

Chemical Consultants

At 7, per Oil Field Chemical and Services

P.O. Box 421
Farmington, New Mexico 87401

WATER ANALYSIS TEST REPORT

COMPANY HICKS				SHEET NUMBER			
FIELD				COUNTY OR PARISH		DATE 12-2-82	
LEASE OR UNIT SE Cha Cha		WELL(S) NAME OR NO. 36		WATER SOURCE (FOTATION) Well Head		STATE	
DEPTH, FT.	ENT, F	SAMPLE SOURCE	TEMP, F	WATER, LBS/DAY	OIL, LBS/DAY	GAS, MCF/DAY	
TYPE OF OIL		API GRAVITY 0	TYPE OF WATER ☐ PRODUCED WATER ☐ INJECTION WATER ☐ OTHER				

WATER ANALYSIS PATTERN (NUMBER BESIDE ION SYMBOL INDICATES M.G./L. SCALE UNIT)

Na ⁺ 20	15	10	5	0	5	10	15	20 Cl ⁻
Ca ⁺⁺								HCO ₃ ⁻
Mg ⁺⁺								SO ₄ ⁼
Fe ⁺⁺⁺								CO ₃ ⁼

BEFORE EXAMINER QUINTANA

OIL CONSERVATION DIVISION

Hicks EXHIBIT NO. **8**

CASE NO. **8548**

DISSOLVED SOLIDS

CATIONS	mg/l*	mg/l*
Total Hardness	55	27.6
Sodium, Na ⁺ (calc.)	43	8.6
Calcium, Ca ⁺⁺	53.3	1,226.
Magnesium, Mg ⁺⁺	.12	1.5
Iron (Total), Fe ⁺⁺⁺	.15	2.7
ANIONS	mg/l*	mg/l*
Chloride, Cl ⁻	33.8	1200.
Sulfate, SO ₄ ⁼	2.0	95
Carbonate, CO ₃ ⁼	2.3	70.
Bicarbonate, HCO ₃ ⁻	15.9	971.
Hydroxyl, OH ⁻	0	0
Sulfide, S ⁼		
Phosphate-Mono, PO ₃ ⁼		
Phosphate-Ortho, PO ₄ ⁼		

DISSOLVED GASES

Hydrogen Sulfide, H ₂ S	mg/l*
Carbon Dioxide, CO ₂	mg/l*
Oxygen, O ₂	mg/l*

PHYSICAL PROPERTIES

pH	8.12
Eh (Redox Potential)	MV
Specific Gravity	
Turbidity, JTU Units	
Total Dissolved Solids (Calc.)	5,575 mg/l*
Stability Index	6 F
CaSO ₄ Solubility	9 F mg/l*
Max. CaSO ₄ Possible (Calc.)	9 F mg/l*
Max. BaSO ₄ Possible (Calc.)	mg/l*
Residual Hydrocarbons	ppm (Vol/Vol)

SUSPENDED SOLIDS (QUALITATIVE)

Iron Sulfide ☐ Iron Oxide ☐ Calcium Carbonate ☐ Acid Insol. Ma ☐

REMARKS AND RECOMMENDATIONS:

ILLEGIBLE

* NOTE: mg/l and mg/l are commonly used interchangeably for ppm and ppm respectively. Where ppm and mg/l are used, numerical values are the same for specific gravity.

Chemical Consultants

All Types Of Field Chemicals and Supplies

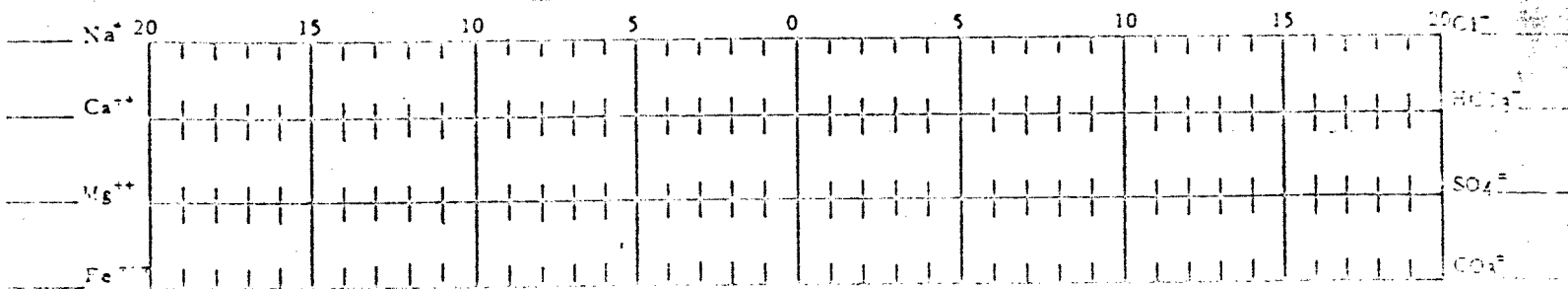
P.O. Box 421

Farmington, New Mexico 87401

WATER ANALYSIS TEST REPORT

COMPANY HICKS				SHEET NUMBER			
FIELD Cha Cha Gallup				DATE 12-13-82			
LEASE OR SALT S.E. Cha Cha				COUNTY OR PARISH San Juan			
WELL(S) NAME OR NO. 37				STATE N.M.			
WATER SOURCE (FORMATION) Well Head							
DEPTH, FT.	ENT, F	SAMPLE SOURCE	TEMP, F	WATER, ERL/DAY	OIL, ERL/DAY	GAS, JOSE/DAY	
TYPE OF OIL		API GRAVITY	TYPE OF WATER ☒ PRODUCED WATER ☐ INJECTION WATER		OTHER		

