



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

GARREY CARRUTHERS
GOVERNOR

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

Date: 7/20/87

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 _____

Gentlemen:

I have examined the application dated 7/14/87
for the Union Super Pet. Corp. Prince A #2
Operator Lease & Well No.

~~_____~~ and my recommendations are as follows:
Unit, S-T-R

Agree

Yours truly,

W. J.



Union Texas Petroleum

375 U.S. Highway 64
Farmington, New Mexico 87401
Telephone (505) 325-3587

September 8, 1989

Mr. William LeMay
N. M. Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504

Re: Pierce A #2E
1830' FNL & 860' FWL
Section 34, T29N-R10W

RECEIVED
SEP 14 1989
OIL CON. DIV
DIST. 3

Dear Mr. LeMay:

Union Texas petroleum is applying for a downhole commingling order for the referenced well in the Basin Dakota and Armenta Gallup fields. The ownership of the zones to be commingled is common. The Bureau of Land Management and the offset operators indicated in Exhibits A and B will receive notification of this proposed downhole commingling.

The subject well was completed on June 5, 1981. The Gallup formation was fracture stimulated with 122,500# sand in 116,000 gallons 75 quality nitrogen foam in two stages. The Dakota formation was fracture stimulated with 126,000# sand in 78,000 gallons 30# cross-linked gel. The well has produced 179 MMCFG and 16 MBO from the Gallup formation, and 144 MMCFG and 1 MBO from the Dakota formation to date. Current production is 15 MMCFD and zero oil from the Gallup, and 65 MCFD and zero oil from the Dakota. The poor production of this well is typical of the Armenta Gallup and Basin Dakota formations in this area. Two tubing strings are utilized. The Dakota is flowed from below a packer and the Gallup is rod pumped. The Gallup rod pump has been stuck since mid 1989.

Continued production of this marginal well is dependent on few or no additional expenses. The mechanical problem of the Gallup zone will require the expense of a rig to repair and can not be justified unless the two zones can be commingled. Commingling both zones is the optimum way to utilize the existing wellbore. The proposed commingling will result in the continued production of the Gallup formation and recovery of additional hydrocarbons from both the Gallup and Dakota formations, thereby preventing waste. This procedure will not violate correlative rights. Commingling will result in a more efficient operation by helping to lift the small amount of Gallup liquids without the use of a rod pump currently utilized.

September 8, 1989
Page Two

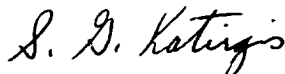
Currently neither the Gallup or the Dakota zones are lifting fluids. A Gallup fluid sample was taken from a south offset, the Zachry #32, and a Dakota fluid sample was taken from a southwest offset, the Zachry #16E.

The attached fluid analysis from these wells indicates the total value of the crude will not be reduced by commingling. The reservoir characteristics of each of the subject zones are such that underground waste would not be caused by the proposed downhole commingling. The calculated bottom hole pressure relative to sea level, based on surface pressure and fluid level measurements, is 282 psi in the Gallup and 560 psi in the Dakota, and within the limits of Rule 303-C, Section 1 (b), Part (6). The fluids from each zone are compatible and no precipitates or emulsions will be formed as a result of commingling to damage either reservoir. Current flow tests of 0 BOPD and 0 BWPD from the Gallup and a trace of water from the Dakota, and anticipated flow rates after commingling of 1 BOPD and 0 water from each zone, indicate the daily production will not exceed the limit of Rule 303-C, Section 1 (a), Parts (1) and (3).

The Aztec District Office will be notified anytime the commingled well is shut in for seven consecutive days. To allocate the commingled production to each of the zones, Union Texas Petroleum will consult with the supervisor of the Aztec District Office and determine an allocation formula for each of the producing zones.

Included with this letter are two plats showing ownership of offsetting leases, a production curve of each zone, Form C-116 (GOR test), Fluid Analysis Report, and a wellbore diagram showing the existing and proposed downhole equipment of the subject well.

