• Jicarilla 98 #2A SE/4, Section 19, T26N, R03W
• Jicarilla 98 #3A SE/4, Section 20, T26N, R03W

Rio Arriba County, New Mexico
Downhole Commingling Request

Gentlemen:

Meridian Oil, Inc. is in the process of applying for an downhole commingling order for the referenced wells in Rio Arriba County, New Mexico, in the Tapacito Pictured Cliffs and the Blanco Mesaverde 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.

Sincerely,



Brian P. Ault
Production Engineering

BPA/rjp

The above downhole commingling request is hereby approved:

Date: _____

MERIDIAN OIL

January 19, 1994

Dugan Production Corp.
P.O. Box 420
Farmington, NM 87499-0420

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Rio Arriba County, New Mexico
Downhole Commingling Request

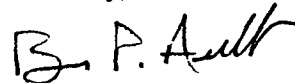
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Downhole Commingling Request

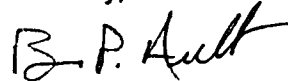
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Production Engineering

BPA/rjp

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Date: _____

MERIDIAN OIL

January 19, 1994

Jerome P. McHugh
650 S. Cherry Street, Suite 1225
Denver, CO 80222

RE: Jicarilla 98 Lease
• Jicarilla 98 #2A SE/4, Section 19, T26N, R03W
• Jicarilla 98 #3A SE/4, Section 20, T26N, R03W

Rio Arriba County, New Mexico
Downhole Commingling Request

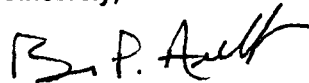
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Sincerely,



Brian P. Ault
Production Engineering

BPA/rjp

The above downhole commingling request is hereby approved:

Date: _____

MERIDIAN OIL

JICARILLA 98 AND 96 LEASE

RIO ARriba COUNTY, NM

MESA VERDE/PICTURED CLIFFS FORMATION



The Western Company

LABORATORY INVESTIGATION

PREPARED FOR

**MR. BRIAN AULT
PRODUCTION ENGINEER**

**SERVICE POINT
FARMINGTON, NM
(505) 327-6222**

**PREPARED BY
LOREN DIEDER / DAVE COLESON
DISTRICT ENGINEER
FARMINGTON**

MARCH 25, 1993

FM020658

March 25, 1993

Meridian Oil
Jicarilla 96 #2
Jicarilla 98 #5

Three samples from Jicarilla 96 #2 (1 oil, 2 water) and two samples from Jicarilla 98 #5 (2 condensates) were submitted for analysis on March 19, 1993 by Mr. Lesley K. Smith, Senior Reservoir Engineer for Meridian Oil.

These samples were to be analyzed to determine if commingling of each of the well products would have adverse effects on well production.

Samples submitted were:

1. Jicarilla 96 #2
 - a. Mesa Verde oil
 - b. Mesa Verde water
 - c. Pictured Cliffs water
2. Jicarilla 98 #5
 - a. Mesa Verde condensate
 - b. Pictured Cliffs condensate

Lab analysis performed:

1. Oil, condensate analysis
 - a. API gravity
 - b. Pour point
 - c. Cloud point
2. Water analysis
 - a. API water analysis
3. Observation and analysis of commingled oil, condensate and water as applicable for well.

Meridian Oil
Jicarilla 96 #2

Result of Analysis:

Pictured Cliffs produced water

ph : 7.12
Resistivity : 1.65
Sp. Gr. : 1.00

Cations

Sodium & Potassium 1601 mg/ l (calc.)
Calcium 48 mg/ l
Magnesium 5 mg/ l (calc.)

Anions

Chloride 2061 mg / l
Sulfate 0 mg / l
Bicarbonate 976 mg / l

Total dissolved solids 4691

Mesa Verde produced water

ph : 6.52
Resistivity : 3.70
Sp. Gr. : 1.005

Cations

Sodium & Potassium 922 mg/ l (calc.)
Calcium 40 mg/ l
Magnesium 5 mg/ l (calc.)

