

MERIDIAN OIL

OIL CONSERVATION DIVISION
12-780

130 DEC 5 AM 8 43

November 12, 1990

Mr William J. LeMay
N. M. Oil Conservation Division
P. O. Box 2088
Santa Fe, N.M. 87501-2088

Re: Hillside #1 Gal/Dk
2310' FSL; 1650' FEL
Section 9, T27N R11W
San Juan County, N. M.

Dear Mr. LeMay:

Meridian Oil Inc. is applying for an administrative downhole commingling order for the referenced well in the Kutz Gallup and Basin Dakota fields. The ownership of the zones to be commingled is common. The offset operator to the northeast and east is Arco Oil and Gas Company, to the southeast and south is Marathon Oil Company, with Meridian Oil having acreage to the north, west and southwest. The Bureau of Land Management and these offset operators will receive notification of this proposed downhole commingling.

This well has produced since 1970 from the Gallup and Dakota intervals. The Gallup has not produced consistently since January 1987 when the well experienced an apparent pumping failure. The Gallup was recently pump tested for a current producing capacity of 30 MCF/D & 2.0 BOPD. It has a cumulative production of 270 MMCF & 3,505 BO as of August 1, 1990. The Gallup can not produce alone without a pumping unit.

The Dakota experienced a normal production decline through 1985, but over the last four years has seen a very rapid decline to 60 MCF/D & 0.1 BOPD. The Dakota is listed as "marginal" in the State Proration Schedule, and its cumulative production is 1,471 MMCF & 10,461 BO as of August 1, 1990.

We believe that the rapid production decline experienced by the Dakota is the result of poor producing efficiency caused by the presence of the production packer in the hole which limits the Dakota's annular volume. (The packer is located only 35' above the top Dakota perf). The Gallup side presently could not economically pay for a pulling job at its present producing rate. However, commingled, this well could produce economically for many more years. The commingling of the subject well in the twilight of its producing life should result in better producing efficiency, a longer life, and more

reserves from both zones. Granting this application will be in the best interest of conservation, the prevention of waste, and the protection of correlative rights.

We plan to commingle this well by pulling the pump, rods, Gallup tubing, and the Dakota tubing and packer seal assembly. The permanent packer will be extracted and a single string of tubing run to the lower producing interval.

The reservoir characteristics of each of the subject zones are such that underground waste would not be caused by the proposed downhole commingling. The fluids from each zone are compatible and no precipitates will be formed to cause damage to either reservoir. See the attached fluid analyses. The daily production will not exceed the limit of Rule 303c, Section 1a, Part 1.

The shut-in pressure for the Gallup and Dakota are 367 psi and 370 psi, respectively. The Dakota makes no water, and the Gallup produces only about 0.5 gallon of water per day.

The District Office in Aztec will be notified anytime the commingled well is shut-in for seven (7) consecutive days.

Using the well's Gallup production from 1986 (before its pump failure) and Dakota production from 1985 (before its rapid decline started), we propose the following production allocation. See the attached calculations.

| | | | |
|------------|-----|------------|-----|
| Gallup gas | 17% | Dakota gas | 83% |
| Gallup oil | 71% | Dakota oil | 29% |

Included with this letter is a plat showing ownership of offsetting leases, a copy of the letter to the offset operators and BLM, wellbore diagrams both before and after commingling, production curves, pertinent data sheet, the allocation calculation sheet, and a detailed report of fluid compatibility.

Yours truly,



P. M. Pippin
Sr. Production Engineer

PMP:pmp
attachments

cc: Frank Chavez - OCD

MERIDIAN OIL

November 16, 1990

Marathon Oil Company
Production Engineering
P.O. Box 269
Littleton, CO 80160

Gentlemen:

Meridian Oil, Inc. is in the process of applying for a downhole commingling order for their Hillside #1 GAL/DK well located 2310' FSL 1650' FEL, Section 09 T27N R11W, N.M.P.M., San Juan County, New Mexico, in the Kutz Gallup and Basin Dakota.

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,



P. M. Pippin
Sr. Production Engineer

PMP:pmp

The above downhole commingling request is hereby approved:

Date: _____

MERIDIAN OIL

November 16, 1990

Arco Oil and Gas Company
P.O. Box 20309
Midland, Texas 79702

Gentlemen:

Meridian Oil, Inc. is in the process of applying for a downhole commingling order for their Hillside #1 GAL/DK well located 2310' FSL 1650' FEL, Section 09 T27N R11W, N.M.P.M., San Juan County, New Mexico, in the Kutz Gallup and Basin Dakota.

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,



P. M. Pippin
Sr. Production Engineer

PMP:pmp

The above downhole commingling request is hereby approved:

Date: _____

MERIDIAN OIL

November 16, 1990

Bureau of Land Management
1235 La Plata Hwy.
Farmington, N. M. 87401

Gentlemen:

Meridian Oil, Inc. is in the process of applying for a downhole commingling order for their Hillside #1 GAL/DK well located 2310' FSL 1650' FEL, Section 9 T27N R11W, N.M.P.M., San Juan County, New Mexico, in the Kutz Gallup and Basin Dakota.