Your truly,



S. G. Katirgis
Production Engineer

SGK:lmg
attachments

cc: Frank Chavez, Aztec OCD
W. K. Cooper
S. J. Hunter

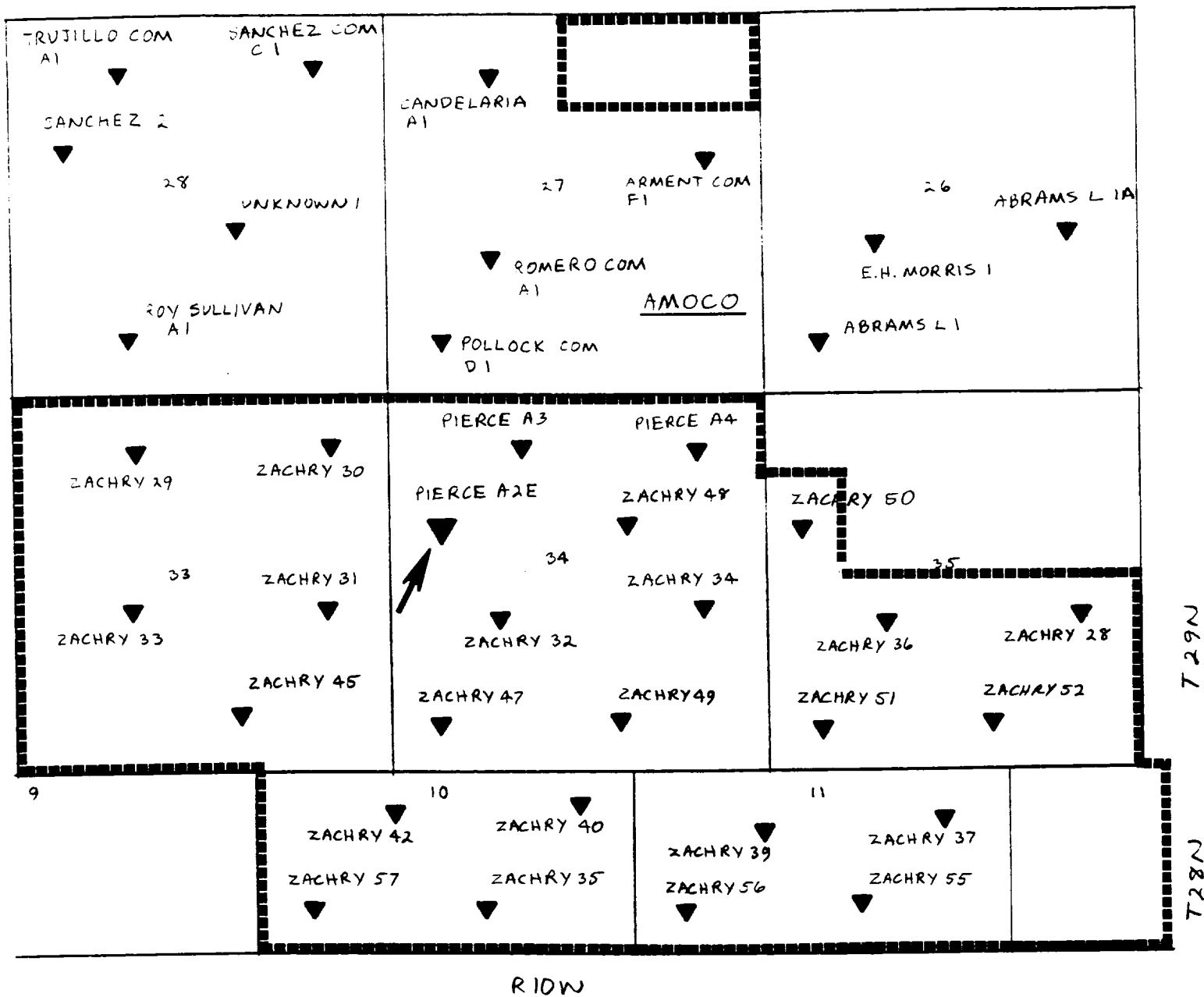


EXHIBIT A - OFFSET GALLUP WELLS



Union Texas Petroleum

SUBJECT: PIERCE A #2E

EXISTING Wellbore Diagram

BY: SGK DATE: 9/7/89

PAGE OF

12 1/4" HOLE
8 5/8" 124*, H-40 @ 292'
Circ cmt to surface

1830 FNL & 860' FNL
SEC 34, T29N-R10W
SAN JUAN CO., NM

5643' GLE
5656' RKB

182 jts, 2 1/16", 3.25", 10rd, 1J, tbg
set @ 5397'. 1.5" SIN & perfed
sub on bottom.

