



OIL DIVISION

'91 JAN 14 AM 9 44

Amoco Production Company

Southern Division
1670 Broadway
P.O. Box 800
Denver, Colorado 80201
303-830-4040

T. D. Autry
Division Production Manager

FILE- SWD- 376

January 9, 1991

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

File: KJK - 54 - WF

E. E. Elliott SWD No. 1
Formation Water Analysis
NW/4, Section 26, T30N, R9W

Per Administrative Order SWD No. 376, stating that prior to commencing injection operations into said well, the operator shall obtain a formation water sample from the Morrison, Bluff and Entrada formations and shall have said samples analyzed, with the results sent to the Santa Fe office of the Division, find attached water analyses for the subject formations.

The samples were taken while swabbing immediately following perforating and prior to fracture stimulation. The water analyses from the Morrison and Bluff formations showed a total dissolved solids (TDS) level of 24,600 and 35,000 parts per million (ppm). These analyses compare favorably with a water analysis for the Morrison formation from Northeast Blanco Unit NEBU No. 501 which shows a TDS level of 35,100 ppm.

The sample from the Entrada formation showed a TDS level of only 8,800 ppm. We believe the Entrada sample is not representative of the formation water. An Entrada water analysis from the NEBU No. 501 shows 19,000 ppm TDS. Amoco's Entrada formation sample was heavily discolored and required dilution prior to analysis to obtain cation and anion levels. As a result the analysis is showing a total dissolved solids level much lower than expected. We believe the water discoloration was due to the significant lost circulation problems encountered in the Entrada and the mud materials pumped and circulated during drilling to alleviate lost circulation. After perforating and prior to fracture stimulation the Entrada formation was swabbed 5 days and 172 barrels of water recovered. Unfortunately all the recovered water was highly discolored. After the 5 days of swabbing Amoco proceeded with the fracture stimulation.

Should you have any questions please contact Brooke Bell at (303) 830-5341 in Denver.

Sincerely,

T. O. Astry /kjk

Attachments

cc: New Mexico Oil Conservation Division w/ attachments
1000 Rio Brazos Road
Aztec, NM 87410
Attention: Ernie Bush

Buddy Shaw - San Juan Operation Center w/ attachments
J. W. Hawkins - Building w/ attachments

API WATER ANALYSIS REPORT FORM

Laboratory No. 25-901231-2A

Company AMOCO		Sample No.		Date Sampled 11/4	
Field		Legal Description		County or Parish State	
Lease or Unit ELLISIT	Well SWD #1	Depth	Formation Morrison	Water, B/D	
Type of Water (Produced, Supply, etc.)		Sampling Point After Perforating, Swab			
		Prior to Stimulation			

DISSOLVED SOLIDS

CATIONS	mg/l	me/l	pH
Sodium, Na (calc.)	9149	397.8	6.37
Calcium, Ca	3260	16.3	1.020
Magnesium, Mg	32	3.1	0.35
Barium, Ba			

ANIONS

Chloride, Cl	13370	374
Sulfate, So ₄	1052	21.9
Carbonate, CO ₃	8.1	1.3
Bicarbonate, HCO ₃		

Total Dissolved Solids (calc.)

24614

Iron, Fe (total)
Sulfide, as H₂S

REMARKS & RECOMMENDATIONS:

ATTN: Jim Bireane
326-9220

Brook Bell

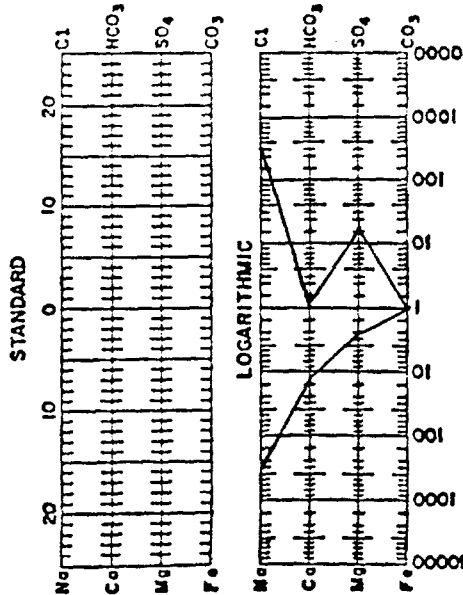
Date Received 12-31-90	Preserved	Date Analyzed 12-31-90	Analyzed By
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TECH, Inc.
333 East Main
Farmington
New Mexico
87401
505/327-3311