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,



P. M. Pippin
Sr. Production Engineer

PMP:pmp

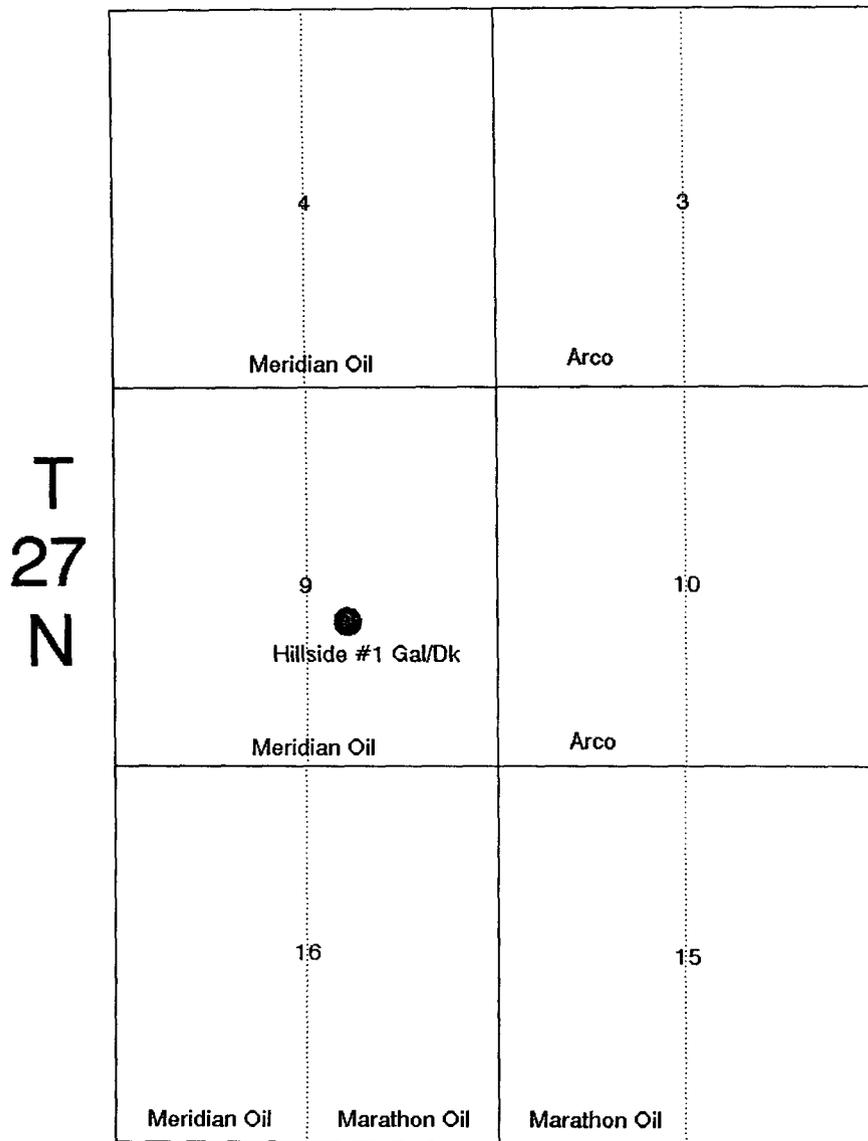
The above downhole commingling request is hereby approved:

Date: _____

MERIDIAN OIL

Commingle Application for Gallup/Dakota
Hillside #1 Gal/Dk

Unit J Section 9 T27N R11W
San Juan County, N. M.

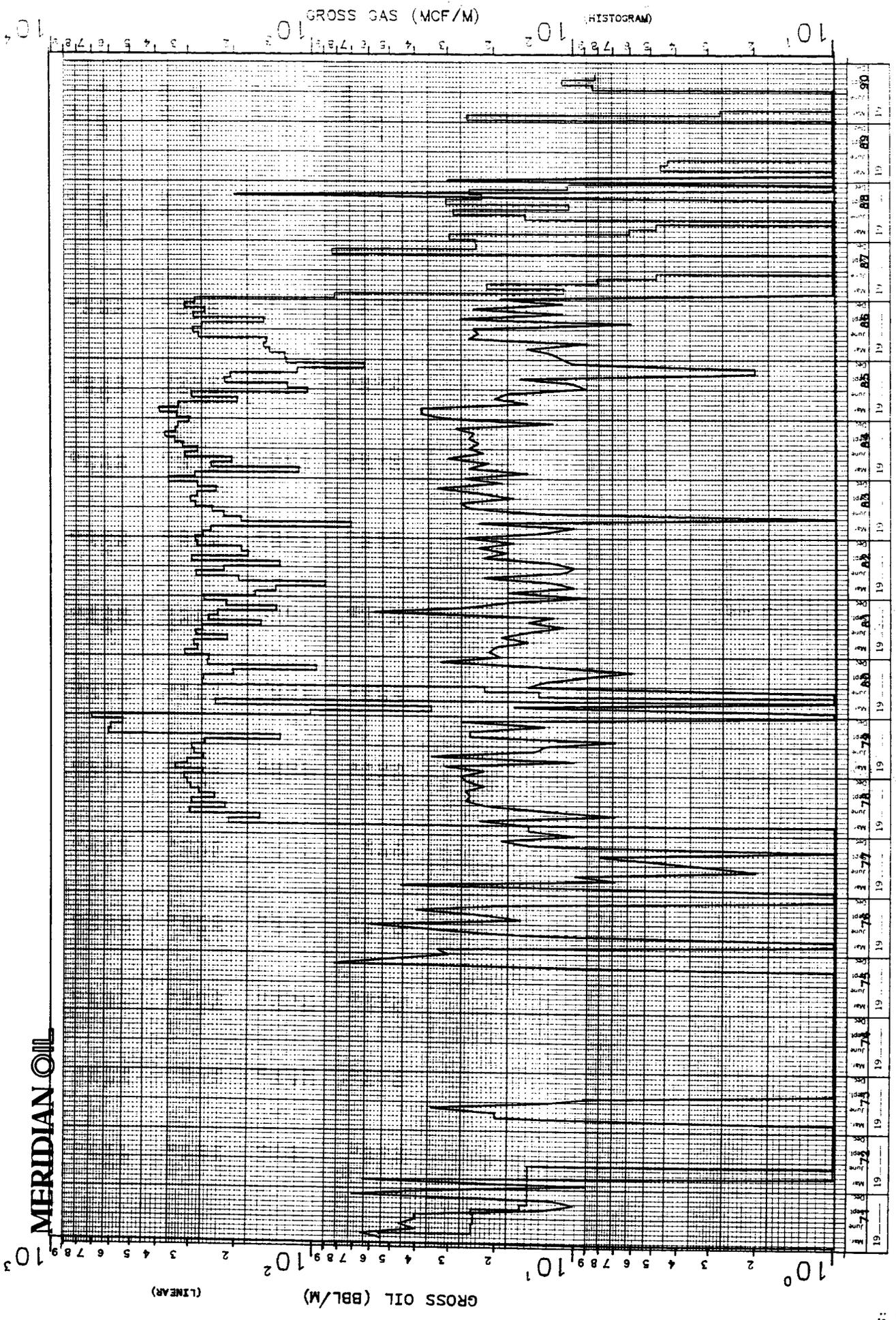


R 11 W

DISTRICT : FARMINGTON
 STATE : NEW MEXICO
 COUNTY : SAN JUAN
 PROJECT NAME :

DP-NO : 28156
 WELL NAME & NO : HILLSIDE
 FIELD NAME : KUTZ GALLUP
 OPERATOR : SOUTHLAND ROYALTY COMPANY
 PAGE NUMBER : 0000001-A