192 jts 2 1/16", 3.25", 10rd, 1J tbg
set @ 6317'. 1.43" SIN & 1jt below
pkr. 6' sub above pkr. 1.5" Model
"L" sliding sleeve above pkr

Sucker rods and rod pump in Gallup
tbg string.

5412'

5732'

5859'

GALLUP

5977'

Baker Model R-3 double grip pkr
@ 6278'

6303'

DAKOTA

6402'

7 7/8" HOLE
5 1/2", 15.5", K-55 @ 6581'
D.V. TOOLS @ 3064' & 5784'

Circ mud during 1st & 3rd
cmt stage. 2nd stage not
cmted. DV tool malfunction.

ID = 6585'
PBTD = 6542'



Union Texas Petroleum

SUBJECT: PIERCE A-2E

COMMINGLED Wellbore Diagram

BY: SGK DATE: 9/7/89

PAGE _____ OF _____

12 1/4" HOLE
8 5/8", 24*, H-40 @ 292'
Circ cmt to surface

830 FNL & 860 FNL
SEC 34, T29N-R10W
SAN JUAN CO., NM

5643' GLE
5656' RKB

2 1/16", 3.25*, J-55, 10rd, 15 tbg
set @ 6390'. S.N. and perfed
sub on bottom.

5412'

5732'

5859' GALLUP

5977'

6303'

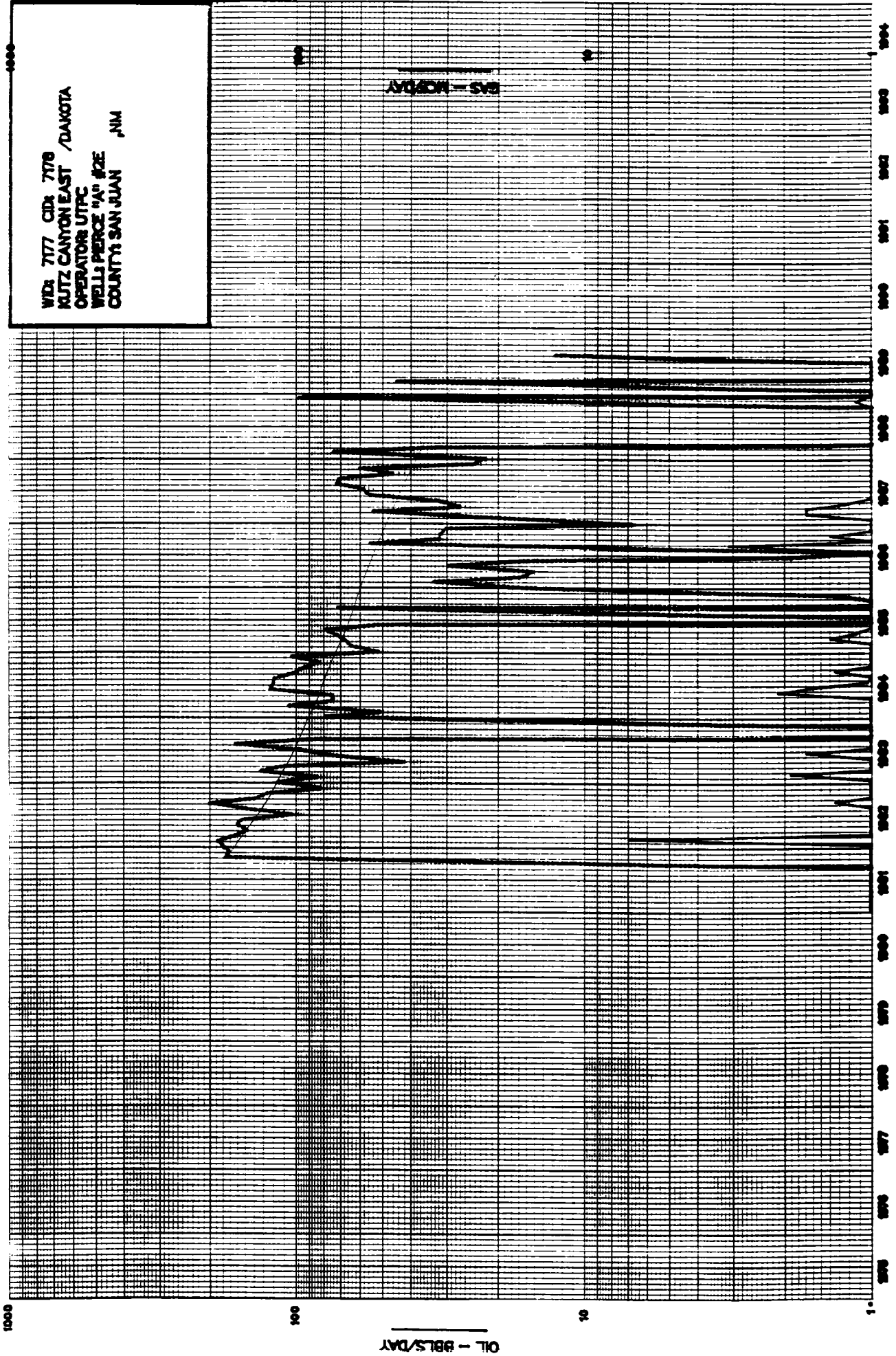
6402'