WATER ANALYSIS PATTERN (SHEET DESIGN OR SYMBOL INDICATES mg/l * SCALE UNIT)



DISSOLVED SOLIDS

CATIONS

Total Hardness	9	450
Sodium, Na ⁺ (calc.)	170.	3910.
Calcium, Ca ⁺⁺	4.2	84
Magnesium, Mg ⁺⁺	4.8	58.3
Iron (Total), Fe ⁺⁺⁺	.03	.5

ANIONS

Chloride, Cl ⁻	164.	5,800.
Sulfate, SO ₄ ⁼	2.5	120
Carbonate, CO ₃ ⁼	0	0
Bicarbonate, HCO ₃ ⁻	12.4	756.
Hydroxyl, OH ⁻	0	0
Sulfide, S ⁼		
Phosphate-Meta, PO ₃ ⁼		
Phosphate-Ortho, PO ₄ ⁼		

DISSOLVED GASES

Hydrogen Sulfide, H ₂ S	mg/l *
Carbon Dioxide, CO ₂	mg/l *
Oxygen, O ₂	mg/l *

PHYSICAL PROPERTIES

pH	7.36
Eh (Redox Potential)	mV
Specific Gravity	
Turbidity, JTU Units	
Total Dissolved Solids (Calc.)	10,272.3 g/l *
Stability Index	θ F
CaCO ₃ Solubility	θ F mg/l *
Max. CaSO ₄ Possible (Calc.)	mg/l *
Max. BaSO ₄ Possible (Calc.)	mg/l *
Residual Hydrocarbons	ppm (Vol/Vol)

SUSPENDED SOLIDS (QUALITATIVE)

Iron Sulfide ☐ Iron Oxide ☐ Calcium Carbonate ☐ Acid Insoluble ☐

REMARKS AND RECOMMENDATIONS:

* NOTE: mg/l and mg/l are commonly used interchangeably for ppm and ppm respectively. Where ppm and ppm are used, conversions should be made for specific gravity.

Chemical Consultants

All Types Oil Field Chemicals and Services

P.O. Box 421
Farmington, New Mexico 87401

WATER ANALYSIS TEST REPORT

COMPANY						SHEET NO. 1 OF 1	
FIELD						DATE	
Hicks						12-13-82	
LEASE OR UNIT				WELL(S) NAME OR NO.		COUNTY OR PARISH	
S.F. Cha Cha				39		San Juan	
WATER SOURCE (FORMATION)				STATE		N.M.	
DEPTH, FT.	TEMP, F	SOURCE SOURCE	TEMP, F	WATER, ERL/DAY	OIL, ERL/DAY	GAS, MCF/DAY	
TYPE OF OIL		TYPE OF WATER					
		☒ PRODUCED WATER		☐ INJECTOR WATER OTHER			

WATER ANALYSIS PATTERN (NUMBER INSIDE ION SYMBOL INDICATES MG/L * SCALE UNIT)

Na ⁺ 20	15	10	5	0	5	10	15	20 Cl ⁻
Ca ⁺⁺								HCO ₃ ⁻
Mg ⁺⁺								SO ₄ ⁼
Fe ⁺⁺								CO ₃ ⁼

DISSOLVED SOLIDS

CATIONS	mg/l *	mg/l *
Total Hardness	9.2	460
Sodium, Na ⁺ (calc.)	175.2	4025
Calcium, Ca ⁺⁺	6.2	124
Magnesium, Mg ⁺⁺	3.0	36.5
Iron (Total), Fe ⁺⁺	.05	1.0
ANIONS	mg/l *	mg/l *
Chloride, Cl ⁻	169.0	6000
Sulfate, SO ₄ ⁼	1.1	55
Carbonate, CO ₃ ⁼	3.6	108
Bicarbonate, HCO ₃ ⁻	10.6	647
Hydroxyl, OH ⁻	0	0
Sulfide, S ⁼		
Phosphate-Mono, PO ₃ ⁼		
Phosphate-Di, PO ₄ ⁼		

DISSOLVED GASES

Hydrogen Sulfide, H ₂ S	mg/l *
Carbon Dioxide, CO ₂	mg/l *
Oxygen, O ₂	mg/l *

PHYSICAL PROPERTIES

pH	8.3
EH (Redox Potential)	MV
Specific Gravity	
Turbidity, JTU Units	
Total Dissolved Solids (Calc.)	10,996.3 mg/l *
Stability Index	0 F
CaSO ₄ Solubility	0 F mg/l *
Max. CaSO ₄ Possible (Calc.)	mg/l *
Max. BaSO ₄ Possible (Calc.)	mg/l *
Residual Hydrocarbons	ppm (Vol/Vol)

SUSPENDED SOLIDS (QUALITATIVE)

Non Soluble ☐ Iron Oxide ☐ Calcium Carbonate ☐ Acid Insoluble ☐

REMARKS AND RECOMMENDATIONS:

* NOTE: mg/l and mg/l are commonly used interchangeably for ppm and ppm respectively. Where ppm and ppm are used, conversions should be made for specific gravity.