MERIDIAN OIL

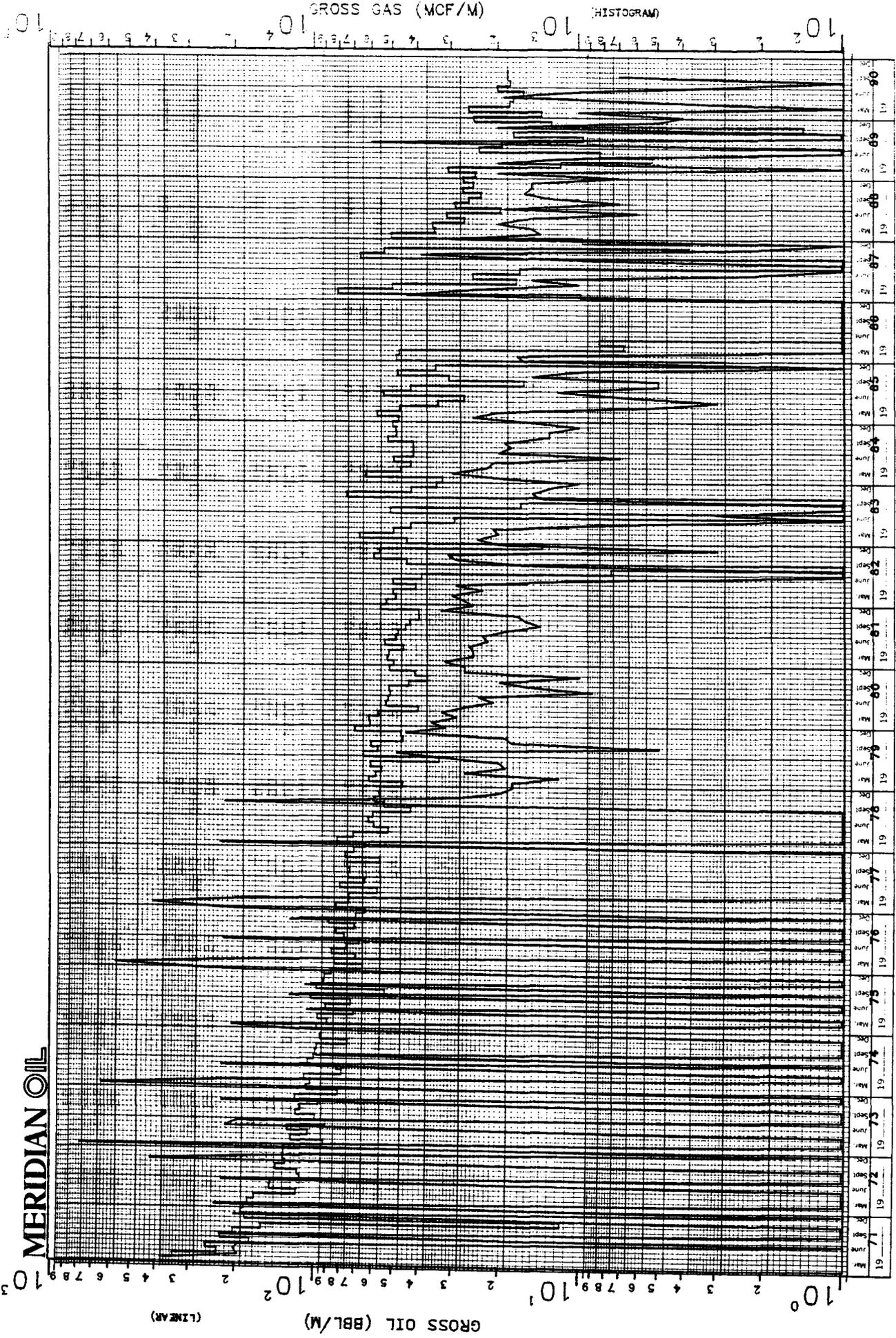


SELECTIONS:
 OIL BY MONTH

GAS BY MONTH

DISTRICT : FARMINGTON
 STATE : NEW MEXICO
 COUNTY : SAN JUAN
 PROJECT NAME :

DP-NO : 28185
 WELL NAME & NO : HILLSIDE
 FIELD NAME : BASIN DAKOTA (PRORATED GAS)
 OPERATOR : SOUTHLAND ROYALTY COMPANY
 PAGE NUMBER : 0000001-A



SELECTIONS:
 OIL BY MONTH
 GAS BY MONTH

MERIDIAN OIL

Commingle Application for Gallup/Dakota
Hillside #1 GL/DK
J 9 27 11
San Juan County, N.M.

Allocation Calculation

See attached decline curves

| | |
|---|--------------------------|
| Gallup Production | (Recent test results) |
| 30 MCF/D | 2.0 BOPD |
| Dakota Production 1985 (before rapid decline started) | |
| 148 MCF/D | 0.8 BOPD |
| Total | 178 MCF/D 2.8 BOPD |
| Gallup Gas Allocation = | $\frac{30}{178} = 17\%$ |
| Gallup Oil Allocation = | $\frac{2.0}{2.8} = 71\%$ |
| Dakota Gas Allocation = | $\frac{148}{178} = 83\%$ |
| Dakota Oil Allocation = | $\frac{0.8}{2.8} = 29\%$ |