Anions

Chloride 1649 mg / l
Sulfate 0 mg / l
Bicarbonate 850 mg / l

Total dissolved solids 3466

Meridian Oil
Jicarilla 96 #2

Mesa Verde produced oil

Appearance	:	Light, amber oil
API gravity @ 60 degrees F	:	58.2
Cloud point	:	0 degrees C
Pour point	:	< -10 degrees C

Pictured Cliffs / Mesa Verde produced water
Combined (using high shear) with Mesa Verde produced oil (50:50
mix of waters and oil).

Appearance	:	Cloudy, amber emulsion
Separation	:	Beginning on cessation of shear
Precipitation	:	None observed
Separation @ time	:	At 1 hour - complete

Summary of results:

No precipitation or other observed adverse reaction from
combined waters or from combination of the oil and waters.

Analysis forms follow.

Analysis done by: _____
Dave Coleson



The Western Company of North America

3250 South Side River Road
Farmington, New Mexico 87401
Phone (505)327-6222
Fax (505)327-5766

API WATER ANALYSIS

Company Meridian Sample No. 511393 Date Sampled 3/8/93
Field _____ Legal Description T26N R03 W1 Sec 2 County or Parish La Brea State NM
Lease or Unit A Well 1c 916 # 2 Depth _____ Formation PC Water: B/D _____
Type of Water (Produced, Supply, ect.) PRODUCED Sampling Point _____ Sampled By _____

DISSOLVED SOLIDS

CATIONS

	mg/l	me/l
Sodium, Na	<u>1601</u>	<u>69.6</u>
Calcium, Ca	<u>48</u>	<u>2.4</u>
Magnesium, Mg	<u>5</u>	<u>0.4</u>
Barium, Ba	_____	_____
_____	_____	_____

ANIONS

Chloride, Cl	<u>2061</u>	<u>58</u>
Sulfate, SO ₄	_____	_____
Carbonate, CO ₃	_____	_____
Bicarbonate, HCO ₃	<u>976</u>	<u>16</u>
Hydroxide, OH	_____	_____
_____	_____	_____

Total Dissolved Solids (calc.) 4691

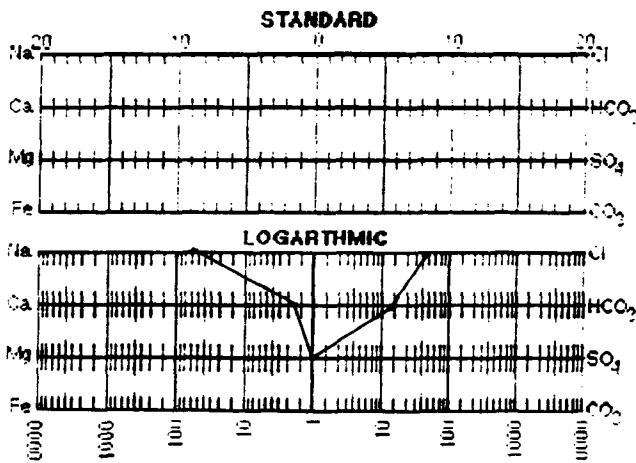
Iron, Fe (total) _____
Sulfide, as H₂S _____

Remarks & Recommendations:

OTHER PROPERTIES

pH	<u>7.12</u>
Specific Gravity, 60/60 F	<u>1.00</u>
Resistivity (ohm-meters) <u>75</u> °C	<u>165</u>
Total Hardness	<u>140</u>
_____	_____
_____	_____

WATER PATTERNS-me/l



Analyst: DC



The Western Company of North America

3250 South Side River Road
Farmington, New Mexico 87401

Phone (505)327-6222

Fax (505)327-5766

API WATER ANALYSIS

Company MERIDIAN Sample No. 51493 Date Sampled 3/8/93
Field _____ Legal Description T26N R03W, S02 County or Parish R. H. Morgan State NM
Lease or Unit A Well Sec 96 # 2 Depth _____ Formation MV Water. B/D _____
Type of Water (Produced, Supply, ect.) Produced Sampling Point _____ Sampled By _____

DISSOLVED SOLIDS

CATIONS

	mg/l	me/l
Sodium, Na	<u>1014</u>	<u>44</u>
Calcium, Ca	<u>40</u>	<u>20</u>
Magnesium, Mg	<u>5</u>	<u>0.4</u>
Barium, Ba	_____	_____
_____	_____	_____