Chemical Consultants

417 Type Out Field Chemical and Services

P.O. Box 421
Farmington, New Mexico 87401

WATER ANALYSIS TEST REPORT

COMPANY Hicks Oil & Gas				SHEET NUMBER	
FIELD				DATE 11-29-82	
LEASE OR UNIT S.E. Cha Cha		WELL(S) NAME OR NO. #40		COUNTY OR PARISH	
DEPTH, FT.		TEMP, F		STATE	
WATER SOURCE		WATER SOURCE (FORMATION)		GAS, MMCF/DAY	
OIL, FBL/DAY		GAS, MMCF/DAY		OTHER	
TYPE OF OIL		TYPE OF WATER		OTHER	
☐ PRODUCED WATER		☐ INJECTION WATER		☐ OTHER	

WATER ANALYSIS PATTERN (NUMBER BESIDE ION SYMBOL INDICATES MG/LI* SCALE UNIT)

Na ⁺ 20	15	10	5	0	5	10	15	20 Cl ⁻
Ca ⁺⁺								HCO ₃ ⁻
Mg ⁺⁺								SO ₄ ⁼
Fe ⁺⁺⁺								CO ₃ ⁼

DISSOLVED SOLIDS

CATIONS	mc/l*	mg/l*
Total Hardness		
Sodium, Na ⁺ (calc.)		
Calcium, Ca ⁺⁺		
Magnesium, Mg ⁺⁺		
Iron (Total), Fe ⁺⁺⁺		
ANIONS		
Chloride, Cl ⁻	107.2	3,800
Sulfate, SO ₄ ⁼	.73	35
Carbonate, CO ₃ ⁼		
Bicarbonate, HCO ₃ ⁻		
Hydroxyl, OH ⁻		
Sulfide, S ⁼		
Phosphate-Meta, PO ₃ ⁼		
Phosphate-Ortho, PO ₄ ⁼		

DISSOLVED GASES

Hydrogen Sulfide, H ₂ S	mg/l*
Carbon Dioxide, CO ₂	mg/l*
Oxygen, O ₂	mg/l*

PHYSICAL PROPERTIES

pH	8.0
Ch (Redox Potential)	KV
Specific Gravity	
Turbidity, JTU Units	
Total Dissolved Solids (Calc.)	6,200 mg/l*
Stability Index	0 F
CaSO ₄ Solubility	0 F mg/l*
Max. CaSO ₄ Possible (Calc.)	mg/l*
Max. BaSO ₄ Possible (Calc.)	mg/l*
Residual Hydrocarbons	ppm (Vol/Vol)

SUSPENDED SOLIDS (QUALITATIVE)

Iron Sulfide ☐ Iron Oxide ☐ Calcium Carbonate ☐ Acid Insoluble ☐

REMARKS AND RECOMMENDATIONS:

* NOTE: mc/l, and mg/l are commonly used interchangeably for ppm and ppn respectively. Where ppm and ppn are used, consideration should be made for specific gravity.

LABORER Mike Jones	TEST NO.	ADDRESS P.O. Box 421 Farmington, NM	PHONE (505) 327-7775
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UNICHEM INTERNATIONAL

601 NORTH LEECH

P.O. BOX 1499

MOLES, NEW MEXICO 88240

COMPANY : ENERGY RESERVES GROUP

DATE : 5-22-84

FIELD, LEASE & WELL : E.H. PIPKIN Well #23 PICTURE CLIFF FIELD

SAMPLING POINT: WELLHEAD

DATE SAMPLED : 5-15-84

SPECIFIC GRAVITY = 1.018

TOTAL DISSOLVED SOLIDS = 28012

PH = 7.49

MG/L

MG/L

CATIONS

CALCIUM	(CA)+2	3.8	76.1
MAGNESIUM	(MG)+2	11	133.
SODIUM	(NA), CALC.	457.	10510.

ANIONS

BICARBONATE	(HCO3)-1	21	1281.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDES	(CL)-1	451	16000

DISSOLVED GASES

CARBON DIOXIDE	(CO2)	NOT RUN
HYDROGEN SULFIDE	(H2S)	NOT RUN
OXYGEN	(O2)	NOT RUN

IRON(TOTAL)	(FE)		5.6
BARIUM	(BA)+2	.15	10.3
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = .49

SCALING INDEX

TEMP

CARBONATE INDEX	30C	90C
CALCIUM CARBONATE SCALING	86F	194F
	0.0	1.08
	LIKELY	LIKELY
CALCIUM SULFATE INDEX	-60.	-57.
CALCIUM SULFATE SCALING	UNLIKELY	UNLIKELY

Pictured Cliffs

UNICHEM INTERNATIONAL

601 NORTH LEECH

P.O. BOX 1499

HOBBBS, NEW MEXICO 88210

COMPANY : ENERGY RESERVERS GROUP
DATE : 12-12-83
FIELD LEASE/WELL : G. C. U. #318
SAMPLING POINT: WELLHEAD
DATE SAMPLED : 12-7-83

SPECIFIC GRAVITY = 1.035
TOTAL DISSOLVED SOLIDS = 51298
PH = 6.68

MG/L

MG/L

CATIONS

CALCIUM	(CA)+2	80	1603.
MAGNESIUM	(MG)+2	120	1408.
SODIUM	(NA), CALC.	714.	16423.

