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: 1/19/93

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

RE: Proposed MC_____ Proposed DHC X
Proposed NSL_____ Proposed SWD_____
Proposed WFX_____ Proposed PMX_____
Proposed NSP_____ Proposed DD_____

Gentlemen:

I have examined the application received on 12/31/92

for the Amoco Schlosser WN Federal #1E
OPERATOR LEASE & WELL NO.

K 10-27N-11W and my recommendations are as follows:
UL-S-T-R

Approve

Yours truly,

ARCO Oil and Gas Company

December 21, 1992

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

RECEIVED
DEC31 1992
OIL CON. DIV.
DIST. 3

Re: Schlosser WN Federal #1-E
1795' FSL, 1575' FWL
Section 10, T27N R11W
San Juan County, N.M.

Dear Mr. LeMay:

ARCO Oil and Gas is applying for administrative approval to commingle Gallup and Dakota production for the referenced well. Ownership of both zones is equally shared by ARCO Oil and Gas, Conoco Inc. and AMOCO Production Company. Offset operators to the referenced well are Meridian Oil to the northeast, northwest and west, Marathon Oil to the southwest and south and Bonneville Fuels Company to the south, southeast and east. A plat illustrating well location and offset operators is attached.

The referenced well was drilled and completed to the Basin Dakota in 1980. Cumulative production for the well is 1192MMCF, 8699 BO and 397 BW. The well had produced on a consistent decline until fluid loading problems arose in early 1991. The fluid problems are believed to have been caused due to either a tubing or packer leak. Production for the year prior to the fluid loading problems was averaging 140 MCF/D and 1 BF/D and an annual decline rate of 11%. In April of 1991 an attempt was made to pull the tubing and correct a suspected tubing leak. The tubing became jammed at a calculated free point depth of 3900' due to suspected casing collapse. An evaluation has been completed for the workover needed to repair the suspected casing problem, reestablish Dakota production and complete the Gallup interval. Marginal economics resulted when either the Gallup or Dakota was considered for individual production as opposed to commingling. A commingling order would help to extend the economic life of the well. A dual string completion is thought to be high risk since the well was completed with 4-1/2" casing. At this time it is not ARCO's intention to abandon the current Dakota horizon without an attempt of returning it to production. Dakota reserves remain for the well and our actions are to prevent waste of those hydrocarbon reserves. It is also felt that approval of this application would be in the best interest of conservation as well as protection of correlative rights.

ARCO plans to commingle Dakota and Gallup production by pulling the existing Dakota tubing, correcting the suspected casing problem, an acid cleanup of the current Dakota perforations and perforation and fracturing of the Gallup horizon from 5920' to 5930'. A single string of tubing will then be ran and tail set above the Dakota perforations at ±6560'. Commingled production would then be either plunger lifted or rod pumped.

The reservoir fluid characteristics of the Gallup and Dakota are such that underground waste is not expected or would be caused by the proposed downhole commingling. The fluids from each zone have been tested and proven to be compatible with no formation of precipitates that would cause damage to either reservoir. See the attached fluid analysis of the offset Meridian operated Hillside #1. The well is located 3200' southeast of the Schlosser WN Federal #1-E and produces commingled from the same horizons and depths that the referenced well would. It should also be noted that commingled production will not exceed the limit set forth by Rule 303c,Sec 1a, Part 1.

The current Dakota reservoir pressure is believed to be not less than 50% of the expected reservoir pressure of the Gallup. The current fluid column of 6000' present in the Schlosser WN Federal #1-E supports a Dakota reservoir pressure in excess of 1500psi. The expected initial reservoir pressure for the Gallup should be in close proximity to the initial discovery reservoir pressure of 1630psi in the N0. 1-B Frontier well located in Section 9, T27N R11W.

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

Allocation for the commingled Gallup/Dakota production will be based on historic Dakota production from the Schlosser WN Federal #1-E and individual production tests during the planned workover. The Dakota had averaged 140 MCF/D and 1 BF/D and an approximate decline of 11% for the year prior to the fluid loading. Allocated Dakota production will follow the same general pattern as historic production from the well and Gallup production should be quantified by isolated production tests. A production allocation will then be calculated to allocate on a percentage basis for all subsequent production.

Included in this letter is a copy of letters to the offset operators and the BLM, plat showing ownership of offsetting leases, diagrams of the current and proposed completion of the referenced well, production curves for gas, oil and water, pertinent completion data sheet, detailed fluid analysis of the offsetting Hillside #1 Gallup/Dakota well, allocation calculation sheet.

Sincerely,

Tony Long

J.A. (Tony) Long
Rockies Engineering

JAL:jal
attachments

cc: Frank Chavez - OCD

bc: J.M. Bartlett MIO - 54828
J.R. Mainwaring MIO - 55128
R.D. Johnston FAR
R.O. Renick FAR

w/out attachments

ARCO Oil and Gas Company
Western Region
600 N. Marienfeld
Midland, Texas 79701
Post Office Box 1610
Midland, Texas 79702
Telephone 915 688 5200

December 21, 1992

Meridian Oil, Inc.
P. O. Box 4289
Farmington, New Mexico 87499-4289

Attn: P. M. Pippin

Re: Schlosser WN Federal #1-E Well
Section 10-T27N-R11W
San Juan County, New Mexico

Gentlemen:

ARCO Oil and Gas Company is in the process of applying for a downhole commingling order for their Schlosser WN Federal #1-E Well located 1795' FSL, 1575' FWL, Section 10-T27N-R11W in San Juan County, New Mexico. The zones to be commingled are 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, please sign the attached copy of this notification and return it to my attention at the above address.

