

CHEMICAL & GEOLOGICAL LABORATORIES

P. O. Box 2794
Casper, Wyoming

RECEIVED

OCT 21 1980

COLO. OIL & GAS CONS. COMM.

WATER ANALYSIS REPORT

APR 125-06190

OPERATOR J-W Operating CompanyWELL NO. KD Farms 1-22FIELD MildredCOUNTY YumaSTATE ColoradoDATE 10-13-80LAB NO. 35453LOCATION NE NE Section 22-2S-46WFORMATION MudstoneINTERVAL 2244-2258SAMPLE FROM Production separator (9-16-80)

REMARKS & CONCLUSIONS:

Cations	mg/l	meq/l
Sodium	7645	332.54
Potassium	325	8.32
Lithium	-	-
Calcium	53	2.64
Magnesium	45	3.70
Iron	-	-
Total Cations		347.20

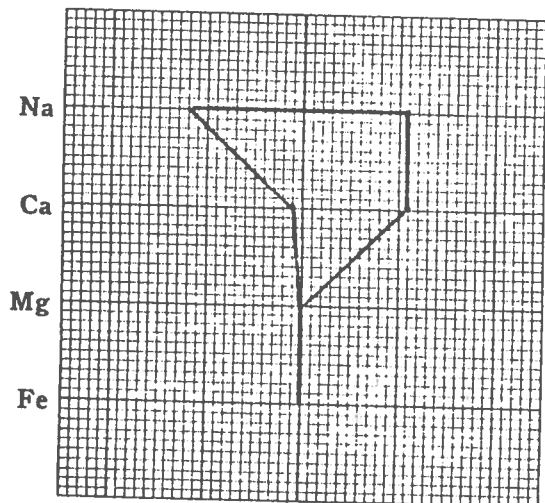
Anions	mg/l	meq/l
Sulfate	9	0.19
Chloride	11500	324.30
Carbonate	0	0.00
Bicarbonate	1385	22.71
Hydroxide	-	-
Hydrogen sulfide	-	-
Total Anions		347.20

Total dissolved solids, mg/l	20259
NaCl equivalent, mg/l	19989
Observed pH	7.6

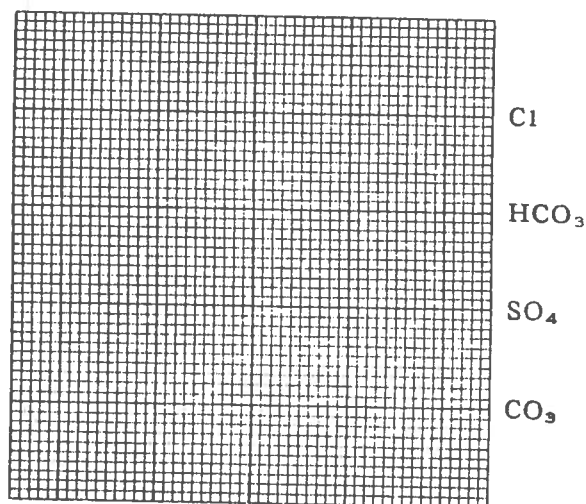
Specific resistance @ 68°F.:	
Observed	0.45 ohm-meters
Calculated	0.34 ohm-meters

WATER ANALYSIS PATTERN

Sample above described

Scale
MEQ per Unit

Cl	20
HCO ₃	2
SO ₄	2
CO ₃	2



(Na value in above graphs includes Na, K, and Li)
NOTE: Mg/l = Milligrams per liter Meq/l = Milligram equivalents per liter
Sodium chloride equivalent = by Dunlap & Hawthorne calculation from components

COLORADO OIL AND GAS CONSERVATION COMMISSION
Room 721, State Centennial Building
1313 Sherman Street
Denver, Colorado 80203
March 18, 1981

MEMO

TO: Douglas V. Rogers
FROM: Carroll G. McDowell
SUBJECT: Evaluation of Retaining Pits.

On February 9, 1981, an evaluation was made of the retaining pits in the Eckley Field, Yuma County, Colorado.