ANIONS

BICARBONATE	(HCO3)-1	12.4	756.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDES	(CL)-1	902	32000

DISSOLVED GASES

CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	

IRON(TOTAL)	(FE)		109.
BARIUM	(BA)+2	.82	56
MANCANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = 1.052

SCALING INDEX

TEMP

	30C	48.8C
	86F	120F
CARBONATE INDEX	.293	.694
CALCIUM CARBONATE SCALING	LIKELY	LIKELY
CALCIUM SULFATE INDEX	-.54.	-.54.
CALCIUM SULFATE SCALING	UNLIKELY	UNLIKELY
BARIUM SULFATE INDEX	-.2.1	-.3.3
BARIUM SULFATE SCALING	UNLIKELY	UNLIKELY

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601 NORTH LEECH

P.O. BOX 1499

MORRIS, NEW MEXICO 88143

COMPANY : ENERGY RESERVERS GROUP
DATE : 12-17-83
FIELD : LEASEWELL C.C.U. #315
SAMPLING POINT : WELHEAD
DATE SAMPLED : 12-7-83

SPECIFIC GRAVITY = 1.04
TOTAL DISSOLVED SOLIDS = 59303
PH = 4.61

		MG/L	MG/L
CATIONS			
CALCIUM	(CA)+2	80	1203
MAGNESIUM	(MG)+2	90	1094
SODIUM	(NA)+CAIC.	824.	19191.
ANIONS			
BICARBONATE	(HCO3)-1	4.8	293.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDES	(CL)-1	1000	37000
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		52.5
BARIUM	(BA)+2	1.7	121
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = 1.157

SCALING INDEX	TEMP	
	30C	86.0C
	86F	100F
CARBONATE INDEX	-1.40	0.0
CALCIUM CARBONATE SCALING	UNLIKELY	UNLIKELY
CALCIUM SULFATE INDEX	-57.	-57.
CALCIUM SULFATE SCALING	UNLIKELY	UNLIKELY
BARIUM SULFATE INDEX	-1.1	-1.7
BARIUM SULFATE SCALING	UNLIKELY	UNLIKELY

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601 NORTH LEECH

P.O. BOX 1499

HOEBB, NEW MEXICO 88240

COMPANY : ENERGY RESERVERS GROUP
DATE 12-17-83
FIELD LEASE/DEWELL : G.C.U. 8813
SAMPLING POINT: WELLHEAD
DATE SAMPLED : 12-7-83

SPECIFIC GRAVITY = 1.035
TOTAL DISSOLVED SOLIDS = 53150
PH = 6.92

		MG/L	MG/L
CATIONS			
CALCIUM	(CA)+2	44.6	895.
MAGNESIUM	(MG)+2	48.3	967.
SODIUM	(NA), CAIC.	810.	15870.
ANIONS			
BICARBONATE	(HCO3)-1	11.5	719.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDES	(CL)-1	902	32600
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		57.4
BARIUM	(BA)+2	1.5	108.
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = 999

SCALING INDEX	TEMP	
	30C	86.3C
	86F	120F
CARBONATE INDEX	0.079	0.079
CALCIUM CARBONATE SCALING	LIKELY	LIKELY
CALCIUM SULFATE INDEX	-64.	-65.
CALCIUM SULFATE SCALING	UNLIKELY	UNLIKELY
BARIUM SULFATE INDEX	-1.1	-1.7
BARIUM SULFATE SCALING	UNLIKELY	UNLIKELY

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601 NORTH LEECH

P.O. BOX 1499

MOORE, NEW MEXICO 88240

UNION PACIFIC ENERGY RESERVES GROUP
 12-12-58
 C C U. 4311
 WELLHEAD
 12-7-58

SPECIFIC GRAVITY = 1.085
 TOTAL DISSOLVED SOLIDS = 33433
 RM = 7.57

CATIONS

CALCIUM
 MAGNESIUM
 SODIUM

(CA)+2
 (MG)+2
 (NA), CALC

ME/L

387
 50
 827.

MG/L

761.
 607.
 19026.