Your prompt attention to this matter would be appreciated and should you need any further information, feel free to contact the undersigned at (915) 688-5549.

Sincerely,

Tony Long

Tony Long
Rockies Engineering

JTL/ckc

The above downhole commingling request is hereby approved.

_____

Date: _____

ARCO Oil and Gas Company
Western Division
[illegible]
Midland, Texas 79701
Post Office Box 1610
Midland, Texas [illegible]
Telephone 915 688 5200

December 21, 1992

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

Re: Schlosser WN Federal #1-E Well
Section 10-T27N-R11W
San Juan County, New Mexico

Gentlemen:

ARCO Oil and Gas Company is in the process of applying for a downhole commingling order for their Schlosser WN Federal #1-E Well located 1795' FSL, 1575' FWL, Section 10-T27N-R11W in San Juan County, New Mexico. The zones to be commingled are 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, please sign the attached copy of this notification and return it to my attention at the above address.

Your prompt attention to this matter would be appreciated and should you need any further information, feel free to contact the undersigned at (915) 688-5549.

Sincerely,

Tony Long

Tony Long
Rockies Engineering

JTL/ckc

The above downhole commingling request is hereby approved.

_____

Date: _____

ARCO Oil and Gas Company
Western [illegible]
[illegible] Marienfeld
Midland, Texas 79701
Post Office Box [illegible]
Midland, Texas 79702
Telephone 915 688 5300

December 21, 1992

Bonneville Fuels Company
1660 Lincoln St., Suite 1800
Denver, Colorado 80264

Attn: Larry Lilo

Re: Schlosser WN Federal #1-E Well
Section 10-T27N-R11W
San Juan County, New Mexico

Gentlemen:

ARCO Oil and Gas Company is in the process of applying for a downhole commingling order for their Schlosser WN Federal #1-E Well located 1795' FSL, 1575' FWL, Section 10-T27N-R11W in San Juan County, New Mexico. The zones to be commingled are 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, please sign the attached copy of this notification and return it to my attention at the above address.

Your prompt attention to this matter would be appreciated and should you need any further information, feel free to contact the undersigned at (915) 688-5549.

Sincerely,

Tony Long

Tony Long
Rockies Engineering

JTL/ckc

The above downhole commingling request is hereby approved.

_____

Date: _____

ARCO Oil and Gas Company
Western Division
600 N. Marienfeld
Midland, Texas 79701
Post Office Box 1610
Midland, Texas 79702
Telephone 915 688 5600

December 21, 1992

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

Re: Schlosser WN Federal #1-E Well
Section 10-T27N-R11W
San Juan County, New Mexico

Gentlemen:

ARCO Oil and Gas Company is in the process of applying for a downhole commingling order for their Schlosser WN Federal #1-E Well located 1795' FSL, 1575' FWL, Section 10-T27N-R11W in San Juan County, New Mexico. The zones to be commingled are 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, please sign the attached copy of this notification and return it to my attention at the above address.

Your prompt attention to this matter would be appreciated and should you need any further information, feel free to contact the undersigned at (915) 688-5549.

