

December 1, 1994

NEW MEXICO OIL CONSERVATION DIVISION  
RECEIVED  
DEC 1 1994

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 89, 94, 95 and 96 Leases

- Jicarilla 89 #2A Unit D, Section 14, T27N, R03W; PC add to existing MV well.
- Jicarilla 89 #4 Unit M, Section 11, T27N, R03W; PC add to existing PC/MV well.
- Jicarilla 89 #4A Unit P, Section 11, T27N, R03W; PC add to existing MV well.
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- Jicarilla 94 #1 Unit B, Section 22, T27N, R03W, PC add to existing PC/MV well.
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- Jicarilla 95 #1 Unit A, Section 35, T27N, R03W, PC add to existing PC/MV well.
- Jicarilla 95 #4 Unit M, Section 26, T27N, R03W, PC add to existing PC/MV well.
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- Jicarilla 95 #7A Unit D, Section 36, T27N, R03W, PC add to existing MV well.
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- Jicarilla 96 #2 Unit A, Section 2, T26N, R03W, PC add to existing PC/MV well.
- Jicarilla 96 #5A Unit D, Section 11, T26N, R03W, PC add to existing MV well.

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 Gavilan 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 plats 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 10-150 MCFD for each zone. 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.

In the Pictured Cliffs pay adds to existing Mesaverde wells, it is proposed to set a bridge plug above the Mesaverde formation, 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. In the Pictured Cliffs/Mesaverde duals, it is proposed to set a bridge plug above the Mesaverde, add additional Pictured Cliffs pay, stimulate, 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, completed for prior commingling on the Jicarilla 94 and 95 leases). The shut-in pressure for the Mesaverde and Pictured Cliffs are 541 and 526 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 NMOCD office for approval of the allocation.

Mr. Bill LeMay  
December 1, 1994  
Page 2

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 twenty-one other wells in this township as per the following NMOCD Order #'s:

R-5350	R-6004	R-5350
R-6004	DHC-924	DHC-925
DHC-982	DHC-983	DHC-984
DHC-985	DHC-986	DHC-987
DHC-988	DHC-989	DHC-1052
DHC-1053	DHC-1054	DHC-1055
DHC-1056	DHC-1057	DHC-1058

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,



Curtis A. Newstrom  
Production Engineer

CAN/rjp

Attachments

xc: Frank T. Chavez - NMOCD/Aztec

December 1, 1994

Bureau of Land Management  
Robert Kent  
435 Montano NE  
Albuquerque, NM 87107

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Rio Arriba County, New Mexico  
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Gentlemen:

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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,



Curtis A. Newstrom  
Production Engineering

CAN/rjp

The above downhole commingling request is hereby approved:

\_\_\_\_\_  
Date: \_\_\_\_\_

December 1, 1994

Jicarilla Apache Tribe  
P.O. Box 167  
Dulce, NM 87528

RE: Jicarilla 89, 94, 95 and 96 Leases

- Jicarilla 89 #2A Unit D, Section 14, T27N, R03W; PC add to existing MV well.
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Sincerely,



Curtis A. Newstrom  
Production Engineering

CAN/rjp

The above downhole commingling request is hereby approved:

\_\_\_\_\_  
Date: \_\_\_\_\_

December 1, 1994

Northwest Pipeline Corporation  
P.O. Box 58900  
Salt Lake City, UT 84158

RE: Jicarilla 89, 94, 95 and 96 Leases

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Sincerely,



Curtis A. Newstrom  
Production Engineering

CAN/rjp

The above downhole commingling request is hereby approved:

\_\_\_\_\_  
Date: \_\_\_\_\_

December 1, 1994

Nassau Resources  
650 South Cherry, Suite 1225  
Denver, CO 80222

RE: Jicarilla 89, 94, 95 and 96 Leases

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Curtis A. Newstrom  
Production Engineering

CAN/rjp

The above downhole commingling request is hereby approved:

\_\_\_\_\_  
Date: \_\_\_\_\_

c:\windows\can002

December 1, 1994

En Re Corp.  
4940 Broadway, Suite 200  
San Antonio, TX 78209

RE: Jicarilla 89, 94, 95 and 96 Leases

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Curtis A. Newstrom  
Production Engineering

CAN/rjp

The above downhole commingling request is hereby approved:

\_\_\_\_\_  
Date: \_\_\_\_\_

December 1, 1994

Amoco Production Company  
P.O. Box 800  
Denver, CO 80201

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Curtis A. Newstrom  
Production Engineering

CAN/rjp

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\_\_\_\_\_  
Date: \_\_\_\_\_