HILLSIDE #1 GAL/DK

UNIT J SECTION 9 T27N R11W
SAN JUAN COUNTY, NEW MEXICO

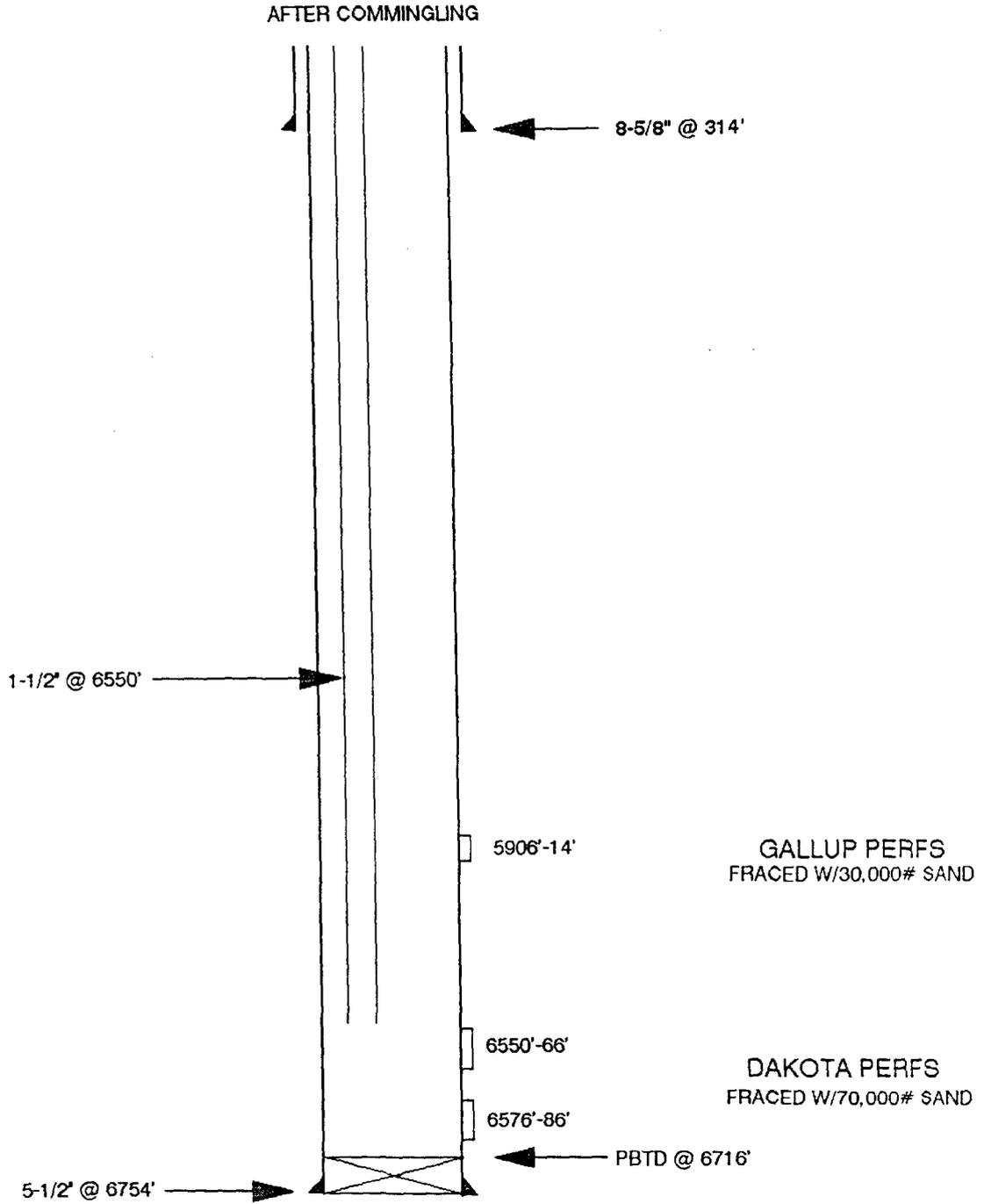


FIGURE 2

HILLSIDE #1 GAL/DK

UNIT J SECTION 9 T27N R11W
SAN JUAN COUNTY, NEW MEXICO

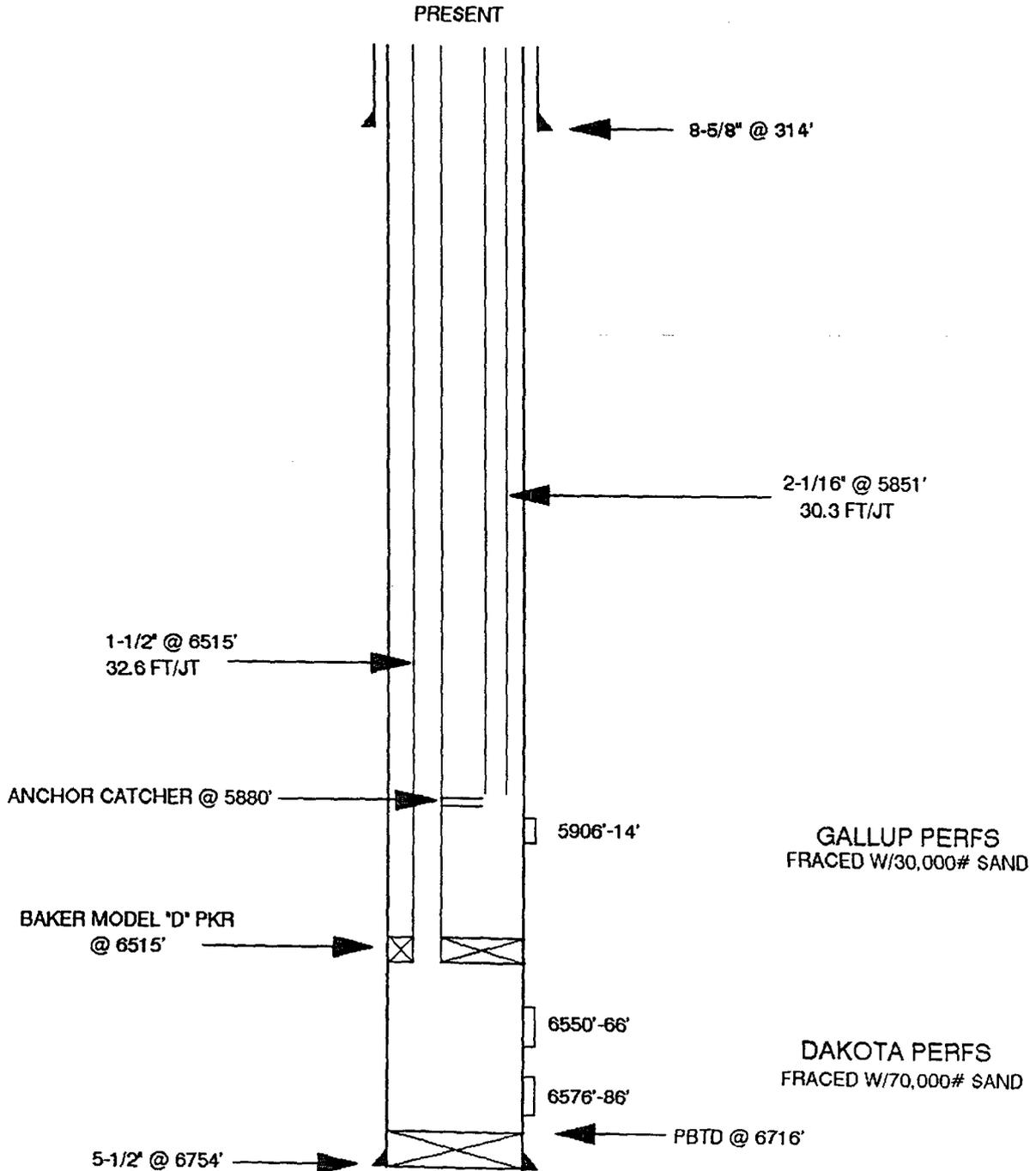


FIGURE 1

Pertinent Data Sheet - HILLSIDE #1 GAL/DK

Location: 2310' FSL 1650' FEL, SEC. 9, T27N R11W, SAN JUAN COUNTY, N.M.