Sincerely,

Tony Long

Tony Long
Rockies Engineering

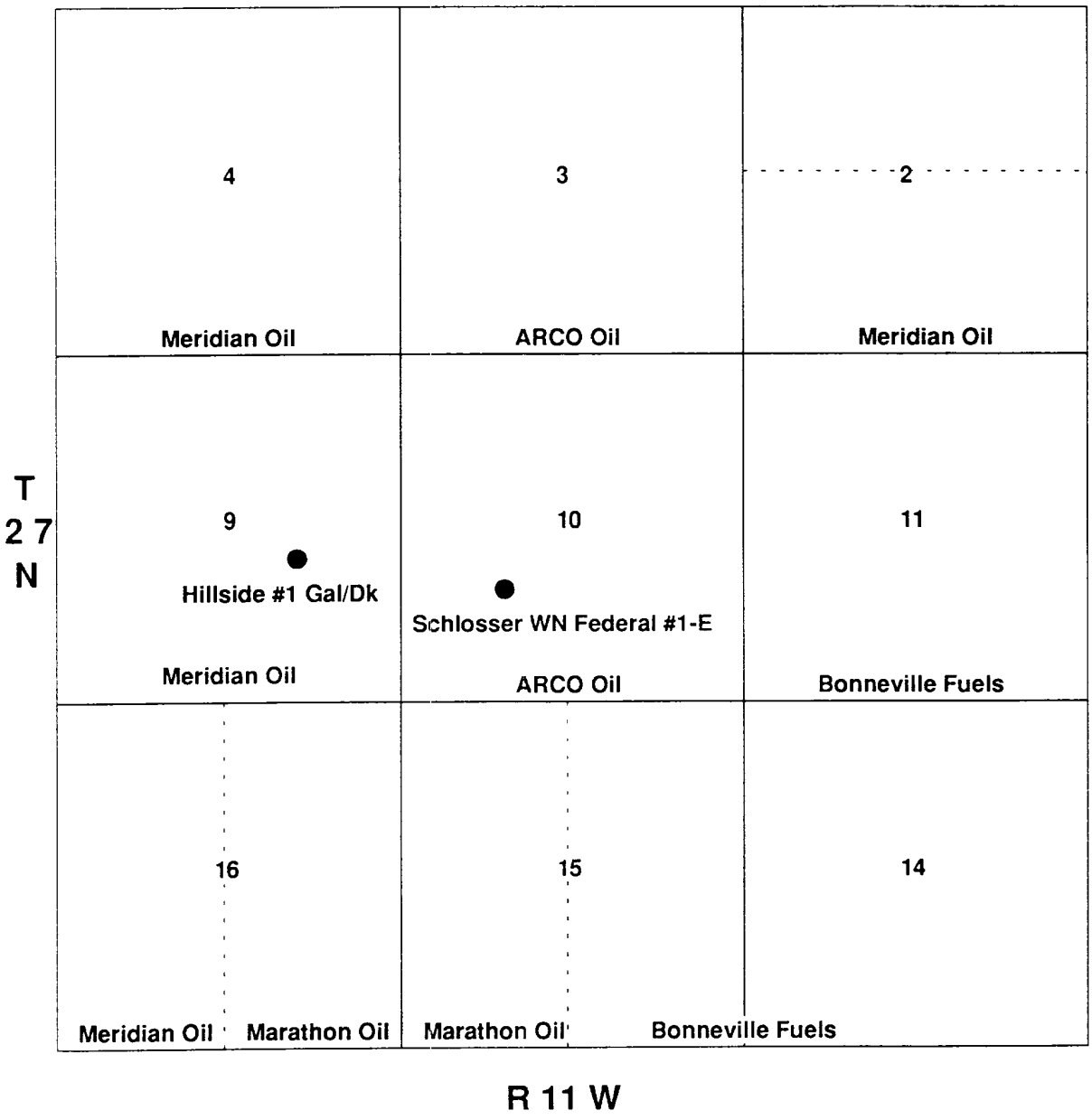
JTL/ckc

The above downhole commingling request is hereby approved.

_____

Date: _____

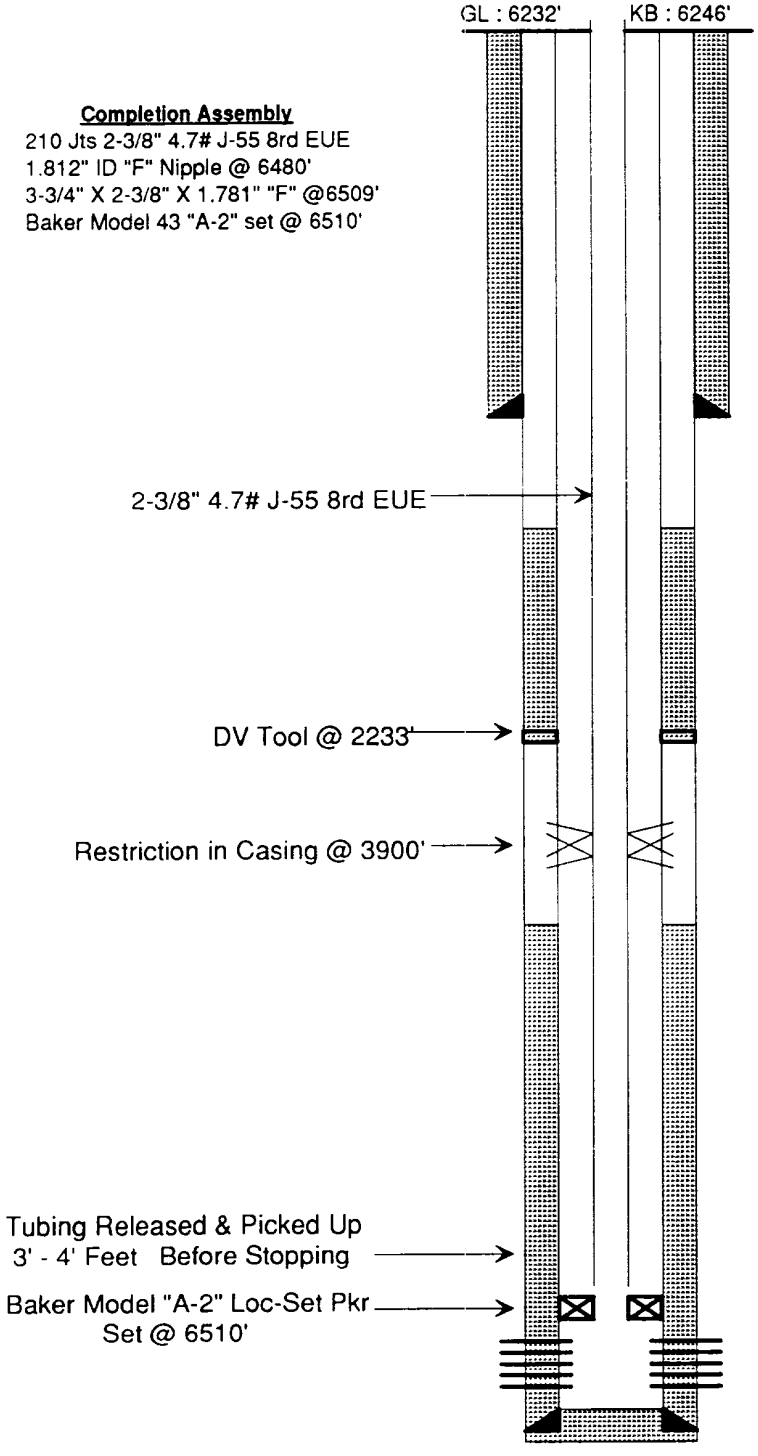
SCHLOSSER WN FEDERAL #1-E
Dakota/Gallup Commingle Application
Section10 - T27N - R11W
ARCO Oil and Gas Company