Mesa Petroleum Co.	Conrad 1-30	SE $\frac{1}{4}$ SW $\frac{1}{4}$ 30-4N-45W
" " "	Conrad 1-31	NE $\frac{1}{4}$ NW $\frac{1}{4}$ 31-4N-45W
" " "	Conrad 1-32	NW $\frac{1}{4}$ NW $\frac{1}{4}$ 32-4N-45W
" " "	Conrad 2-25	NW $\frac{1}{4}$ NW $\frac{1}{4}$ 25-4N-46W
" " "	Conrad 3-25	E $\frac{1}{2}$ SW $\frac{1}{4}$ 25-4N-46W
" " "	Eckley/Kitzmilller 1-5	NE $\frac{1}{4}$ SE $\frac{1}{4}$ 5-3N-45W
" " "	Eckley/Kitzmilller 1-28	SW $\frac{1}{4}$ SW $\frac{1}{4}$ 28-4N-45W
" " "	Eckley/Kitzmilller 1-32	SE $\frac{1}{4}$ SW $\frac{1}{4}$ 32-4N-45W
" " "	Kitzmilller 2-33	NW $\frac{1}{4}$ NW $\frac{1}{4}$ 33-4N-45W
" " "	Eckley/Conrad 1-6	NE $\frac{1}{4}$ NE $\frac{1}{4}$ 6-3N-45W
" " "	Eckley/Conrad 1-25	C SE $\frac{1}{4}$ 25-4N-46W
" " "	Eckley/State 1-36	SE $\frac{1}{4}$ SE $\frac{1}{4}$ 36-4N-46W
" " "	Eckley/State 2-36	NE $\frac{1}{4}$ NE $\frac{1}{4}$ 36-4N-46W

These wells produce gas from the Niobrara formation, with the produced water analysis having a total dissolved solids (TDS) of 7000-12,000 ppm. The operator states that each lease has no retaining pit, but one (1) water disposal tank with an inflow of one (1) barrel of produced water per day. A few water wells exist in the area and the distance to the nearest creek is from 1-4 miles west.

The geology shows Dune Sand is deposited on the surface, underlain by the Ogallala formation, the main aquifer. The top of the Pierre formation is at a depth from 325 feet to 450 feet in this area.

Recommend that the produced water be injected, or hauled to an approved disposal facility. Should retaining pits be used, each one should be sealed or lined, and if not covered, must be kept free of oil accumulations. The above conditions of approval would eliminate the possible pollution of surface and subsurface aquifers in the area.

JUN 30 1983

CHEMICAL & GEOLOGICAL LABORATORIES

P. O. Box 2794
Casper, Wyoming

COLO. OIL & GAS CONS. COMM



02091902

API 025-06072

WATER ANALYSIS REPORT

OPERATOR Kansas Nebraska Natural Gas
 WELL NO. Bruder Water! Bruder 1-7
 FIELD NESE 7-25-43W
 COUNTY _____
 STATE Colorado

DATE May 19, 1977 LAB NO. 23552-2
 LOCATION _____
 FORMATION NIOBRARA
 INTERVAL _____
 SAMPLE FROM Gin Bottle

REMARKS & CONCLUSIONS:

Iron (Fe), mg/l - - - - - 7.40

Total hardness as CaCO₃, mg/l - - - - - 1463

Extremely hard water. Mineral solids exceed recommended maxima and this water is not suitable for domestic use.

Cations	mg/l	meq/l
Sodium - - - - -	211	9.20
Potassium - - - - -	40	1.02
Lithium - - - - -		
Calcium - - - - -	392	19.56
Magnesium - - - - -	118	9.70
Iron - - - - -	-	

Anions	mg/l	meq/l
Sulfate - - - - -	1550	32.24
Chloride - - - - -	44	1.24
Carbonate - - - - -	-	
Bicarbonate - - - - -	366	6.00
Hydroxide - - - - -		
Hydrogen sulfide - - - - -	-	

Total Cations - - - - - 39.48

Total Anions - - - - - 39.48

Total dissolved solids, mg/l - - - - -	2535
NaCl equivalent, mg/l - - - - -	1777
Observed pH - - - - -	7.1