ANIONS

BICARBONATE
 CARBONATE
 HYDROXYL
 SULFATE
 CHLORIDE

(HCO3)-1
 (CO3)-2
 (OH)-1
 (SO4)-2
 (CL)-1

13.6
 0
 0
 0
 902

829.
 0
 0
 0
 32000

DISSOLVED GASES

CARBON DIOXIDE
 HYDROGEN SULFIDE
 OXYGEN

(CO2)
 (H2S)
 (O2)

NOT RUN
 NOT RUN
 NOT RUN

IRON (TOTAL)
 BARIUM
 MANGANESE

(FE)
 (BA)+2
 (MN)

1.5
 NOT RUN

13
 108

IONIC STRENGTH (MOLAL) = .995

SCALING INDEX

CARBONATE INDEX
 CALCIUM CARBONATE SCALING
 CALCIUM SULFATE INDEX
 CALCIUM SULFATE SCALING
 BARIUM SULFATE INDEX
 BARIUM SULFATE SCALING

TEMP

80C 42.5C
 86F 120F
 611 1.01
 LIKELY LIKELY
 -66. -67.
 UNLIKELY UNLIKELY
 -1.1 -1.7
 UNLIKELY UNLIKELY

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201 NORTH LEECH

P.O. BOX 1499

MOORE, NEW MEXICO 88240

COMPANY : ENERGY RESERVE GROUP
DATE : 12-12-83
FIELD : LEASEWELL : G. C. U. #303
SAMPLING POINT : SEPARATOR
DATE SAMPLED : 12-7-83

SPECIFIC GRAVITY = 1.062
TOTAL DISSOLVED SOLIDS = 48101
PH = 7.10

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	38	781
MAGNESIUM	(MG)+2	37	609
SODIUM	(NA)+1	751	17229
ANIONS			
BICARBONATE	(HCO3)-1	8.2	500
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDES	(CL)-1	818	27000

DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	

IRON(TOTAL)	(FE)		9.8
BARIUM	(BA)+2	1.7	123
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOL/L) = .895

SCALING INDEX		TEMP	
		30C	48.8C
		86F	120F
		.194	.394
CARBONATE INDEX		LIKELY	LIKELY
CALCIUM CARBONATE SCALING			
CALCIUM SULFATE INDEX		.63	.64
CALCIUM SULFATE SCALING		UNLIKELY	UNLIKELY
BARIUM SULFATE INDEX		-.91	-1.6
BARIUM SULFATE SCALING		UNLIKELY	UNLIKELY

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801 NORTH LEECH

P.O. BOX 1099

HOBBES, NEW MEXICO 88240

COMPANY : ENERGY RESERVES GROUP
DATE : 12-12-83
FIELD NO. : 88AUBILL C.O.C.U. : 251
SAMPLING POINT : WELLSHEAD
DATE SAMPLED : 12-7-83

SPECIFIC GRAVITY = 1.043
TOTAL DISSOLVED SOLIDS = 23770
PH = 7.18

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	36.6	736
MAGNESIUM	(MG)+2	45.5	551
SODIUM	(NA)+1	1029	23670
ANIONS			
BICARBONATE	(HCO3)-1	11.6	737
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDES	(CL)-1	1100	38000
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON (TOTAL)	(FE)		10.3
BARIUM	(BA)+2	1.5	106
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MCLAL) = 1.191

SCALING INDEX

TEMP

	30C	75.8C
	86F	180F
	306	708
CARBONATE INDEX	LIKELY	LIKELY
CALCIUM CARBONATE SCALING		
CALCIUM SULFATE INDEX	-72	-75
CALCIUM SULFATE SCALING	UNLIKELY	UNLIKELY
BARIUM SULFATE INDEX	-1.5	-2.0
BARIUM SULFATE SCALING	UNLIKELY	UNLIKELY

UNICHEM INTERNATIONAL

801 NORTH LEECH

P.O. BOX 1679

ROSEBURY, NEW MEXICO 88240

COMPANY : ENERGY RESERVES GROUP
DATE : 12-12-83
FIELD : LEASEWELL C O U. 1300
SAMPLING POINT : SEPARATOR
DATE SAMPLED : 12-7-83

SPECIFIC GRAVITY = 1.032
TOTAL DISSOLVED SOLIDS = 28139
PR = 7.11

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	33.3	336
MAGNESIUM	(MG)+2	51.6	528
SODIUM	(NA), CALC	742	17076
ANIONS			
BICARBONATE	(HCO3)-1	9.8	997
CARBONATE	(CO3) 2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDES	(CL)-1	818	29100
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON (TOTAL)	(FE)		15.1
BARIUM	(BA)+2	2.0	138
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = .902

SCALING INDEX	TEMP	
	80C	46.8C
	266F	120F
CARBONATE INDEX	.873	.473
CALCIUM CARBONATE SCALING	LIKELY	LIKELY
CALCIUM SULFATE INDEX	.65	.66
CALCIUM SULFATE SCALING	UNLIKELY	UNLIKELY
BARIUM SULFATE INDEX	.81	.1.2
BARIUM SULFATE SCALING	UNLIKELY	UNLIKELY

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601 NORTH LEECH

P.O. BOX 1499

MOSES, NEW MEXICO 88245

COMPANY : ENERGY RESERVES
DATE : 12-12-88
FIELD: LEASWELL G C U 1230
SAMPLING POINT: SEPP/TCR
DATE SAMPLED : 12-7-88

SPECIFIC GRAVITY = 1.035
TOTAL DISSOLVED SOLIDS = 83463
PH = 7.05

		MG/L	MG/L
CATIONS			
CALCIUM	(CA)*2	41.3	828
MAGNESIUM	(MG)*2	36.6	183
SODIUM	(NA)*CALC.	837.	19151
ANIONS			
BICARBONATE	(HCO3)-1	13.4	817.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDES	(CL)-1	502	31000
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		9.1
BARIUM	(BA)*2	1.7	120
MANCANESE	(MNE)	NOT RUN	