SCHLOSSER WN FEDERAL #1-E
CURRENT STATUS

Section 10 - T27N - R11W
San Juan County, New Mexico
Spud: 6/6/80 Completed: 7/10/80
GL : 6232' KB : 6246'

Completion Assembly
210 Jts 2-3/8" 4.7# J-55 8rd EUE
1.812" ID "F" Nipple @ 6480'
3-3/4" X 2-3/8" X 1.781" "F" @6509'
Baker Model 43 "A-2" set @ 6510'



8-5/8" K-55 24# STC
Set @ 531'
Cmnt'd to Surface w/ 350 sx

TOC 2nd Stage @ 1906"
CBL 6/25/80

TOC 1st Stage @ 4750'
CBL 6/25/80

Dakota Perforations

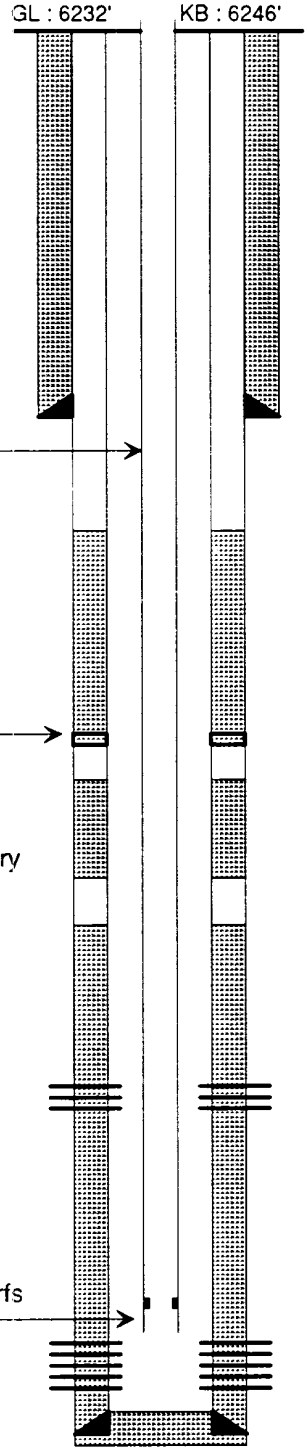
6563' - 6611'

TD : 6690'
PBD : 6650'

4-1/2" K-55 10.5# STC
Set @ 6685'
2 Stage Cement Job
1st Stage 605 sx , 2nd Stage 407 sx
DV Tool @ 2233'

SCHLOSSER WN FEDERAL #1-E
PROPOSED COMMINGLED COMPLETION

Section 10 - T27N - R11W
San Juan County, New Mexico
Spud: 6/6/80 Completed: 7/10/80
GL : 6232' KB : 6246'



8-5/8" K-55 24# STC
Set @ 531'
Cmnt'd to Surface w/ 350 sx

210 Jts 2-3/8" 4.7# J-55 8rd EUE

TOC 2nd Stage @ 1906"
CBL 6/25/80

DV Tool @ 2233'

Remove Restriction @ 3900'
Squeeze and Repair if Necessary

TOC 1st Stage @ 4750'
CBL 6/25/80

Kutz - Gallup Perforations

5920'- 5930'

Set Tubing Tail Above Dakota Perfs
and Plunger Lift or Rod Pump

Dakota Perforations

6563' - 6611'

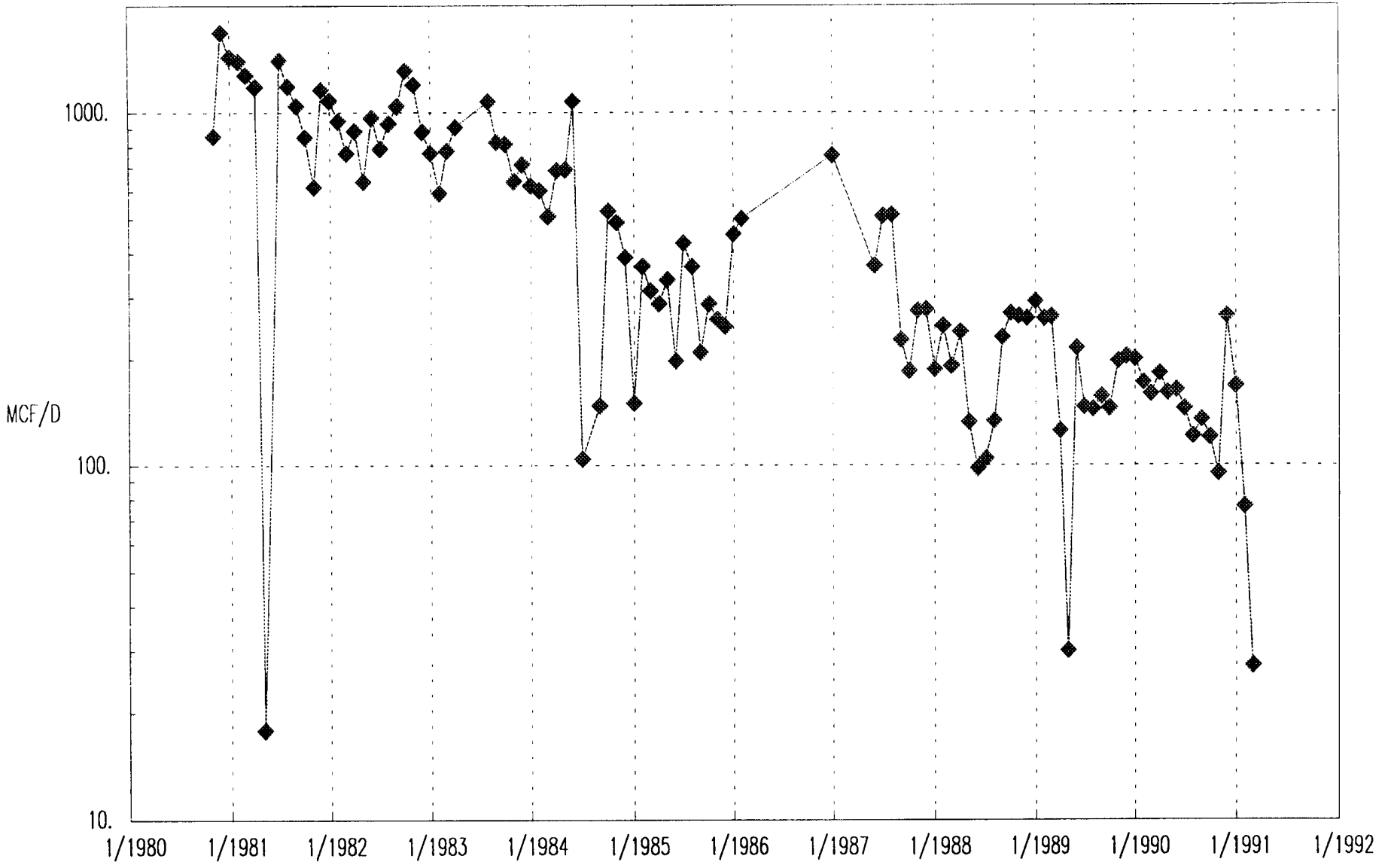
TD : 6690'
PBD : 6650'