ANIONS

Chloride, Cl	<u>1649</u>	<u>46.5</u>
Sulfate, SO ₄	_____	_____
Carbonate, CO ₃	_____	_____
Bicarbonate, HCO ₃	<u>1096</u>	<u>18</u>
Hydroxide, OH	_____	_____
_____	_____	_____

Total Dissolved Solids (calc.) 3804

Iron, Fe (total) _____

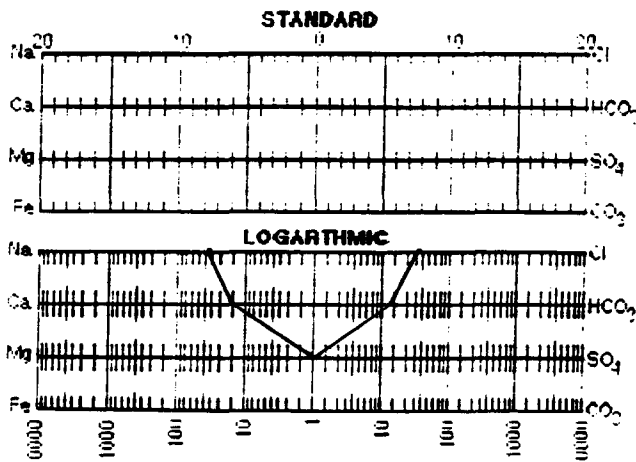
Sulfide, as H₂S _____

Remarks & Recommendations:

OTHER PROPERTIES

pH	<u>6.52</u>
Specific Gravity, 60/60 F	<u>1.002</u>
Resistivity (ohm-meter) <u>44</u> °C	<u>3.7</u>
Total Hardness	<u>120</u>
_____	_____
_____	_____

WATER PATTERNS-me/l



Analyst: DC



The Western Company of North America

3250 South Side River Road
Farmington, New Mexico 87401
Phone (505)327-6222
Fax (505)327-5766

API WATER ANALYSIS

Company MERIDIAN Sample No. 211593 Date Sampled 3/8/93
Field _____ Legal Description T26N R03W, SEC 2 County or Parish Do. Huerfano State NM
Lease or Unit A Well 1c 96 # 2 Depth _____ Formation EC/W Water: B/D _____
Type of Water (Produced, Supply, ect.) PRODUCED Sampling Point _____ Sampled By _____

DISSOLVED SOLIDS

CATIONS

	mg/l	me/l
Sodium, Na	<u>922</u>	<u>40</u>
Calcium, Ca	<u>40</u>	<u>20</u>
Magnesium, Mg	<u>5</u>	<u>0.4</u>
Barium, Ba	_____	_____
_____	_____	_____
_____	_____	_____

ANIONS

Chloride, Cl	<u>1649</u>	<u>46.5</u>
Sulfate, SO ₄	<u>—</u>	<u>—</u>
Carbonate, CO ₃	<u>—</u>	<u>—</u>
Bicarbonate, HCO ₃	<u>800</u>	<u>14</u>
Hydroxide, OH	_____	_____
_____	_____	_____

Total Dissolved Solids (calc.) 3466

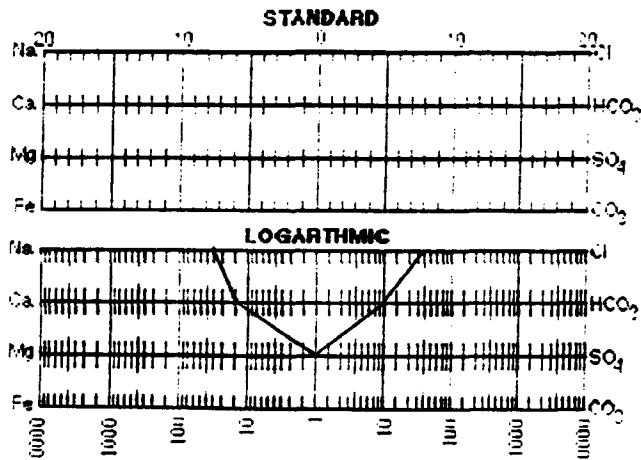
Iron, Fe (total) —
Sulfide, as H₂S —

Remarks & Recommendations:

OTHER PROPERTIES

pH	<u>7.29</u>
Specific Gravity, 60/60 F	<u>1.005</u>
Resistivity (ohm-meters) <u>70</u> °F	<u>2.2</u>
Total Hardness	<u>120</u>
_____	_____
_____	_____