Field: Basin Dakota
Kutz Gallup

Elevation: 6223' GL
12' KB

TD: 6754'
PBTD: 6716'

Completed: 10-29-70

GWI:
NRI:

Initial Potential:

DK: SITP= 1531 psi, AOF=4612 MCF/D, Q=3251 MCF/D
GAL: Pumping 32 BOPD, 118 MCF/D, GOR=3688

Casing Record:

| <u>Hole Size</u> | <u>Csq. Size</u> | <u>Wt. & Grade</u> | <u>Depth Set</u> | <u>Cement</u> | <u>Top/Cmt.</u> |
|------------------|------------------|------------------------|------------------|---------------|-----------------|
| 12-1/4" | 8-5/8" | 24# | 314' | 200 sx | circ. cmt |
| 7-7/8" | 5-1/2" | 14# | 6754' | 200 sx | |
| | | | Stg tool @ 4905' | 200 sx | |

Tubing Record: 1-1/2" EUE 10rd 6515' (203 jts)
F nipple@6483' Prod. Mod "D" pkr @ 6515'
Anchor Catcher @ 5880'
2-1/16" 3.25# IJ X-LINE 5851' (190 jts) Buttress
S.N. @ 5845' GST Streamline

Formation Tops:

| | | | |
|-----------------|-------|-----------|-------|
| Kirtland | 958' | Gallup | 5558' |
| Fruitland | 1665' | Greenhorn | 6392' |
| Pictured Cliffs | 1968' | Graneros | 6450' |
| Mesaverde | 2900' | Dakota | 6547' |
| Point Lookout | 4448' | | |
| Mancos | 4713' | | |

Logging Record: Induction, Density

Stimulation: DAKOTA. Perfed Dk w/4/spf @ 6550'-66' & 6576'-86' & fraced w/70,000# sand in water.

GALLUP. Perfed Gal @ 5906'-14' & fraced w/30,000# sand in water.

Workover History: 3-25-85. Stripped tbg & rods out of hole. TIH Could not J into parallel anchor. Landed 2-1/16" tbg @ 5851'.

Production History: First delivered to EPNG on 12-23-70. DK cum = 1,471 MMCF & 10,461 BO. Gallup cum = 3,505 BO & 270 MMCF. See attached production curves. This well is cathodically protected.



MERIDIAN OIL
HILLSIDE #1 - GALLUP
HILLSIDE #1 - DAKOTA
LEASE FLUIDS

LABORATORY INVESTIGATION
OF
HILLSIDE DAKOTA AND GALLUP FLUIDS COMPATIBILITY
OCTOBER 25, 1990

PREPARED FOR:

MERIDIAN OIL, INC
MIKE PIPPIN
PETROLEUM ENGINEER

PREPARED BY:

BRIAN P. AULT
PETROLEUM ENGINEER
WESTERN COMPANY OF
NORTH AMERICA

SERVICE POINT
FARMINGTON, NEW MEXICO
505-327-6222

MERLABINV

MERIDIAN OIL
HILLSIDE #1 - GALLUP
HILLSIDE #1 - DAKOTA
LEASE FLUIDS

SUMMARY OF RESULTS

1. No precipitation of materials was observed from either admixture of fluids.
2. Emulsion testing was performed. There should be no serious concern over the formation of a stabilized emulsion at well bore temperatures.
3. The cloud point of oil mixtures dropped or remained the same upon mixing of fluids.
4. According to calculations not enough cool down from gas expansion will occur to alter paraffin deposition significantly.

MERIDIAN OIL
HILLSIDE #1 - GALLUP
HILLSIDE #1 - DAKOTA
LEASE FLUIDS

On Thursday, October 25, 1990, a request for laboratory work was placed by Mike Pippin, Petroleum Engineer of Meridian Oil, Inc.

PURPOSE

Two oil samples were received of Mr. Pippin with the request we investigate the concern of potentially detrimental effects due to commingling of Gallup and Dakota fluids in the Hillside #1 wellbore.

INVESTIGATION

1. Background information - current wellbore.
 - a. Figure 1
 - b. Figure 2
 - c. BHST Gradient: 1.375° f/100 ft.
 - d. Current production problems are primarily due to paraffin deposition from surface down to more/less 1000' depth.
 - e. Commingling Order Mixture Requirements:

The commingling requests present the mixing of Hillside #1 Dakota fluids with Hillside #1 Gallup fluids.

The tests performed simulated the mixture of fluids that may result from this commingling action. Each oil component was analyzed for API gravity, paraffin, pour point and cloud point. Each water component was analyzed for dissolved solids, pH, specific gravity and resistivity. The mixture of oils addressed the potential increase in precipitation of materials and the potential increase in paraffin content by a synergistic effect of mixing oils of different constitution. Emulsion tests simulated the mixing environment of the wellbore where the water component of a fluid could be tied up in a resulting emulsion without the ability to break out and allow separation of the oil and water constituents. The emulsion test results

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MERIDIAN OIL
HILLSIDE #1 - GALLUP
HILLSIDE #1 - DAKOTA
LEASE FLUIDS

present the number of ml (% of mixture) of water breakout at listed time intervals. The volume of test sample (mixture) used in the emulsion tests is 100 ml.

2. Concerns to address in analysis:

- a. The precipitation of materials produced by the admixture of oils of potentially different constitution.
- b. The creation of emulsions due to the admixture of different fluids.
- c. Increased paraffin deposition by additive properties of oils.
- d. Increased paraffin deposition due to the reduction of temperature accompanying gas expansion.

3. Steps taken in analysis

- a. API Analysis of oils including: API Gravity
Pour Point
Cloud Point
Paraffin Content
- b. Discussion with Mr. Pippen regarding the well bore production environment, e.g., mode of hydrocarbon production, pump type and operation, water components of production fluids, current paraffin problems, etc.
- c. Mixing of oils in appropriate cases with additional cloud point testing to determine resulting fluid characteristics.
- d. API Water Analysis
- e. Emulsion tendency testing via mixing of fluids in appropriate cases.