4-1/2" K-55 10.5# STC
Set @ 6685'
2 Stage Cement Job
1st Stage 605 sx , 2nd Stage 407 sx
DV Tool @ 2233'

SCHLOSSER WN FEDERAL #1-E

Dakota Production

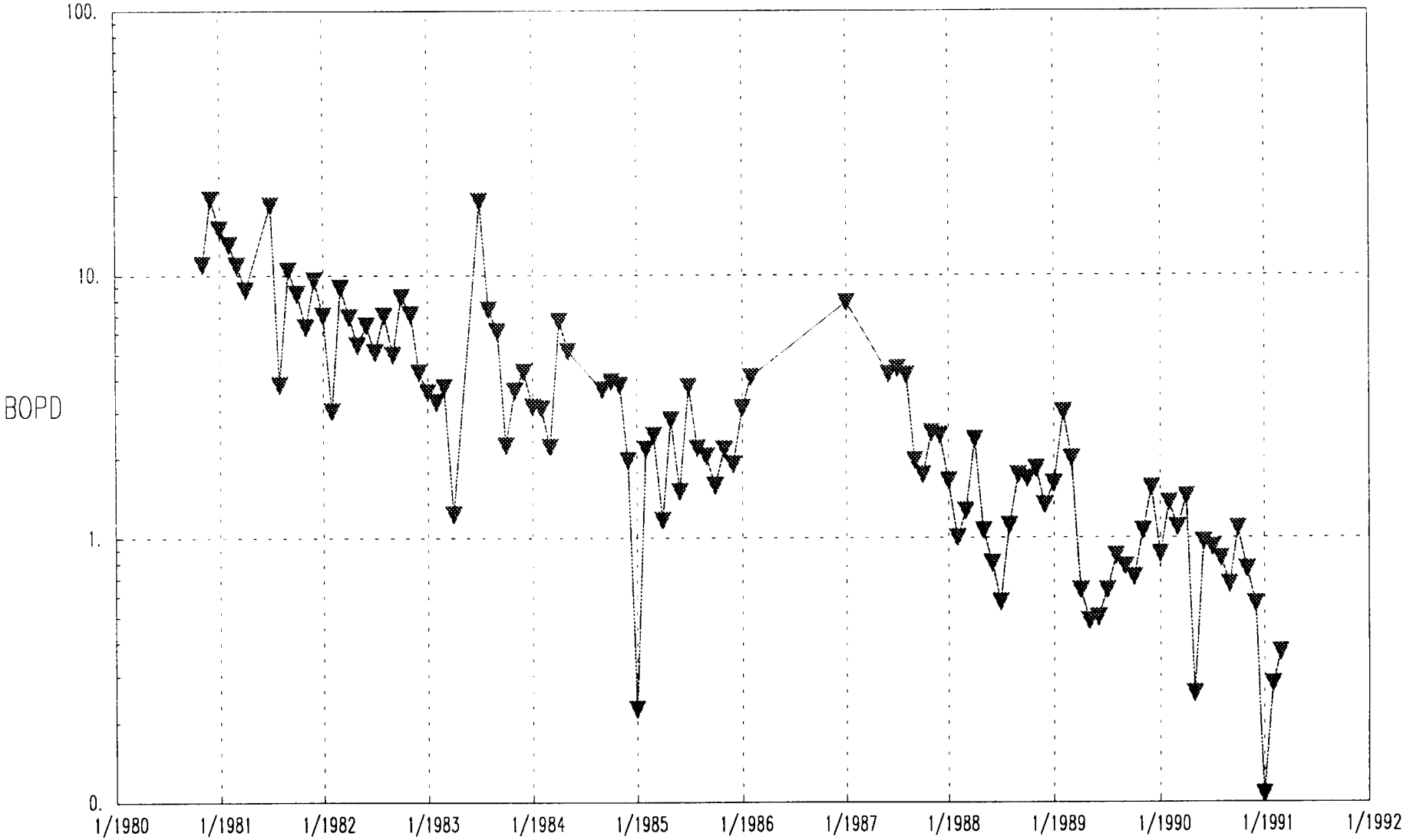
San Juan County, NM



SCHLOSSER WN FEDERAL #1-E

Dakota Production

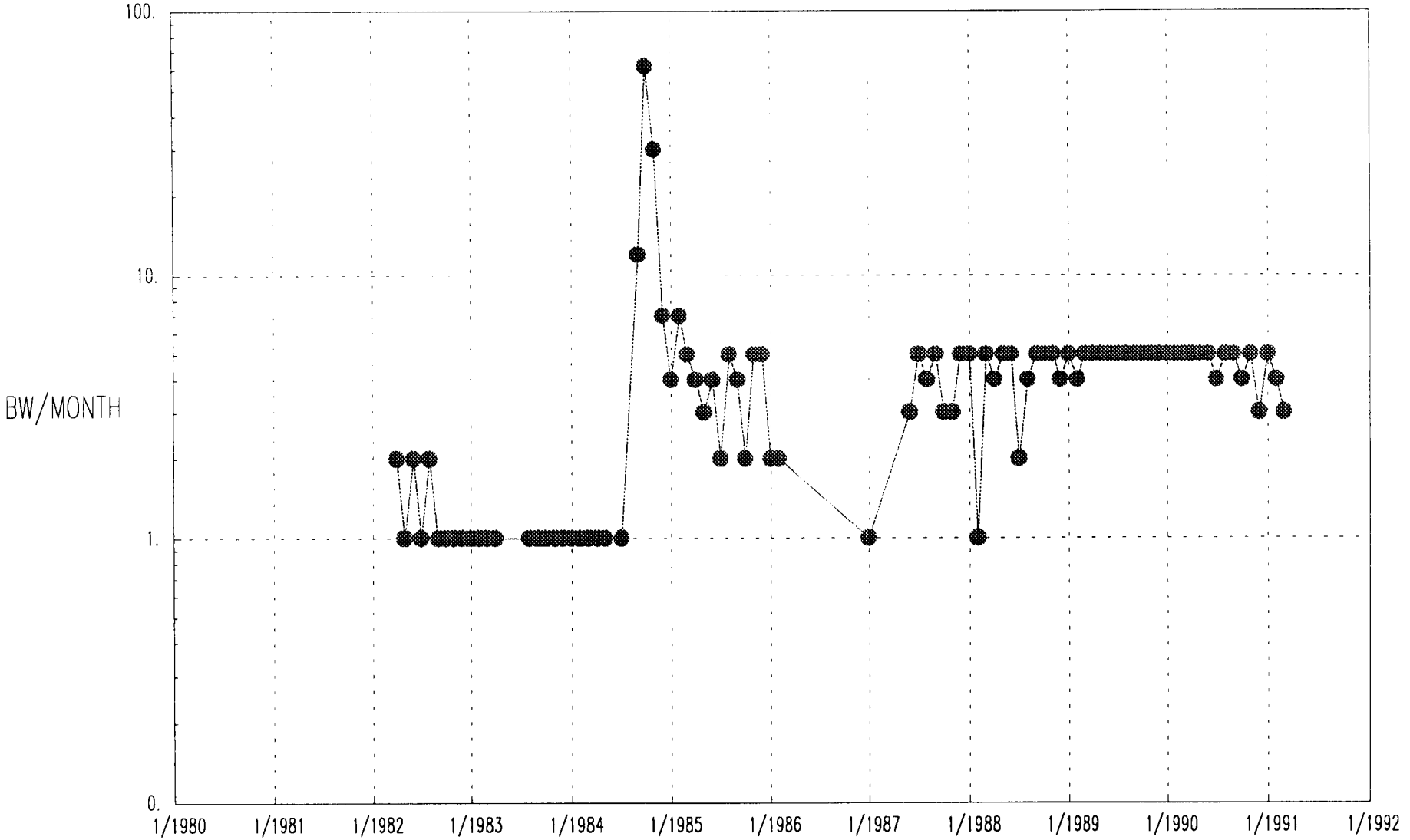
San Juan County, NM



SCHLOSSER WN FEDERAL #1-E

Dakota Production

San Juan County, NM



SCHLOSSER WN FEDERAL #1-E

Pertinent Completion Data Sheet

Location : 1795' FSL , 1575' FWL, Sec10 T27N R11W — API # : 30-045-24277
San Juan County, New Mexico

Field : Basin Dakota — Elevation: GL 6223' KB 6246' — TD : 6690' PBD : 6650'

Spud : 6/6/80
Completed: 7/10/80

Initial Potential :
Dakota : Calc. AOF : 2.49MMCF/D, Q=2.3MMCF/D & 30 BCPD, SITP: 1302#
Gallop : No Perforations

Casing Record :

Hole Size	Casing Size	Wt & Grade	Depth & Cement	Top of Cmnt
12-1/4"	8-5/8"	24# K-55	531' 350 sx	Surface
7-7/8"	4-1/2"	10.5# K-55	6685' 605 sx	4750'
		DV Tool @ 2233'	407 sx	1906'