Post-It™ brand fax transmittal memo 7671		# of pages 1	
To	J. Bireane	From	MLT
Co.	Amoco	Co.	TECH
Dept.		Phone #	
Fax #	326-9262	Fax #	

WATER PATTERNS — me/l



API WATER ANALYSIS REPORT FORM

Laboratory No. 25-901127-1A

Company AMOCO Production Co.		Sample No.		Date Sampled	
Field		Legal Description		County or Parish	
Lease or Unit E.E. Eliot		Well SWD #1		Depth	
Type of Water (Produced, Supply, etc.) Produced		Formation Bluff		Water, B/D	
Sampling Point Swab after perforating		Sampled By			

DISSOLVED SOLIDS

CATIONS	mg/l	me/l	OTHER PROPERTIES
Sodium, Na (calc.)	12827	557.7	pH <u>6.77</u>
Calcium, Ca	581	29.0	Specific Gravity, 60/60 F. <u>1.025</u>
Magnesium, Mg	109	9.0	Resistivity (ohm-meters) <u>62.6F.</u>
Barium, Ba			

ANIONS

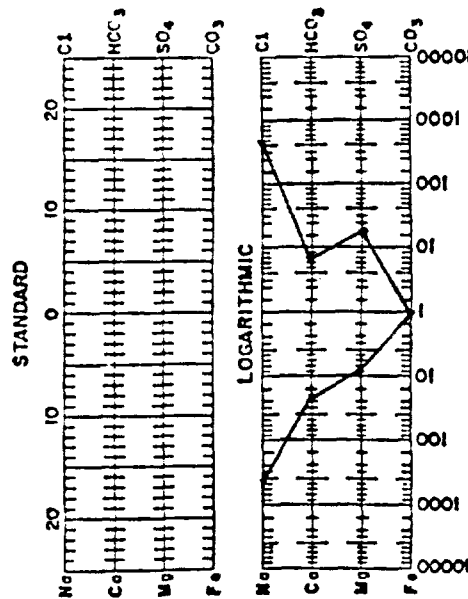
Chloride, Cl	20167	567.2
Sulfate, So ₄	1010	21.0
Carbonate, CO ₃	459	7.5
Bicarbonate, HCO ₃		

Total Dissolved Solids (calc.)

35093

Iron, Fe (total)
Sulfide, as H₂S

WATER PATTERNS — me/l



REMARKS & RECOMMENDATIONS:

Attn: Terry Crews

FAX: 303-247-6825

Date Received 11-27-90	Preserved	Date Analyzed 11-27-90	Analyzed By HL
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TECH, Inc.
333 East Main
Farmington
New Mexico
87401
505/327-3311

API WATER ANALYSIS REPORT FORM

Laboratory No. 25-901119-5A

Company Amoco		Sample No.		Date Sampled	
Field	Legal Description	County or Parish		State	
Lease or Unit	Well E.E. Elliot SWD #1	Depth	Formation Entrada	Water, B/D	
Type of Water (Produced, Supply, etc.)		Sampling Point Swabbing after perforation prior to stimulation	Sampled By		

DISSOLVED SOLIDS

CATIONS	mg/l	me/l	pH
Sodium, Na (calc.)	3022	131.41	Specific Gravity, 60/60 F.
Calcium, Ca	110	5.5	Resistivity (ohm-meters) ____ F.
Magnesium, Mg	9	0.75	
Barium, Ba			

ANIONS

Chloride, Cl	3455	97.47
Sulfate, So ₄	907	18.91
Carbonate, CO ₃		
Bicarbonate, HCO ₃	1246	31.25

Total Dissolved Solids (calc.)