DAKOTA

7 7/8" HOLE
5 1/2", 15.5*, K-55 @ 6581'
DV TOOLS @ 3064' & 5784'

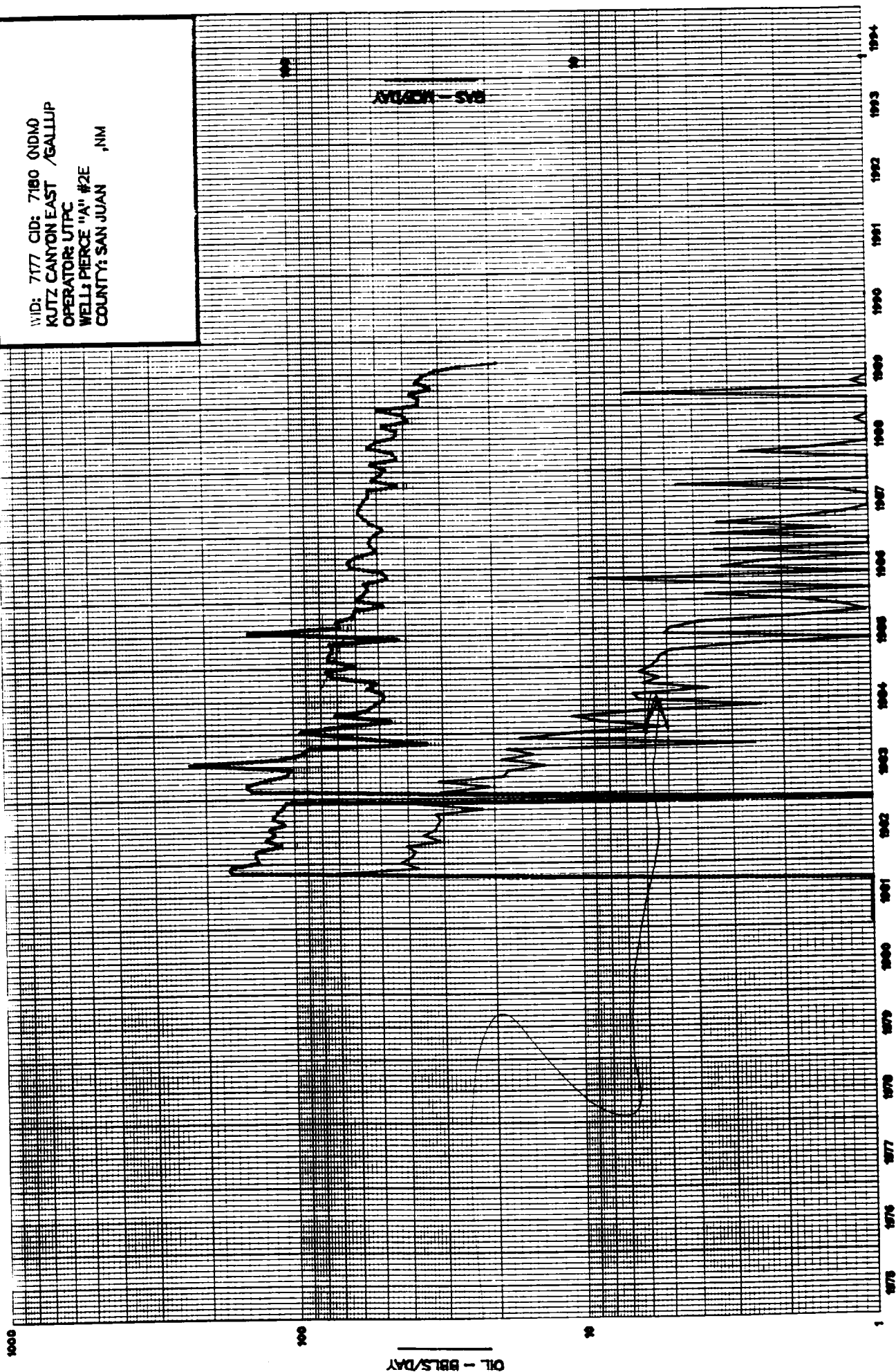
Circ mud during 1st & 3rd
cmt stage. 2nd stage not
cmted. DV tool malfunction.