Tubing Record: 2-3/8" 4.7# 8rd EUE @ 6509' 210 Jts
1.812" ID "F" Nipple @6480'
Baker Model "FL" On-Off Sealing Connector w/ 1.781" Sealbore @ 6509'
Baker Model "A-2" Loc-Set Ret Pkr set @ 6510'

Formation Tops:

Pictured Cliffs	2002'	Gallup	5574'
Chacra	2928'	Tocite	5986'
Mesa Verde	3600'	Greenhorn	6409'
Point Lookout	4484'	Ganeros	6465'
Upper Mancos	4712'	Dakota	6560'

Logging Record: DIL, SFL, FDC &CNL w/GR, CBL

Stimulation: Dakota: Perf'd 6563,65,67,69,71,73,76,78,82,95,97,6602,04,09,11
Acid 1000 gals 15% HCL
Frac Dakota Interval 6563-6611 w/ 31,000 gals 2% KCL
118,000# 20/40 Mesh Sd, 5000 gal Pad, 4300 gal Flush

Workover History:
Sep-84 Ran Baker "A-2" Pkr set @ 6510' due to suspected csg problem
Apr-91 Attempted to pull tubing & stuck same. Freepoint calc. @3900'

Production History : First Production 11/80
Dakota Cumulative : 1192 MMCF, 8699 BC, 397 BW
Well 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.

MERLABINV

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

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

MERLABINV

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

CALCULATIONS

Cool down effects due to gas expansion:

Reference: Perry's Handbook of Chemical Engineering

RE: Adiabatic Expansion of Ethane, Methane

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

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°F

NOTE:

A total cooldown of 33° F would be expected

ANALYSIS NO. 24-11-90

FIELD RECEIPT NO. _____

API FORM 45-1

API WATER ANALYSIS REPORT FORM

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

DISSOLVED SOLIDS

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

ANIONS		
Chloride, Cl	554	15.63
Sulfate, SO_4	27	.56
Carbonate, CO_3	0	0
Bicarbonate, HCO_3	698	11.44
OH	0	0

Total Dissolved Solids (calc) 1915

Iron, Fe (total) 0.0 ppm

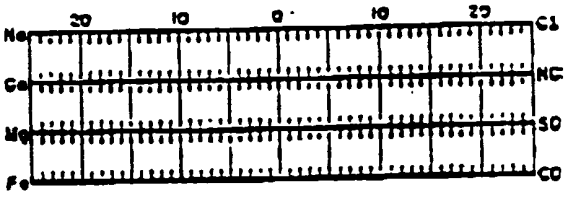
Sulfide as H_2S neg

OTHER PROPERTIES

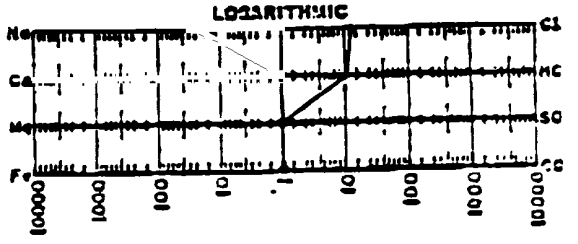
pH	7.33
Specific Gravity, 60/60 F.	1.001
Resistivity (ohm-meters) 76 F.	3.9
Total hardness	51

WATER PATTERNS — me/l

STANDARD



LOGARITHMIC



REMARKS & RECOMMENDATIONS:

ANALYST: Lee

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

Please refer any questions to: BRIAN AULT . District Engineer

ANALYSIS NO. 54-13-90

FIELD RECEIPT NO. _____

API FORM 45-1

API WATER ANALYSIS REPORT FORM

Company	Sample No.	Date Sampled
Meridian Oil		10-24-90

Field	Legal Description	County or Parish	State
Basin Dakota / Kutz Gallup	Sec 9, T27N, R11W	San Juan	NM

Lease or Unit	Well	Depth	Formation	Water, B/D
	Hillside 1	5558	Gallup	

Type of Water (Produced, Supply, etc.)	Sampling Point	Sampled By
Produced		M. Pippin

DISSOLVED SOLIDS

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

ANIONS		
Chloride, Cl	2058	58.04
Sulfate, SO_4	0	0
Carbonate, CO_3	0	0
Bicarbonate, HCO_3	561	9.20
OH	0	0

Total Dissolved Solids (calc.) 4,213

Iron, Fe (total) 11,111 0.0 ppm

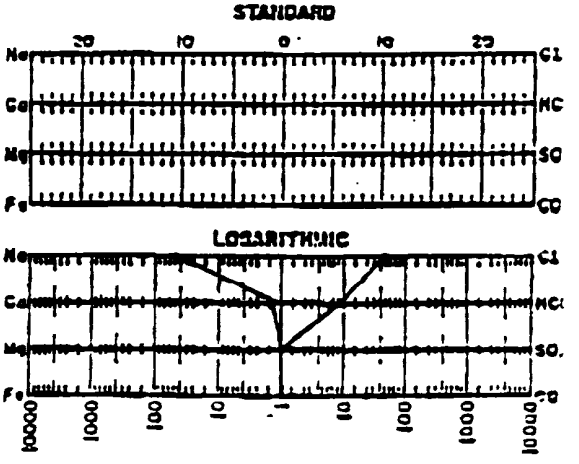
Sulfide as H_2S neg

REMARKS & RECOMMENDATIONS:

OTHER PROPERTIES

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

WATER PATTERNS — me/l



ANALYST: LHP

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

Please refer any questions to: BRIAN AULT . District Engineer

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

The Western Company

Oil Analysis

Operator Meridian Oil
Well Hillside 1
Field Kutz Gallup
Formation Gallup
Depth 5550'
County San Juan
State NM

Date Sampled 10-24-90
Date Received 10-25-90
Submitted By Mike Pippin
Worked By LLee
Sample Description 300 ml sample w/ 17% free H_2O + 83% brown oil.