MERIDIAN OIL
HILLSIDE #1 - GALLUP
HILLSIDE #1 - DAKOTA
LEASE FLUIDS

DATA

SAMPLE #1 - HILLSIDE #1

| | |
|---------------------|---------|
| ZONE | GALLUP |
| API GRAVITY @ 60° F | 34.59° |
| CLOUD POINT | >40D F* |
| POUR POINT | 40D F |
| PARAFFIN CONTENT | 3.95% |

SAMPLE #2 - HILLSIDE #1

| | |
|---------------------|--------|
| ZONE | DAKOTA |
| API GRAVITY @ 60° F | 58.02° |
| CLOUD POINT | 28° F |
| POUR POINT | <23° F |
| PARAFFIN CONTENT | 0% |

SAMPLE #3 50:50 MIX OF HILLSIDE #1 FLUIDS

| | |
|---------------------|------------------|
| ZONE | 50:50 MIX GAL/DK |
| API GRAVITY @ 60° F | 39.94° |
| CLOUD POINT | >17°** |
| POUR POINT | <17° F |
| PARAFFIN CONTENT | 1.94% |

*UNABLE TO ACCURATELY DETERMINE DUE TO THE DARK COLOR OF THE SAMPLE.

**UNABLE TO ACCURATELY DETERMINE DUE TO THE RESULTING DARK MIX

CALCULATIONS

Cool down effects due to gas expansion:

Reference: Perry's Handbook of Chemical Engineering

RE: Adiabatic Expansion of Ethane, Methane

$$T_s + T_r \left(\frac{P_s}{P_r} \right)^{\frac{K-1}{K}}, \text{ where}$$

T_s = Surface Temperature

T_r = Reservoir Temperature

P_s = Surface Pressure

P_r = Reservoir Pressure

K = $\frac{\text{Specific heat at constant pressure}}{\text{Specific heat at constant volume}}$

Assumed values for maximum cool down due to gas expansion:

T_s = Unknown

T_r = 160° F

P_s = 500 psi

P_r = 2000 psi

K = 1.2

$T_s = 160 \left(\frac{500}{2000} \right)^{0.1667}$

$T_s = 127^\circ \text{F}$

NOTE:

A total cooldown of 33° F would be expected

ANALYSIS NO. 54-11-90

FIELD RECEIPT NO. _____

API FORM 45-1

API WATER ANALYSIS REPORT FORM

| | | | | |
|--|--|------------------------------------|----------------------------------|-----------------------------|
| Company <u>Meridian Oil</u> | | Sample No. | Date Sampled <u>10-24-90</u> | |
| Field <u>BASIN DAK / Kutz GALLUP</u> | Legal Description <u>Sec 9, T27N, R11W</u> | | County or Parish <u>San Juan</u> | State <u>NM</u> |
| Lease or Unit | Well <u>Hillside 1</u> | Depth <u>5550 GAL 6560 DAK</u> | Formation <u>Dakota</u> | Water, B/D |
| Type of Water (Produced, Supply, etc.) <u>Produced</u> | | Sampling Point | | Sampled By <u>M. Pippin</u> |

DISSOLVED SOLIDS

| CATIONS | mg/l | me/l |
|---------------------------|------------|--------------|
| Sodium, Na (calc.) | <u>606</u> | <u>26.33</u> |
| Calcium, Ca | <u>16</u> | <u>.80</u> |
| Magnesium, Mg | <u>3</u> | <u>.22</u> |
| Barium, Ba | <u>—</u> | <u>—</u> |
| Potassium, K ⁺ | <u>11</u> | <u>.28</u> |

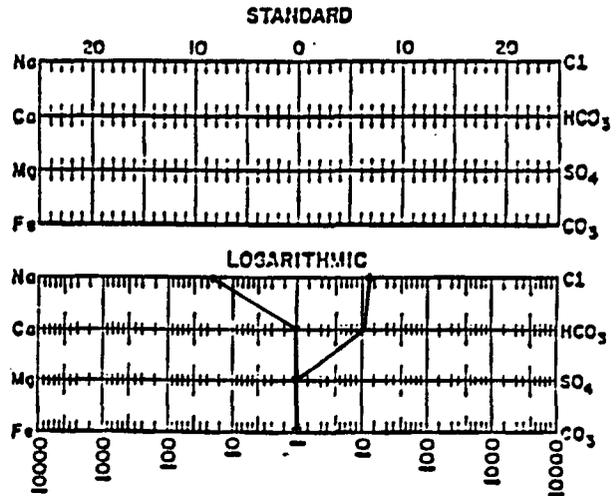
OTHER PROPERTIES

| | |
|---------------------------------------|--------------|
| pH | <u>7.33</u> |
| Specific Gravity, 60/60 F. | <u>1.001</u> |
| Resistivity (ohm-meters) <u>76 F.</u> | <u>3.9</u> |
| Total hardness | <u>51</u> |
| | |
| | |

ANIONS

| | | |
|-------------------------------|------------|--------------|
| Chloride, Cl | <u>554</u> | <u>15.63</u> |
| Sulfate, SO ₄ | <u>27</u> | <u>.56</u> |
| Carbonate, CO ₃ | <u>0</u> | <u>0</u> |
| Bicarbonate, HCO ₃ | <u>698</u> | <u>11.44</u> |
| <u>OH</u> | <u>0</u> | <u>0</u> |

WATER PATTERNS — me/l



Total Dissolved Solids (calc.) 1915

Iron, Fe (total) #, # 0.0 ppm
Sulfide, as H₂S neg

REMARKS & RECOMMENDATIONS:

ANALYST: Lee

THE WESTERN COMPANY OF
NORTH AMERICA, FARMINGTON, NM
(505) 327-6222

Please refer any questions to: **BRIAN AULT**, District Engineer

ANALYSIS NO. 54-12-90

API FORM 45-1

FIELD RECEIPT NO. _____

API WATER ANALYSIS REPORT FORM

| | | | | |
|--|--|-------------------|----------------------------------|-----------------------------|
| Company <u>Meridian Oil</u> | | Sample No. | Date Sampled <u>10-24-90</u> | |
| Field <u>Basin DAKOTA / Kutz GALLUP</u> | Legal Description <u>Sec 9, T27N, R11W</u> | | County or Parish <u>San Juan</u> | State <u>NM</u> |
| Lease or Unit | Well <u>Hillside 1</u> | Depth <u>5558</u> | Formation <u>Gallup</u> | Water, B/D |
| Type of Water (Produced, Supply, etc.) <u>Produced</u> | | Sampling Point | | Sampled By <u>M. Pippin</u> |