TD = 6585'
PBD = 6542'



WID: 7177 CID: 7180 QNDNO
KUTZ CANYON EAST /GALLUP
OPERATOR: UTPC
WELL: PIERCE "A" #2E
COUNTY: SAN JUAN ,NM

AVIATION - SVR





Union Texas Petroleum

75 U.S. Highway 64
Termination, New Mexico 87401
Telephone (505) 325-3587

September 8, 1989

Mesa Petroleum
P. O. Box 579
Flora Vista, NM 87415

Gentlemen:

Union Texas Petroleum Corporation is in the process of applying for a downhole commingling order for our Pierce A #2E well located 1830' FNL & 860' FWL, Section 34, Township 29N, Range 10W, NMPM, San Juan County, New Mexico, in the Armenta Gallup and Basin Dakota zones.

This letter is to notify you of such action as our records indicate that you are owner and operator of acreage which adjoins the area in which the downhole commingling is requested. If you have no objections to the proposed downhole 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 greatly appreciated.

Sincerely,

S. G. Katirgis

S. G. Katirgis
Production Engineer

The downhole commingling request is hereby approved:

(Date)



Union Texas Petroleum

375 U.S. Highway 64
Farmington, New Mexico 87401
Telephone (505) 325-3587

September 8, 1989

Southwest Production, Inc.
Attn: Fred Crum
P. O. Box 400
Aztec, NM 87410

Dear Mr. Crum:

Union Texas Petroleum Corporation is in the process of applying for a downhole commingling order for our Pierce A #2E well located 1830' FNL & 860' FWL, Section 34, Township 29N, Range 10W, NMPM, San Juan County, New Mexico, in the Armenta Gallup and Basin Dakota zones.

This letter is to notify you of such action as our records indicate that you are owner and operator of acreage which adjoins the area in which the downhole commingling is requested. If you have no objections to the proposed downhole 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 greatly appreciated.

Sincerely,

S. G. Katirgis
Production Engineer

The downhole commingling request is hereby approved:

(Date)



Union Texas Petroleum

375 U.S. Highway 64
Farmington, New Mexico 87401
Telephone (505) 325-3587

September 8, 1989

Amoco Production Company
34 Southside River Road
Farmington, NM 87401

Gentlemen:

Union Texas Petroleum Corporation is in the process of applying for a downhole commingling order for our Pierce A #2E well located 1830' FNL & 860' FWL, Section 34, Township 29N, Range 10W, NMPM, San Juan County, New Mexico, in the Armenta Gallup and Basin Dakota zones.

This letter is to notify you of such action as our records indicate that you are owner and operator of acreage which adjoins the area in which the downhole commingling is requested. If you have no objections to the proposed downhole 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 greatly appreciated.

Sincerely,

S. G. Katirgis

S. G. Katirgis
Production Engineer

The downhole commingling request is hereby approved:

(Date)



UNION TEXAS PETROLEUM
ZACHRY 16E
ZACHRY 32
LEASE FLUIDS

Rocky Mountain Region

LABORATORY INVESTIGATION
OF
ZACHRY, DAKOTA AND GALLUP FLUIDS COMPATABILITY
SEPTEMBER 11, 1989

PREPARED FOR:

UNION TEXAS PETROLEUM
STERG KATIRGIS
PETROLEUM ENGINEER

PREPARED BY:

BRIAN P. AULT
PETROLEUM ENGINEER
WESTERN COMPANY OF
NORTH AMERICA

SERVICE POINT
FARMINGTON, NEW MEXICO
505-327-6222

LABORATORY INVESTIGATION
ZACHRY 16E
ZACHRY 32

SUMMARY OF RESULTS

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

BRIAN AULT
PETROLEUM ENGINEER
WESTERN COMPANY OF NORTH AMERICA
FARMINGTON DISTRICT
FARMINGTON, N.M.