IONIC STRENGTH (MOLAL) = .993

SCALING INDEX	TEMP	
	30C	48.8C
	86F	120F
CARBONATE INDEX	.252	.652
CALCIUM CARBONATE SCALING	LIMFLY	LIMFLY
CALCIUM SULFATE INDEX	.65	.66
CALCIUM SULFATE SCALING	UNLIKELY	UNLIKELY
BARIUM SULFATE INDEX	-1.0	-1.5
BARIUM SULFATE SCALING	UNLIKELY	UNLIKELY

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601 NORTH LEECH

P.O. BOX 1499

MOBEE, NEW MEXICO 88240

COMPANY: ENERGY RESERVES GROUP
DATE: 12-12-83
WELL: LEASTWELL C C H 4237
SAMPLING POINT: WELHEAD
DATE SAMPLED: 12-7-83

SPECIFIC GRAVITY = 1.038
TOTAL DISSOLVED SOLIDS = 56746
PH = 7.1

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	39.3	786.
MAGNESIUM	(MG)+2	28.6	470.
SODIUM	(NA) CALC.	895.	20594.
ANIONS			
BICARBONATE	(HCO3)-1	9.8	597.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	0	0
CHLORIDE	(CL)-1	964	35200
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		49.6
BARIUM	(BA)+2	1.4	90.8
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = 1.055

SCALING INDEX	TEMP	
	28C	48.8C
	86F	100F
CARBONATE INDEX	.103	.503
CALCIUM CARBONATE SCALING	Likely	Likely
CALCIUM SULFATE INDEX	-.68	-.68
CALCIUM SULFATE SCALING	Unlikely	Unlikely
BARIUM SULFATE INDEX	-1.3	-2.0
BARIUM SULFATE SCALING	Unlikely	Unlikely

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HOBBES, NEW MEXICO 88240

COMPANY : ENERGY RESERVES GROUP
DATE : 7-5-84
FIELD, LEASE, WELL : OH RANBAL GALIUP
SAMPLING POINT: SEPERATOR
DATE SAMPLED : 6-29-84

SPECIFIC GRAVITY = 1.007
TOTAL DISSOLVED SOLIDS = 11292
PH = 6.08

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	.96	19.3
MAGNESIUM	(MG)+2	.72	8.7
SODIUM	(NA), CALC.	171.	3939.
ANIONS			
BICARBONATE	(HCO3)-1	34	2074.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	26.0	1250
CHLORIDES	(CL)-1	113	4000
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		764
BARIUM	(BA)+2	.01	1
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = .189

SCALING INDEX	TEMP
	30C 48.8C
	86F 120F
CARBONATE INDEX	-1.4 -1.0
CALCIUM CARBONATE SCALING	UNLIKELY UNLIKELY
CALCIUM SULFATE INDEX	-28. -28.
CALCIUM SULFATE SCALING	UNLIKELY UNLIKELY

Galley

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601 NORTH LEECH

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HOBBS, NEW MEXICO 88240

COMPANY : ENERGY RESOURCES
 DATE : 5-6-82
 FIELD, LEASE & WELL : N.E. HOGBACK WELL #33
 SAMPLING POINT:
 DATE SAMPLED : 4-28-82

SPECIFIC GRAVITY = 1.04
 TOTAL DISSOLVED SOLIDS = 59866
 pH = 6.7

		MG/L	MG/L
CATIONS			
CALCIUM	(CA)+2	70	1402.
MAGNESIUM	(MG)+2	20	243.
SODIUM	(NA), CALC.	936.	21538.
ANIONS			
BICARBONATE	(HCO3)-1	10	610.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	1.6	80
CHLORIDES	(CL)-1	1015.	35991.
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	1	17.0
OXYGEN	(O2)	NOT RUN	
IRON (TOTAL)	(FE)		3.2
CHROMIUM	(CR)+2	1.0	73.2
MANGANESE	(MN)	NOT RUN	

SCALING INDEX

TEMP

CARBONATE INDEX
 CALCIUM CARBONATE SCALING

30C
 86F
 .952
 LIKELY

SULFATE INDEX
 CALCIUM SULFATE SCALING

-34.
 UNLIKELY

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HOBBS, NEW MEXICO 88240

COMPANY : ENERGY RESOURCES
DATE : 5-6-82
FIELD, LEASE & WELL : N.E. HOGBACK TANK BATTERY #2
SAMPLING POINT: HEATER TREATER
DATE SAMPLED : 4-28-82

SPECIFIC GRAVITY = 1.027
TOTAL DISSOLVED SOLIDS = 40747
PH = 7.42

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	17.3	347.
MAGNESIUM	(MG)+2	19.6	239.
SODIUM	(NA), CALC.	657.	15110.
ANIONS			
BICARBONATE	(HCO3)-1	16.8	1025.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	31.5
SULFATE	(SO4)-2	.55	23994.
CHLORIDES	(CL)-1	676.	
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)	.36	3.6
BARIUM	(BA)+2	NOT RUN	25.1
MANGANESE	(MN)		