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 LLee

*Report calculations and data on back.

Paraffin Content

wt. beaker + sample _____

- wt. beaker - _____

(wt. sample) 2.0268 g

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

After filtering:

wt. beaker + paraffin residue 98.16

- wt. beaker (from above) 98.16 g

(wt. paraffin in beaker) 0

wt. funnel, glass, papers + paraffin residue 148.15

- wt. funnel, watch glass filter papers from above 148.07 g

(wt. paraffin in these) .08

Total wt. paraffin:

wt. paraffin in beaker 0

+ wt. paraffin in others .08

Total paraffin .08 grams

Paraffin content (%) =

$\frac{.08}{2.0268}$ $\frac{\text{Total paraffin}}{\text{Sample wt.}}$ X 100 = 3.95 %

Asphaltene Content

wt. tube + sample _____

- wt. tube - _____

(wt. sample) _____

wt. tube & residue _____

- wt. tube - _____

(wt. residue) _____

Asphaltene content (%)

$\frac{\text{wt. residue}}{\text{wt. sample}}$ X 100 = _____

Analysis No. 24-02-90
Date 10-26-90

The Western Company

Oil Analysis

Operator Meridian Oil
Well Hillside 1
Field Basin Dakota
Formation Dakota
Depth 6550'
County San Juan
State NM

Date Sampled 10-24-90
Date Received 10-25-90
Submitted By Mike Pippin
Worked By hlee
Sample Description 425 ml sample w/ 4% free H2O & 96% clear yellowish brown oil.

API Gravity 58.02° at 60°F
*Paraffin Content 0 % by weight
*Asphaltene Content — % by weight
Pour Point <23 °F
Cloud Point 28 °F

Comments:

Analyst hlee

*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 187.02 g

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 (%) =

$\frac{\text{Total paraffin}}{\text{Sample wt.}} \times 100 =$ 0 %

Asphaltene Content

wt. tube + sample _____

- wt. tube - _____

(wt. sample) _____

wt. tube & residue _____

- wt. tube - _____

(wt. residue) _____

Asphaltene content (%)

$\frac{\text{wt. residue}}{\text{wt. sample}} \times 100 =$ _____

Analysis No. 24-04-90
Date 10-29-90

The Western Company

Oil Analysis

Operator Meridian Oil
Well Hillside 1
Field Kutz Gallup/Basin Dak
Formation Gallup / Dakota
Depth 5550' - 6550'
County San Juan
State NM

Date Sampled 10-24-90
Date Received 10-25-90
Submitted By Mike Pippin
Worked By Llee
Sample Description 50/50 mix of Hillside 1 Gallup oil & 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 Llee

*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 (%) =

$\frac{.04}{2.0600}$ $\frac{\text{Total paraffin}}{\text{Sample wt.}} \times 100 =$ 1.94 %

Asphaltene Content

wt. tube + sample _____

- wt. tube - _____

(wt. sample) _____

wt. tube & residue _____

- wt. tube - _____

(wt. residue) _____

Asphaltene content (%)

$\frac{\text{wt. residue}}{\text{wt. sample}} \times 100 =$ _____

ANALYSIS #
DATE: 10-29-90

water Fig. 1
ACID-OIL EMULSION TESTS DATA SHEET

OPERATOR: Meridian Oil
WELL: Hillside 1
FIELD: Basin Dakota/Ute 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
~~TYPE & CONC. OF SOLIDS~~: water
TEST TEMPERATURE: 78°F
~~OIL/EMULSION/WATER RATIO~~:
ANALYSIS BY: LLee

PERCENTAGE OF ORIGINAL ACID water SEPARATED AT VARIOUS TIME INTERVALS AFTER EMULSIFYING

Test Number	1															
Additives & Concentration. Gal/1000 Gal	25 ml & Hillside 1 Gallup water 25 ml & Hillside 1 Dakota water 25 ml & Hillside 1 Gallup oil 25 ml & Hillside 1 Dakota 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 ph
OI=oil-wet interface; WI=water-wet interface
** Interface: F=Fluid; S=Solid; V=Viscous

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

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

ARCO Oil and Gas Company

Allocation Calculation

Gallup Production : Isolated Production Test at Time of Workover

Dakota Production : Expect similiar to 1/90 - 1/91 Rate
140 MCF/D 0.8 BOPD
To be tested During workover

Gallup Gas Allocation : $\frac{\text{Isolated Production Test Rate}}{\text{Total Dakota + Gallup Gas Rate}}$

Gallup Oil Allocation : $\frac{\text{Isolated Production Test Rate}}{\text{Total Dakota + Gallup Oil Rate}}$

Dakota Gas Allocation : $\frac{\text{Isolated Production Test Rate *}}{\text{Total Dakota + Gallup Gas Rate}}$

Dakota Oil Allocation : $\frac{\text{Isolated Production Test Rate *}}{\text{Total Dakota + Gallup Oil Rate}}$

* with reference to historic production data also