LABORATORY INVESTIGATION
ZACHRY 16E
ZACHRY 32

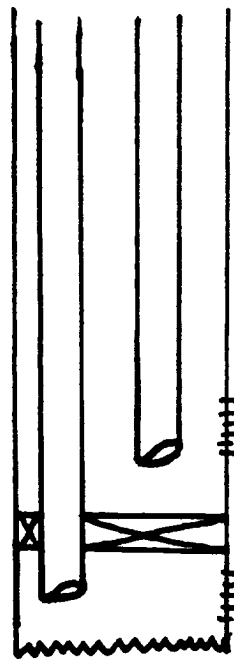
On Tuesday, September 5, 1989, a request for laboratory work was placed by Sterg Katirgis, Petroleum Engineer of Union Texas Petroleum Corporation.

PURPOSE

Two oil samples were received of Mr. Katirgis with the request we investigate the concern of potentially detrimental effects due to commingling of Gallup and Dakota fluids in the Zahcry 16E and 32.

INVESTIGATION

1. Background information - current wellbore
 - a)



PROPOSED GALLUP
PERFORATIONS

EXISTING DAKOTA
PERFORATIONS

- b. BHST gradient: 1.375° f/100 ft. depth
 - c. Current production problems are primarily due to paraffin deposition from surface down to $\approx 1000'$ depth.

LABORATORY INVESTIGATION
ZACHRY 16E
ZACHRY 32

d) Commingling Order Mixture Requirements:

The commingling requests present the mixing of Zachry 16E fluids with Zachry 32 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 tests 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.

LABORATORY INVESTIGATION
ZACHRY 16E
ZACHRY 32

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. Katirgis 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.

LABORATORY INVESTIGATION
ZACHRY 16E
ZACHRY 32

DATA

SAMPLE #1 ZACHRY 16E

ZONE:	DAKOTA
API GRAVITY @ 60° F	57.7
CLOUD POINT	< 20° F
POUR POINT	< 20° F
PARAFFIN CONTENT	.15% (WEIGHT)

SAMPLE #2 ZACHRY 32

ZONE:	GALLUP
API GRAVITY @ 60° F	40.0
CLOUD POINT	77° F
POUR POINT	< 20° F
PARAFFIN CONTENT	4.08% (WEIGHT)

SAMPLE #3 50/50 MIX

ZONE	50/50 MIX, SAMPLE #1 AND #2
API GRAVITY @ 60° F	47.8
CLOUD POINT	63° F
POUR POINT	< 20° F
PARAFFIN CONTENT	1.15% (WEIGHT)

Analysis No. 53-05-89
Date 09 06 89

The Western Company

Oil Analysis

Operator <u>UNION TEXAS PETROLEUM</u>	Date Sampled <u>09 01 89</u>
Well <u>ZACHRY 16E</u>	Date Received <u>09 06 89</u>
Field _____	Submitted By <u>STERG KATIRGIS</u>
Formation <u>DAKOTA</u>	Worked By <u>LEE</u>
Depth _____	Sample Description _____
County _____	OIL/WATER SAMPLE: OIL PHAS IS CLEAR
State _____	YELLOW, WATER PHASE IS ORANGE, SMALL
	AMOUNT OF BOTTOM SOLIDS PRESENT

API Gravity 57.67 ° at 60°F

*Paraffin Content .15 % by weight

*Asphaltene Content NA % by weight

Pour Point <20 °F

Cloud Point <20 °F

sample: 75% H₂O + 25% oil

Comments:

Analyst L. LEE

*Report calculations and data on back.