2201
193
-

Iron, Fe (total)
Sulfide, as H₂S

REMARKS & RECOMMENDATIONS:

SAMPLED NOV 15 1990

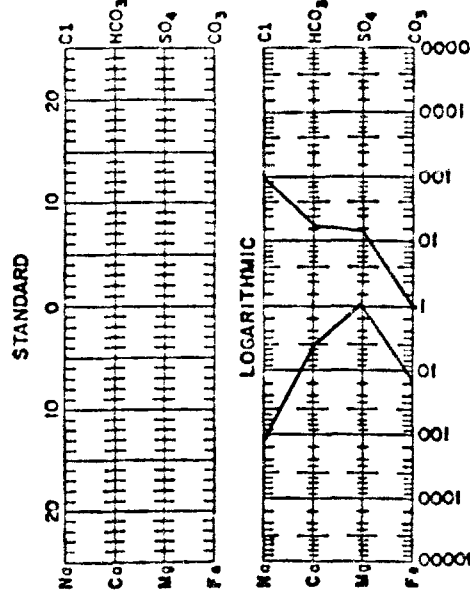
Date Received 19th Nov, 1990.	Preserved	Date Analyzed 20th Nov, 1990.	Analyzed By R.H.
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TECH, Inc.
333 East Main
Farmington
New Mexico
87401
505/327-3311

Post-It™ brand fax transmittal memo 7671		# of pages 2	
To	From	Co.	Dept.
Schm Sullivan	M Lane	Amoco	
Fax #	Phone #		
503 247 6825			

WATER PATTERNS — me/l



75 SUITE STREET
PO BOX 2605
DURANGO, CO 81302
(303) 247-4220

ATTEN: L CLARK
PO BOX 1237
DURANGO, CO 81302
(303) 247-0728

DATE SAMPLED: 3/1/88
WELL NAME: NEPU UNIT 501
LOCATION:
FORMATION: MORRISON PERFS.
SAMPLED FROM:
WELL ON/OFF:

CDS ID #: 1120

CONSTITUENT		ppm	epa
Sodium	Na +	10600	461.1
Potassium	K +	1810	46.3
Calcium	Ca ++	685	34.2
Magnesium	Mg ++	65.9	5.4
Iron Total	Fe++ & Fe+++	230	12.4

Item 3A
SWD-339


POSITIVE SUB-TOTAL 13390.9 557.3565

Chloride	Cl -	18200	513.2
Carbonate	CO3 =	0	0.0
Bicarbonate	HCO3-	537	8.8
Hydroxide	OH -	0	0.0
Sulfate	SO4 =	1750	36.4

NEGATIVE SUB-TOTAL 20487 558.47643

Total Dissolved Solids 35100 ppm
pH 6.71 units
Specific Gravity 1.023 @ 73 F.
Resistivity 24 ohm-cm

APPROVED BY:


DR. JOE BOWDEN, DIRECTOR

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Results are based on analysis made at the time samples are received at the laboratory.

75 SUITE STREET

ATTEN: L. CLARK

DATE SAMPLED: 8/1/88

ATTACHMENT VII 5.

PO BOX 2605

PO BOX 1237

WELL NAME: NEBU UNIT 501

DURANGO, CO 81302

DURANGO, CO 81302

LOCATION:

(303) 247-4220

(303) 247-0728

FORMATION: ENTRADA WATER

SAMPLED FROM:

CDS ID #: 1119

WELL ON/OFF:

CONSTITUENT	ppm	epm
Sodium Na +	4760	207.1
Potassium K +	169	4.3
Calcium Ca ++	1310	65.4
Magnesium Mg ++	29.4	2.4
Iron Total Fe++ & Fe+++	164	8.0

Item 2A
SWD-339

POSITIVE SUB-TOTAL 6432.4 287.9779

Chloride Cl -	8280	233.5
Carbonate CO3 =	0	0.0
Bicarbonate HCO3-	152	2.5
Hydroxide OH -	0	0.0
Sulfate SO4 =	2100	43.7

NEGATIVE SUB-TOTAL 10532 279.70728

Total Dissolved Solids 19000 ppm.
pH 5.07 units
Specific Gravity 1.01 @ 73 F.
Resistivity 45 ohm-cm

APPROVED BY:

DR. JOE BOWEN, DIRECTOR

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