SCALING INDEX

CARBONATE INDEX
CALCIUM CARBONATE SCALING
SULFATE INDEX
CALCIUM SULFATE SCALING

TEMP

30C
86F
1.15
LIKELY
-100
UNLIKELY

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HOBBS, NEW MEXICO 88240

COMPANY : ENERGY RESOURCES
DATE : 5-6-82
FIELD, LEASE & WELL : N.E. HOGBACK WELL #8
SAMPLING POINT:
DATE SAMPLED : 4-28-82

SPECIFIC GRAVITY = 1.029
TOTAL DISSOLVED SOLIDS = 43892
PH = 7.12

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	23.3	467.
MAGNESIUM	(MG)+2	12.6	153.
SODIUM	(NA), CALC.	712.	16371.
ANIONS			
BICARBONATE	(HCO3)-1	14.4	878.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	.54	26
CHLORIDES	(CL)-1	733.	25994.
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	0	0
HYDROGEN SULFIDE	(H2S)	4.5	74.6
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		1.6
BARIUM	(BA)+2	.07	5.3
MANGANESE	(MN)	NOT RUN	

SCALING INDEX	TEMP
CARBONATE INDEX	30C
CALCIUM CARBONATE SCALING	86F
	.968
	LIKELY
SULFATE INDEX	-121
CALCIUM SULFATE SCALING	UNLIKELY

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HOBBES, NEW MEXICO 88240

COMPANY : CHACE OIL CO.

DATE : 9-5-84

FIELD, LEASE & WELL : JICARILLA 71-30

SAMPLING POINT: SEPERATOR

DATE SAMPLED : 8-27-84

SPECIFIC GRAVITY = 1.01

TOTAL DISSOLVED SOLIDS = 17892

PH = 7.67

CATIONS

CALCIUM
MAGNESIUM
SODIUM

ANIONS

BICARBONATE
CARBONATE
HYDROXIDE
SULFATE
CHLORIDES

DISSOLVED GASES

CARBON DIOXIDE
HYDROGEN SULFIDE
OXYGEN

IRON (TOTAL)
BARIUM
MANGANESE

ONIC STRENGTH (MOLAL) = .313

SCALING INDEX

REONATE INDEX
LICIUM CARBONATE SCALING
LICIUM SULFATE INDEX
LICIUM SULFATE SCALING

(CA)+2
(MG)+2
(NA), CALC.

(HCO3)-1
(CO3)-2
(OH)-1
(SO4)-2
(CL)-1

(CO2)
(H2S)
(O2)

(FE)
(BA)+2
(MN)

ME/L

MG/L

5
5
290.

100.
60.7
6674.

13.4
0
0
4.9
282

817.
0
0
237.
10000

NOT RUN
NOT RUN
NOT RUN

.03
NOT RUN

1.7
1.8

TEMP

30C
86F
.252
LIKELY

45.8C
120F
.453
LIKELY

-46.
UNLIKELY
-56.
UNLIKELY

Gallup - Combined

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601 NORTH LEECH

HOBBES, NEW MEXICO 88240

COMPANY : CHACE OIL CO.
DATE : 9-5-84
FIELD : LEASEWELL : JICARILLA 71-27
SAMPLING POINT : SEPARATOR
DATE SAMPLED : 8-27-84

SPECIFIC GRAVITY = 1.003
TOTAL DISSOLVED SOLIDS = 6747
PH = 7.96

CATIONS

CALCIUM
MAGNESIUM
SODIUM

(CA)+2
(MG)+2
(NA), CALC.

ME/L

MG/L

1.5
1.8
110.

30.0
22.2
2533.

ANIONS

BICARBONATE
CARBONATE
HYDROXIDE
SULFATE
CHLORIDES

(HCO3)-1
(CO3)-2
(OH)-1
(SO4)-2
(CL)-1

.6
0
0
10.9
102

36.6
0
0
525
3600

DISSOLVED GASES

CARBON DIOXIDE
HYDROGEN SULFIDE
OXYGEN

(CO2)
(H2S)
(O2)

NOT RUN
NOT RUN
NOT RUN

1.4
.2

IRON(TOTAL)
BARIUM
MANGANESE

(FE)
(BA)+2
(MN)

0
NOT RUN

IONIC STRENGTH (MOLAL) = .122

SCALING INDEX

CARBONATE INDEX
CALCIUM CARBONATE SCALING
CALCIUM SULFATE INDEX
CALCIUM SULFATE SCALING

TEMP
30C
86F
-88

UNLIKELY

-26.
UNLIKELY

48.8C
120F
-47

UNLIKELY

-26.
UNLIKELY

Continued

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601 NORTH LEECH

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HOBBS, NEW MEXICO 88240

COMPANY : CHASE OIL COMPANY
 DATE : 4-19-84
 FIELD, LEASE, WELL : WELL #71-14
 SAMPLING POINT: SEPARATORS
 DATE SAMPLED : 4-11-84

SPECIFIC GRAVITY = 1.009
 TOTAL DISSOLVED SOLIDS = 17604
 PH = 7.69

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	5.3	106.
MAGNESIUM	(MG)+2	1.3	16.2
SODIUM	(NA), CALC.	289.	6857.
ANIONS			
BICARBONATE	(HCO3)-1	10.6	646.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	3.6	175.
CHLORIDES	(CL)-1	282	10000
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		11
BARIUM	(BA)+2	83	2
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = .306