Analysis No. 53 06 89
Date 09 06 89

The Western Company

Oil Analysis

Operator UNION TEXAS PETROLEUM Date Sampled 09 01 89
Well ZACHRY 32 Date Received 09 06 89
Field _____ Submitted By STERG KATIRGIS
Formation GALLUP Worked By LEE
Depth _____ Sample Description OIL/WATER SAMPLE
County _____ OIL PHASE IS DARK BROWN
State _____ WATER PHASE IS CLEAR. SMALL AMOUNT OF

BOTTOM SOLIDS PRESENT

API Gravity 40.02 at 60°F
*Paraffin Content 4.08 % by weight
*Asphaltene Content NA % by weight
Pour Point <20 °F
Cloud Point 77 °F

SAMPLE 37% H₂O + 63% OIL
Comments:

Analyst L. LEE

*Report calculations and data on back.

Analysis No. 53 07 89
Date 09 11 89

The Western Company

Oil Analysis

Operator <u>UNION TEXAS PETROLEUM</u>	Date Sampled <u>09 01 89</u>
Well _____	Date Received <u>09 06 89</u>
Field _____	Submitted By <u>STERC KATIRCIS</u>
Formation _____	Worked By <u>LEE</u>
Depth _____	Sample Description <u>OIL</u>
County <u>SAN JUAN</u>	<u>50/50 MIX OF ZACHRY 16E</u>
State _____	<u>OIL AND ZACHRY 32 OIL</u>

API Gravity 47.76° at 60°F

*Paraffin Content 1.15 % by weight

*Asphaltene Content NA % by weight

Pour Point <20 °F

Cloud Point 63 °F

Comments:

Analyst _____

*Report calculations and data on back.

ANALYSIS NO. 53-38-89

API FORM 45-1

FIELD RECEIPT NO. _____

API WATER ANALYSIS REPORT FORM

Company <u>Union Texas Petroleum</u>		Sample No. <u>1</u>	Date Sampled	
Field	Legal Description	County or Parish		State
Lease or Unit	Well <u>Zachry 16E</u>	Depth	Formation <u>Dakota</u>	Water, B/D
Type of Water (Produced, Supply, etc.)		Sampling Point		Sampled By

DISSOLVED SOLIDS

CATIONS

	mg/l	me/l
Sodium, Na (calc.)	<u>1105</u>	<u>48.06</u>
Calcium, Ca	<u>42</u>	<u>2.09</u>
Magnesium, Mg	<u>5</u>	<u>.40</u>
Barium, Ba		
Potassium, K ⁺	<u>92</u>	<u>2.35</u>

ANIONS

Chloride, Cl	<u>1443</u>	<u>40.71</u>
Sulfate, SO ₄	<u>123</u>	<u>2.56</u>
Carbonate, CO ₃	<u>0</u>	<u>0</u>
Bicarbonate, HCO ₃	<u>587</u>	<u>9.63</u>

Total Dissolved Solids (calc.)

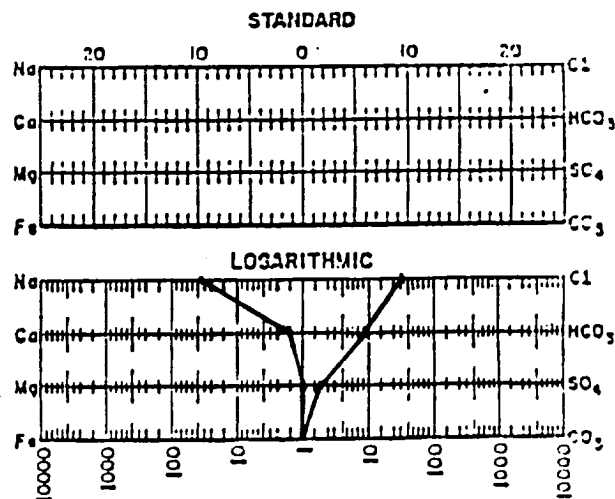
3397Iron, Fe (total) ^{†, ††}0.0Sulfide, as H₂Sneg

REMARKS & RECOMMENDATIONS:

OTHER PROPERTIES

pH	<u>7.81</u>
Specific Gravity, 60/60 F.	<u>1.002</u>
Resistivity (ohm-meters) <u>77</u> F.	<u>1.85</u>
Total hardness	<u>125</u>

WATER PATTERNS — me/l

ANALYST: L. Lee

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

Please refer any questions to: BRIAN AULT

District Engineer

ANALYSIS NO. 53-39-89

API FORM 45-1

FIELD RECEIPT NO. _____

API WATER ANALYSIS REPORT FORM

Company <u>Union Texas Petroleum</u>		Sample No. <u>2</u>	Date Sampled	
Field	Legal Description	County or Parish	State	
Lease or Unit	Well <u>Zachry 32</u>	Depth	Formation <u>Gallup</u>	Water, B/D
Type of Water (Produced, Supply, etc.)		Sampling Point		Sampled By