ATTN: David Catanach

**MERIDIAN OIL** CONSERVATION DIVISION  
RECEIVED

December 1, 1994

DEC 15 1994

Jicarilla Apache Tribe  
P.O. Box 167  
Dulce, NM 87528

RE: Jicarilla 89, 94, 95 and 96 Leases

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Sincerely,



Curtis A. Newstrom  
Production Engineering

CAN/rjp

The above downhole commingling request is hereby approved:

Joe Incardine

Date: DEC 15 1994

RECEIVED  
DEC 20 1994  
OIL CON. DIV.  
DIST. 3

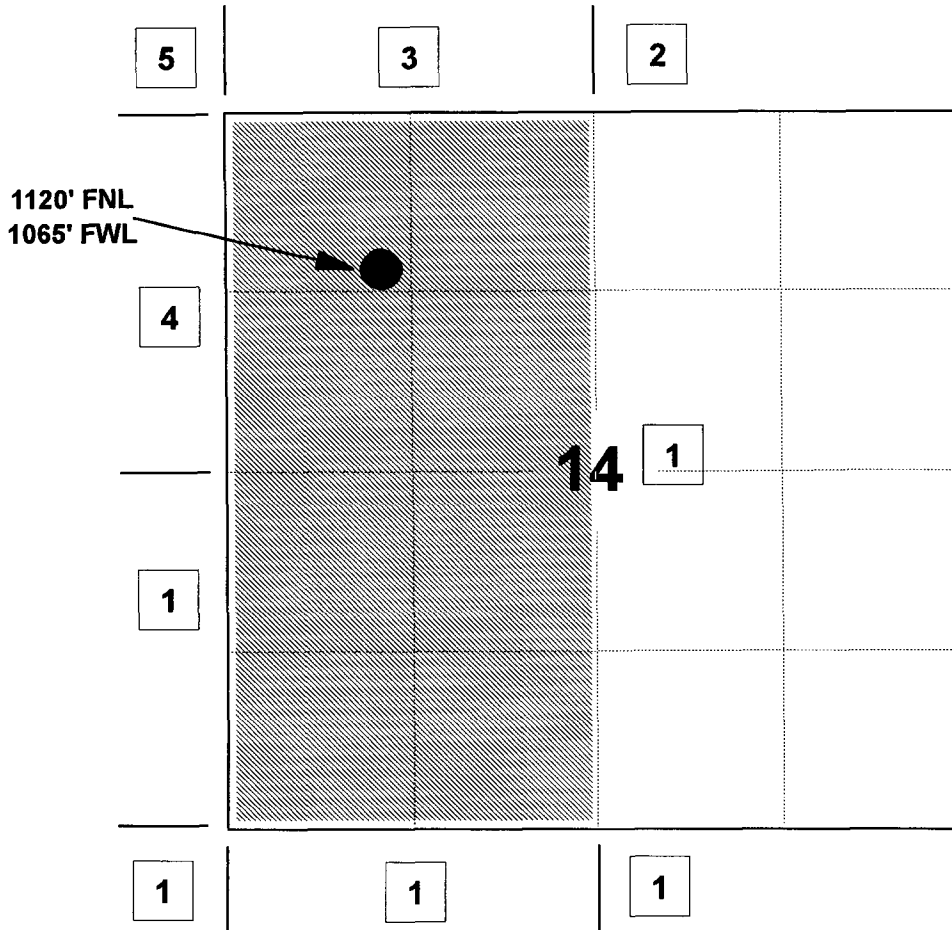
# MERIDIAN OIL INC

## JICARILLA 89 #2A

### OFFSET OPERATOR \ OWNER PLAT

#### Mesaverde / Pictured Cliffs Formations Commingle Well

Township 27 North, Range 3 West



1) Meridian Oil Inc

2) Meridian Oil Inc &

Jicarilla Apache Tribe

PO Box 507, Dulce, NM 87528

3) Meridian Oil Inc &

Northwest Pipeline Corporation

PO Box 58900, Salt Lake City, UT 84158

4) Nassau Resources

650 South Cherry, Suite 1225, Denver, CO 80222

5) Nassau Resources & Northwest Pipeline Corporation

Mesaverde Formation

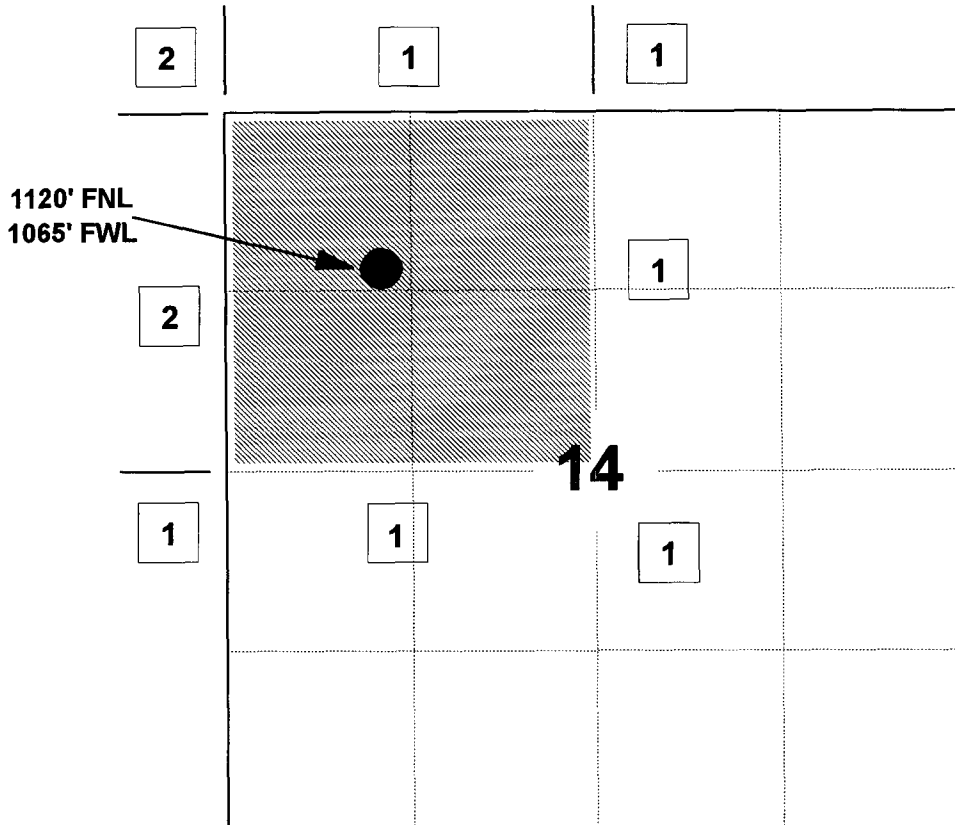
# MERIDIAN OIL INC

JICARILLA 89 #2A

OFFSET OPERATOR \ OWNER PLAT

Mesaverde / Pictured Cliffs Formations Commingle Well

Township 27 North, Range 3 West