WATER PATTERNS-me/l



Analyst: DC



Date 3/22/93
M 31 93

Rocky Mountain Region

THE WESTERN COMPANY

Oil Analysis

Operator <u>Meridian</u>	Date Sampled _____
Well <u>Sic 96 #2</u>	Date Received <u>MAR. 18/93</u>
Field _____	Submitted By _____
Formation <u>MESA VERDE</u>	Worked By <u>DC</u>
Depth _____	Sample Description _____
County <u>RO ARIZONA</u>	<u>LIGHT, AMBER LIQUID</u>
State <u>N.M.</u>	_____

API Gravity 58.2 ° at 60°F

Paraffin Content _____ % by weight

Asphaltene Content _____ % by weight

Pour Point _____ °F

Cloud Point _____ °F

Comments:

56.8 @ 40 ° F

Analyst DC

Meridian Oil
Jicarilla 98 #5

Results of analysis:
Pictured Cliffs produced condensate:

Appearance	:	Light, clear oil
API gravity @ 60 degrees F	:	61.3 @ 60 degrees F
Cloud point	:	< -8 degree C
Pour point	:	< -8 degrees C

Mesa Verde produced condensate:

Appearance	:	Light, clear liquid
API gravity @ 60 degrees F	:	62.6 @ 60 degrees F
Cloud point	:	< -8 degree C
Pour point	:	< -8 degrees C

Commingled Pictured Cliffs and Mesa Verde condensates:

Appearance	:	Light, clear liquid
API gravity @ 60 degrees F	:	59.6 @ 60 degrees F
Cloud point	:	< -8 degree C
Pour point	:	< -8 degrees C

Summary of results:

The mixture of the two condensates displayed no adverse reaction regarding precipitation of solids.

Analysis forms follow:

Analysis done by: _____
Dave Coleson



Date 3/22/93
113093

Rocky Mountain Region

THE WESTERN COMPANY

Oil Analysis

Operator <u>MERIDIAN</u>	Date Sampled <u>3/8/93</u>
Well <u>< 1/2 98-5</u>	Date Received <u>3/19/93</u>
Field _____	Submitted By _____
Formation <u>MESA VERDE</u>	Worked By <u>DC</u>
Depth _____	Sample Description _____
County <u>RIO ARriba</u>	<u>CLEAR LIQUID</u>
State <u>NM</u>	_____

API Gravity 62.6 ° at 60°F

Paraffin Content _____ % by weight

Asphaltene Content _____ % by weight

Pour Point _____ °F

Cloud Point _____ °F

Comments:

61 @ 46°F

Analyst DC



Date 3/24/93
MI 3293

Rocky Mountain Region

THE WESTERN COMPANY

Oil Analysis

Operator MERIDIAN Date Sampled 3/8/93
Well Cic 98-5 Date Received _____
Field _____ Submitted By _____
Formation MD/PC Worked By DC
Depth _____ Sample Description _____
County RO ARRIAN BOTH CLEAR & LIGHT
State NM

API Gravity 36.6° at 60°F

Paraffin Content _____ % by weight

Asphaltene Content _____ % by weight

Pour Point _____ °F

Cloud Point _____ °F

Comments:

60.5 @ 68°F

CLEAR LIQUID - REMAINED CLEAR @ NO PRECIP.

Analyst DC



Date 3/22/93
113493

Rocky Mountain Region

THE WESTERN COMPANY

Oil Analysis

Operator MERIDIAN Date Sampled 3/8/93
Well _____ Date Received 3/19/93
Field _____ Submitted By _____
Formation PICTURED CLIFFS Worked By DC
Depth _____ Sample Description _____
County RIO ARriba CLEAR, LIGHT LIQUID
State NM

API Gravity 61.3° at 60°F

Paraffin Content _____ % by weight

Asphaltene Content _____ % by weight

Pour Point _____ °F

Cloud Point _____ °F

Comments:

59.9 @ 44°

Analyst DC

Unit O, Sec 19, T26N, R03W

JICARILLA 9B : 2A : 29151A-1 Montebello

• OIL/GMS
• OIL
• GAS

10
100
10000

1
10
1000

1
10
100

78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97