DISSOLVED SOLIDS

CATIONS	mg/l	me/l
Sodium, Na (calc.)	<u>841</u>	<u>36.56</u>
Calcium, Ca	<u>25</u>	<u>1.25</u>
Magnesium, Mg	<u>4</u>	<u>.36</u>
Barium, Ba	<u>—</u>	<u>—</u>
Potassium, K ⁺	<u>24</u>	<u>.61</u>

ANIONS	mg/l	me/l
Chloride, Cl	<u>1204</u>	<u>33.96</u>
Sulfate, SO ₄	<u>0</u>	<u>0</u>
Carbonate, CO ₃	<u>0</u>	<u>0</u>
Bicarbonate, HCO ₃	<u>294</u>	<u>4.82</u>

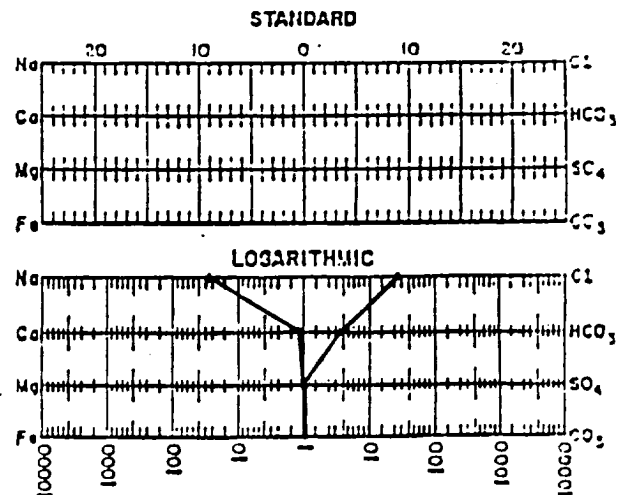
Total Dissolved Solids (calc.) 2,392
 Iron, Fe (total) ^{†, ‡} 0.0
 Sulfide, as H₂S neg

REMARKS & RECOMMENDATIONS:

OTHER PROPERTIES

pH	<u>7.93</u>
Specific Gravity, 60/60 F.	<u>1.001</u>
Resistivity (ohm-meters) <u>77° F.</u>	<u>2.90</u>
Total hardness	<u>80</u>

WATER PATTERNS — me/l

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

Please refer any questions to: BRIAN AULT District Engineer

DATE:

Fig. 1
ACID-OIL EMULSION TESTS DATA SHEET

OPERATOR: U T P

SUBMITTED BY: STERG KATIRGIS

TYPE & CONC. OF FLUID: 50/50 MIX OF GALLUP/DAKOTA

WELL:

SOURCE OF SAMPLE:

TYPE & CONC. OF INHIBITOR: FLUIDS

FIELD:

DATE SAMPLED: 09 01 89

TYPE & CONC. OF SOLIDS: ZACHRY 16E OIL AND WATER

FORMATION: GALLUP/DAKOTA

DATE RECEIVED: 09 06 89

TEST TEMPERATURE: 75°F

DEPTH:

API GRAVITY OF OIL: 47.76

AND ZACHRY 32 OIL

COUNTY: SAN JUAN

OIL/TREATMENT FLUID RATIO:

ANALYSIS BY:

WATER
PERCENTAGE OF ORIGINAL ~~ACID~~ SEPARATED AT VARIOUS TIME INTERVALS AFTER EMULSIFYING

Test Number	1		2		3		4		5		6		7		8	
Additives & Concentration, Gal/1000 Gal																
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: 25 ML GALLUP ZACHRY 32 OIL + 10 ML GALLUP ZACHRY 32 WATER +
25 ML DAKOTA ZACHRY 16E OIL + 40 ML DAKOTA ZACHRY 16E WATER

* Preferential wetting of solids: OS=oil-wet bottom; OO=oil-wet oil phase; WS=water-wet bottom; WO=water-wet oil phase
OI=oil-wet interface; WI=water-wet interface

** Interface: F=Fluid; S=Solid; V=Viscous

LABORATORY INVESTIGATION

ZACHRY 16E

ZACHRY 32

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