SCALING INDEX	TEMP
	30C 48.8C
	86F 120F
CARBONATE INDEX	.206 .607
CALCIUM CARBONATE SCALING	LIKELY LIKELY
CALCIUM SULFATE INDEX	-.66. -.66.
CALCIUM SULFATE SCALING	UNLIKELY UNLIKELY

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601 NORTH LEECH

P.O. BOX 1499

MOORE, NEW MEXICO 88240

COMPANY : CHASS OIL COMPANY
DATE : 4-19-84
FIELD / LEASEWELL : WELL 471-21
SAMPLING POINT: SEPARATORS
DATE SAMPLED : 4-11-84

SPECIFIC GRAVITY = 1.009
TOTAL DISSOLVED SOLIDS = 15493
PH = 8.3

		MG/L	MG/L
CATIONS			
CALCIUM	(CA)+2	2.6	53.4
MAGNESIUM	(MG)+2	2.6	32.3
SODIUM	(NA), CALC.	257.	5910.
ANIONS			
BICARBONATE	(HCO3)-1	7	427.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	1.4	68
CHLORIDES	(CL)-1	256	9000
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		6.4
BARIUM	(BA)+2	.03	2.4
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = .269

SCALING INDEX	TEMP	
	30C	48.5C
	86F	100F
CARBONATE INDEX	.352	.754
CALCIUM CARBONATE SCALING	LIKELY	LIKELY
CALCIUM SULFATE INDEX	-.45.	-.46.
CALCIUM SULFATE SCALING	UNLIKELY	UNLIKELY

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601 NORTH LEECH

HOEBBS, NEW MEXICO 88240

COMPANY : ENERGY RESERVES GROUP
 DATE : 7-5-84
 FIELD : LEASESWELL : OH RANDAL DAKOTA
 SAMPLING POINT : SEPERATOR
 DATE SAMPLED : 6-29-84

SPECIFIC GRAVITY = 1
 TOTAL DISSOLVED SOLIDS = 48
 pH = 6.29

CATIONS

CALCIUM
 MAGNESIUM
 SODIUM

(CA)+2
 (MG)+2
 (NA).CALC.

ME/L

MG/L

8.0
 2.4
 45

ANIONS

BICARBONATE
 CARBONATE
 HYDROXIDE
 SULFATE
 CHLORIDES

(HCO3)-1
 (CO3)-2
 (OH)-1
 (SO4)-2
 (CL)-1

.6
 0
 0
 0.02
 0

36.6
 0
 0
 1
 0

DISSOLVED GASES

CARBON DIOXIDE
 HYDROGEN SULFIDE
 OXYGEN

(CO2)
 (H2S)
 (O2)

NOT RUN
 NOT RUN
 NOT RUN

27.1
 2

IRON(TOTAL)
 CURIUM
 MANGANESE

(FE)
 (EA)+2
 (MN)

0
 NOT RUN

IONIC STRENGTH (MOLAL) = 1E-03

SCALING INDEX

CARBONATE INDEX
 CALCIUM CARBONATE SCALING
 CALCIUM SULFATE INDEX
 CALCIUM SULFATE SCALING

TEMP

50C
 86F
 2.66
 LIKELY

48.5C
 120F
 3.04
 LIKELY

-19.
 UNLIKELY

-19.
 UNLIKELY

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LEECH
MOERS, NEW MEXICO 88240

SPECIFIC GRAVITY = 1.01
TOTAL DISSOLVED SOLIDS = 16158
pH = 6.98

(C2) + 2
(HG) + 2
(HA) . CALC.

(HCO₃) - 1
(CO₃) - 2
(OH) - 1
(SO₄) - 2
(CL) - 1

4
0
0
3
2 7 0

NOT
NOT
NOT

(CO2)
(H2S)
(O2)

$$\begin{pmatrix} EE \\ EA \\ EN \end{pmatrix} + 2$$

TEMP

200
B 6 E

UNLIKELY

UNCLAS

MC / L

200.
474.
5525.

390.
0
0
170
9597.

3712
0.68

NOT valid

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HOBBS, NEW MEXICO 88240

COMPANY : ENERGY RESERVES GROUP
 DATE : 5-22-84
 FIELD, LEASE & WELL : E.H. PIPKIN WELL #8 DAKOTA FIELD
 SAMPLING POINT: WELLHEAD
 DATE SAMPLED : 5-15-84

SPECIFIC GRAVITY = 1
 TOTAL DISSOLVED SOLIDS = 734
 pH = 7.61

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	.6	12.0
MAGNESIUM	(MG)+2	.5	6.0
SODIUM	(NA).CALC.	9.6	222.
ANIONS			
BICARBONATE	(HCO3)-1	3.2	195.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	.58	28
CHLORIDES	(CL)-1	7	260
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		23.3
BARIUM	(BA)+2	.16	11
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) = .012

SCALING INDEX	TEMP
	30C 90C
	86F 194F
CARBONATE INDEX	1.28 3.17
CALCIUM CARBONATE SCALING	LIKELY LIKELY
CALCIUM SULFATE INDEX	-19. -19.
CALCIUM SULFATE SCALING	UNLIKELY UNLIKELY