DISSOLVED SOLIDS

| CATIONS | mg/l | me/l |
|---------------------------|-------------|--------------|
| Sodium, Na (calc) | <u>1398</u> | <u>60.78</u> |
| Calcium, Ca | <u>33</u> | <u>1.64</u> |
| Magnesium, Mg | <u>12</u> | <u>.96</u> |
| Barium, Ba | <u>—</u> | <u>—</u> |
| Potassium, K ⁺ | <u>151</u> | <u>3.86</u> |

| ANIONS | mg/l | me/l |
|-------------------------------|-------------|--------------|
| Chloride, Cl | <u>2058</u> | <u>58.04</u> |
| Sulfate, SO ₄ | <u>0</u> | <u>0</u> |
| Carbonate, CO ₃ | <u>0</u> | <u>0</u> |
| Bicarbonate, HCO ₃ | <u>561</u> | <u>9.20</u> |
| OH | <u>0</u> | <u>0</u> |

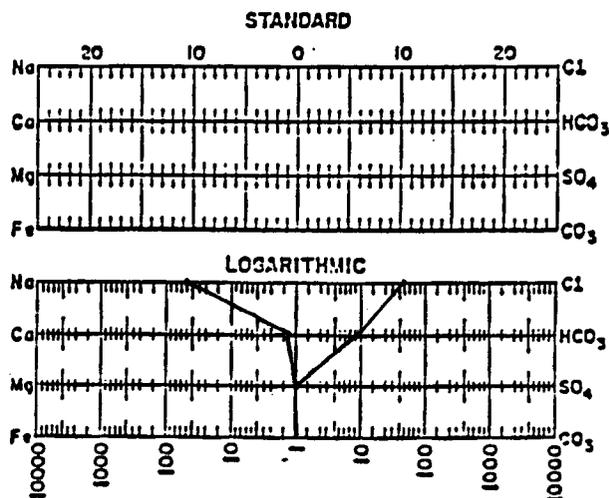
Total Dissolved Solids (calc.) 4,213Iron, Fe (total) #,## 0,0 ppm
Sulfide, as H₂S neg

REMARKS & RECOMMENDATIONS:

OTHER PROPERTIES

| | |
|---------------------------------------|--------------|
| pH | <u>7.10</u> |
| Specific Gravity, 60/60 F. | <u>1.005</u> |
| Resistivity (ohm-meters) <u>76 F.</u> | <u>1.49</u> |
| Total hardness | <u>130</u> |
| _____ | _____ |
| _____ | _____ |

WATER PATTERNS — me/l

ANALYST: LeeTHE WESTERN COMPANY OF
NORTH AMERICA, FARMINGTON, NM
(505) 327-6222Please refer any questions to: **BRIAN AULT**, District Engineer

Analysis No. 54-03-90
Date 10-26-90

The Western Company

Oil Analysis

| | |
|------------------------------|---|
| Operator <u>Meridian Oil</u> | Date Sampled <u>10-24-90</u> |
| Well <u>Hillside 1</u> | Date Received <u>10-25-90</u> |
| Field <u>KUTZ GALLUP</u> | Submitted By <u>Mike Pippin</u> |
| Formation <u>Gallup</u> | Worked By <u>L Lee</u> |
| Depth <u>5550'</u> | Sample Description <u>300 ml sample</u> |
| County <u>San Juan</u> | <u>w/ 17% free H₂O +</u> |
| State <u>NM</u> | <u>83% brown oil.</u> |

API Gravity 34.59° at 60°F
*Paraffin Content 3.95 % by weight.
*Asphaltene Content — % by weight
Pour Point 40 °F
Cloud Point >40 °F

Comments:

Unable to determine cloud point due to dark color of sample.

Analyst L Lee

*Report calculations and data on back.

Paraffin Content

wt. beaker + sample _____
 - wt. beaker _____
 (wt. sample) 2.0268g

wt. Buchner funnel, watch glass, and filter papers 148.07g

After filtering:

wt. beaker + paraffin residue 98.16
 - wt. beaker (from above) 98.16g
 (wt. paraffin in beaker) 0

wt. funnel, glass, papers + paraffin residue 148.15
 - wt. funnel, watch glass filter papers from above 148.07g
 (wt. paraffin in these) .08

Total wt. paraffin:

wt. paraffin in beaker 0
 + wt. paraffin in others .08
 Total paraffin .08 grams

Paraffin content (%) =

$$\frac{.08}{2.0268} \times 100 = \underline{3.95} \%$$

Asphaltene Content

wt. tube + sample _____
 - wt. tube _____
 (wt. sample) _____

wt. tube & residue _____
 - wt. tube _____
 (wt. residue) _____

Asphaltene content (%)

$$\frac{\text{wt. residue}}{\text{wt. sample}} \times 100 = \underline{\hspace{2cm}}$$

Analysis No. 54-02-90
Date 10-26-90

The Western Company

Oil Analysis

Operator Meridian Oil Date Sampled 10-24-90
Well Hillside 1 Date Received 10-25-90
Field Basin Dakota Submitted By Mike Pippin
Formation Dakota Worked By hee
Depth 6550' Sample Description 425 ml sample
County San Juan w / 4% free H₂O + 96% clear yellowish brown oil.
State NM

API Gravity 58.02° at 60°F
*Paraffin Content 0 % by weight
*Asphaltene Content — % by weight
Pour Point 123 °F
Cloud Point 28 °F

Comments:

Analyst hee

*Report calculations and data on back.