1) Meridian Oil Inc

2) Nassau Resources

650 South Cherry, Suite 1225, Denver, CO 80222

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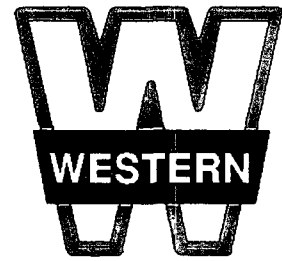
Pictured Cliffs Formation

# **MERIDIAN OIL INC.**

**JICARILLA 98 AND 96**

**RIO ARRIBA COUNTY, NM**

**MESA VERDE/PICTURED CLIFFS FORMATION**



**The Western Company**

## **LABORATORY INVESTIGATION**

**PREPARED FOR**

**MR. CURTIS NEWSTROM  
RESERVOIR ENGINEER**

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

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

**MARCH 25, 1993**

**FM050219**

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. S11393 Date Sampled 7/8/93  
Field \_\_\_\_\_ Legal Description T26N R03 W, Sec 2 County or Parish La Brea State NM  
Lease or Unit A Well IC 96 # 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 <sub>4</sub>	_____	_____
Carbonate, CO <sub>3</sub>	_____	_____
Bicarbonate, HCO <sub>3</sub>	<u>976</u>	<u>16</u>
Hydroxide, OH	_____	_____
_____	_____	_____
_____	_____	_____

Total Dissolved Solids (calc.) 4691

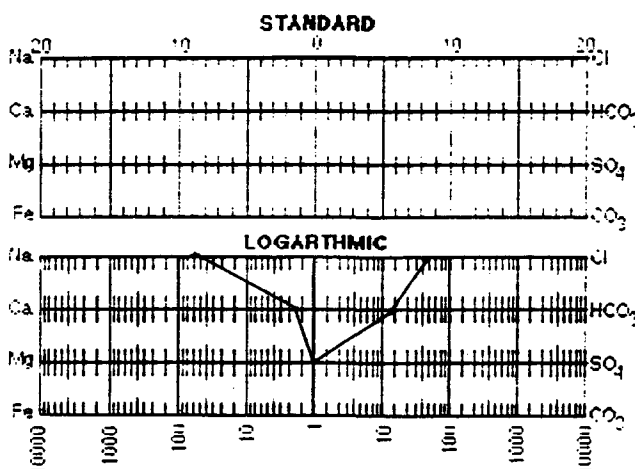
Iron, Fe (total) \_\_\_\_\_  
Sulfide, as H<sub>2</sub>S \_\_\_\_\_