Paraffin Content

wt. beaker + sample _____
 - wt. beaker _____
 (wt. sample) 2.013 g

wt. Buchner funnel, watch glass, and filter papers 187.02g

After filtering:

wt. beaker + paraffin residue 95.68 g
 - wt. beaker (from above) 95.68 g
 (wt. paraffin in beaker) 0

wt. funnel, glass, papers + paraffin residue 187.02 g
 - wt. funnel, watch glass filter papers from above 187.02 g
 (wt. paraffin in these) 0

Total wt. paraffin:

wt. paraffin in beaker 0
 + wt. paraffin in others 0
 Total paraffin 0 grams

Paraffin content (%) =
 $\frac{\text{Total paraffin}}{\text{Sample wt.}} \times 100 = \underline{0} \%$

Asphaltene Content

wt. tube + sample _____
 - wt. tube _____
 (wt. sample) _____

wt. tube & residue _____
 - wt. tube _____
 (wt. residue) _____

Asphaltene content (%)
 $\frac{\text{wt. residue}}{\text{wt. sample}} \times 100 = \underline{\hspace{2cm}}$

Analysis No. 54-04-90
Date 10-29-90

The Western Company

Oil Analysis

Operator Meridian Oil Date Sampled 10-24-90
Well Hillside 1 Date Received 10-25-90
Field Kutz Gallup/BASIN DAK. Submitted By Mike Pippin
Formation Gallup / Dakota Worked By Lee
Depth 5550' - 6550' Sample Description 50/50 mix
County Sau Juan of Hillside 1 Gallup oil
State NM + Hillside 1 Dakota oil.

API Gravity 39.94 ° at 60°F
*Paraffin Content 1.94 % by weight
*Asphaltene Content — % by weight
Pour Point <17 °F
Cloud Point >17 °F

Comments:

Unable to determine cloud point due to dark color of sample.

Analyst Lee

*Report calculations and data on back.

Paraffin Content

wt. beaker + sample _____
 - wt. beaker - 98.16
 (wt. sample) 2.0600 g

wt. Buchner funnel, watch glass, and filter papers 187.02

After filtering:

wt. beaker + paraffin residue 98.16
 - wt. beaker (from above) 98.16
 (wt. paraffin in beaker) 0

wt. funnel, glass, papers + paraffin residue 187.06
 - wt. funnel, watch glass filter papers from above 187.02
 (wt. paraffin in these) .04

Total wt. paraffin:

wt. paraffin in beaker 0
 + wt. paraffin in others .04
 Total paraffin .04 grams

Paraffin content (%) =
 $\frac{.04}{2.0600} \times 100 = \underline{1.94} \%$

Asphaltene Content

wt. tube + sample _____
 - wt. tube - _____
 (wt. sample) _____

wt. tube & residue _____
 - wt. tube - _____
 (wt. residue) _____

Asphaltene content (%)

$\frac{\text{wt. residue}}{\text{wt. sample}} \times 100 = \underline{\hspace{2cm}}$

ANALYSIS #
DATE: 10-29-90

Water Fig. 1
~~AGEB~~-OIL EMULSION TESTS DATA SHEET

OPERATOR: Meridian Oil
WELL: Hillside 1
FIELD: Basin Dakota/Kutz Gallup
FORMATION: Gallup/Dakota
DEPTH: 5550 - 6550'
COUNTY: San Juan

SUBMITTED BY: Mike Pippin
SOURCE OF SAMPLE: Produced
DATE SAMPLED: 10-24-90
DATE RECEIVED: 10-25-90
API GRAVITY OF OIL: 39.9

TYPE & CONC. OF FLUID: 50/50 mix of Gallup/Dakota Fluids
~~TYPE & CONC. OF EMULSION:~~ Hillside 1 oil and water
~~TYPE & CONC. OF SOLIDS:~~
TEST TEMPERATURE: 78°F
~~OIL/TREATMENT FLUID RATIO:~~
ANALYSIS BY: Lee

water
PERCENTAGE OF ORIGINAL ~~AGEB~~ SEPARATED AT VARIOUS TIME INTERVALS AFTER EMULSIFYING

| Test Number | 1 | | | | | | | | | | | | | | | |
|---|--|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| Additives & Concentration, Gal/1000 Gal | 25 ml H ₂ O 25 ml D H ₂ O 25 ml G oil 25 ml D oil | | | | | | | | | | | | | | | |
| Elapsed Time | Time | Vol | Time | Vol | Time | Vol | Time | Vol | Time | Vol | Time | Vol | Time | Vol | Time | Vol |
| 1 min | 1 | 50 | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| 2 | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | |
| 3 | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | |
| 4 | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | |
| 5 | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | |
| 6 | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | | 13 | |
| 7 | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | | 13 | | 14 | |
| 8 | 8 | | 9 | | 10 | | 11 | | 12 | | 13 | | 14 | | 15 | |
| 9 | 9 | | 10 | | 11 | | 12 | | 13 | | 14 | | 15 | | 16 | |
| 10 | 10 | | 11 | | 12 | | 13 | | 14 | | 15 | | 16 | | 17 | |
| 20 | 20 | | 21 | | 22 | | 23 | | 24 | | 25 | | 26 | | 27 | |
| 30 | 30 | | 31 | | 32 | | 33 | | 34 | | 35 | | 36 | | 37 | |
| Total Vol (ml) | *50 | | | | | | | | | | | | | | | |
| Vol. Emulsion / Sludge | 0 | | | | | | | | | | | | | | | |
| Solids* | — | | | | | | | | | | | | | | | |
| Interface** | — | | | | | | | | | | | | | | | |
| Vol. Sediment | — | | | | | | | | | | | | | | | |

REMARKS:

* Preferential wetting of solids: OB=oil-wet bottom; OO=oil-wet oil phase; WB=water-wet bottom; WO=water-wet oil phase
OI=oil-wet interface; WI=water-wet interface
** Interface: F=Fluid; S=Solid; V=Viscous

25 ml Hillside 1 Gallup oil + 25 ml Hillside 1 Dakota oil + 25 ml Hillside 1 Gallup water + 25 ml Hillside 1 Dakota water.

* 50 ml of the 50 ml water separated in 1 minute @ 78°F.
Approximately 2 ml of the 50 ml oil adhered to the side of glass in the water phase.



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
 OIL CONSERVATION DIVISION
 AZTEC DISTRICT OFFICE

OIL CONSERVATION DIVISION
 RECEIVED

GARREY CARRUTHERS
 GOVERNOR

'90 DEC 12 AM 9 22

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

Date: Dec 11, 1990

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

Re: Proposed MC _____
 Proposed DHC _____
 Proposed NSL _____
 Proposed SWD _____
 Proposed WFX _____
 Proposed PMX _____

Gentlemen:

I have examined the application dated Dec 4, 1990
 for the Merid Hillside #1
 Operator Lease & Well No.

J-9-25N-11W and my recommendations are as follows:
 Unit, S-T-R

Approve

Yours truly,

J.S. G