Remarks & Recommendations:

### OTHER PROPERTIES

pH	<u>7.12</u>
Specific Gravity, 60/60 F	<u>1.00</u>
Resistivity (ohm-meters) <u>75</u> °F	<u>1.65</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. 81493 Date Sampled 3/8/93  
Field \_\_\_\_\_ Legal Description T26N R03W, S002 County or Parish Rio Arriba State NM  
Lease or Unit A Well Le 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 <sub>4</sub>	_____	_____
Carbonate, CO <sub>3</sub>	_____	_____
Bicarbonate, HCO <sub>3</sub>	<u>1096</u>	<u>18</u>
Hydroxide, OH	_____	_____
_____	_____	_____
_____	_____	_____

Total Dissolved Solids (calc.) 3804

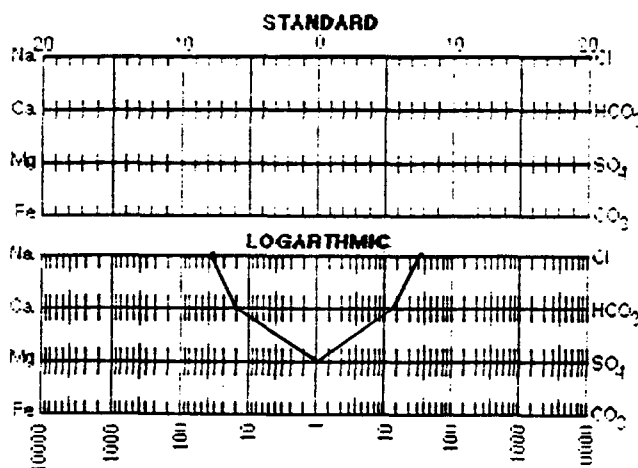
Iron, Fe (total) \_\_\_\_\_  
Sulfide, as H<sub>2</sub>S \_\_\_\_\_

Remarks & Recommendations:

### OTHER PROPERTIES

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

### WATER PATTERNS-me/l



Analyst: TC



# 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. 21593 Date Sampled 3/8/93  
Field \_\_\_\_\_ Legal Description T26N R03W, SEC 2 County or Parish Doña Ana State NM  
Lease or Unit A Well Kic 96 #2 Depth \_\_\_\_\_ Formation ECMU 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 <sub>4</sub>	_____	_____
Carbonate, CO <sub>3</sub>	_____	_____
Bicarbonate, HCO <sub>3</sub>	<u>850</u>	<u>14</u>
Hydroxide, OH	_____	_____
_____	_____	_____
_____	_____	_____

Total Dissolved Solids (calc.) 3466

Iron, Fe (total) —

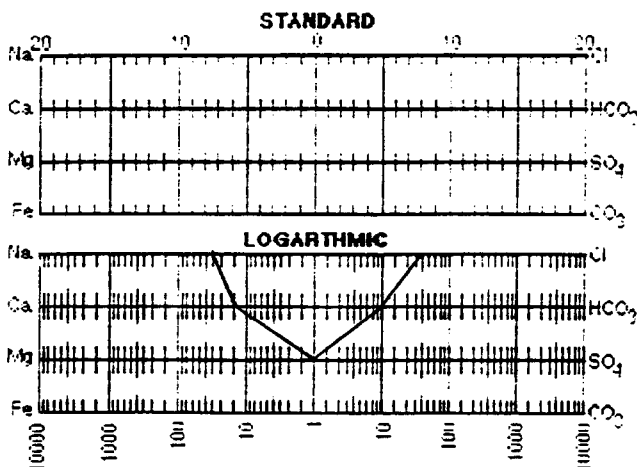
Sulfide, as H<sub>2</sub>S —

Remarks & Recommendations:

### OTHER PROPERTIES

pH	<u>7.29</u>
Specific Gravity, 60/60 F	<u>1.005</u>
Resistivity (ohm-meter) <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>RIO ARIDA</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

Commingle 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  
1130 93

Rocky Mountain Region

THE WESTERN COMPANY

Oil Analysis

Operator <u>MERIDIAN</u>	Date Sampled <u>3/8/93</u>
Well <u>&lt; 1c 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 32 93

Rocky Mountain Region

THE WESTERN COMPANY

Oil Analysis

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

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 C 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 CUFFS 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