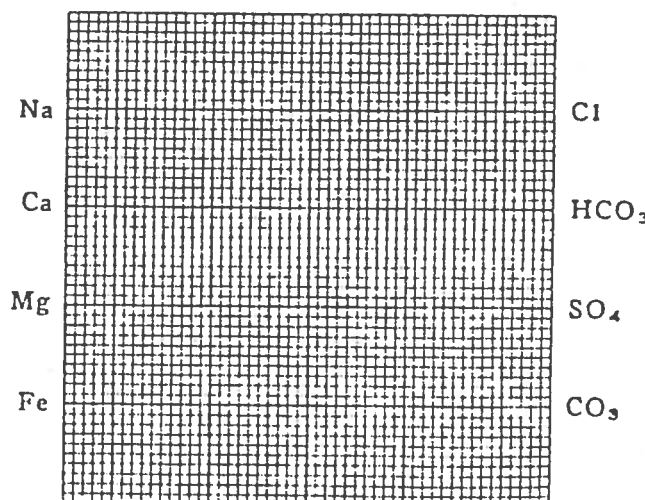
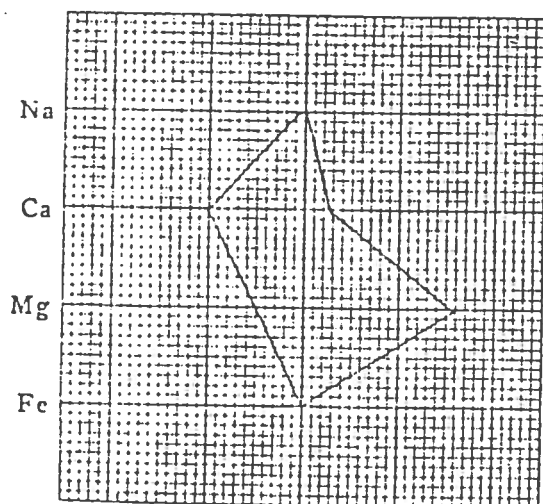
Specific resistance @ 68°F.:

Observed - - - - -	3.80	ohm-meters
Calculated - - - - -	3.40	ohm-meters

WATER ANALYSIS PATTERN

Scale
MEQ per Unit

Sample above described



(Na value in above graphs includes Na, K, and Li)

NOTE: Mg/l = Milligrams per liter Meq/l = Milligram equivalents per liter

Sodium chloride equivalent = by Dunlap & Hawthorne calculation from components

J-W OPERATING COMPANY

P. O. BOX 305
WRAY, COLORADO 80758

Oil and Gas Property Management

November 11, 1987

303 332-3151

Department of Natural Resources
Oil & Gas Conservation Commission
State of Colorado
Suite 380, 1580 Logan Street
Denver, CO 80203

Attn: Mr. William R. Smith, Director

RE: McCoy #1-13
NE/4 - S13-T5N-R47W
Salvador #1-18 69400
NW/4 - S18-T5N-R46W
Yuma County, Colorado

Gentlemen:

Schmidt 69/68

We would like you to address a concern of J-W Operating Company regarding the Disposal of Water Produced With Oil & Gas Operations (Rule 325) from the above referenced leases.

The leases have water production in excess of five (5) barrels a day (please refer to attachment "A" for test information) and J-W Operating Company, as operator, has been disposing of the water thru an injection well IAW Rule 325.

Two of the Working Interests in these wells have disagreed to the disposal method. They are claiming that they received verbal permission from the commission to pit the water in unlined earthen pits utilizing natural drainage as the major system of disposal.

J-W Operating Company is requesting a confirmation from the commission if in fact verbal approval was given to the working interests. We have several wells in Northeastern Colorado that will be effected by any variance in Rule 325 and would expect equal consideration be allowed for all the wells in the area.

Obviously this dispute is causing a concern to all parties in the leases and we would appreciate your prompt consideration on this matter.

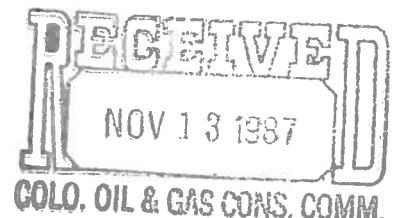
Sincerely,

J-W OPERATING COMPANY

Andrew R. Weaver
Andrew R. Weaver
District Manager

ARW/ma

cc: D.L. Sherlock
S. Jones
File

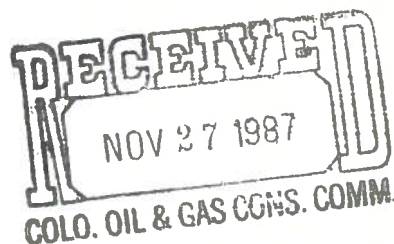


ATTACHMENT "A"

	<u>DATE OF TEST</u>	<u>TEST DURATION</u>	<u>BBLs PRODUCED</u>
<u>Salvador #1-18</u>	03/06/87	24 hours	6.8/day
	05/27/87	24 hours	7.1/day
	08/12/87	1 hour	6.6/day
	11/02/87	72 hours	6.6/day
<u>McCoy #1-13</u>	03/10/87	24 hours	7.9/day
	05/27/87	24 hours	8.6/day
	08/11/87	12 hours	9.1/day
	11/02/87	72 hours	6.6/day



Donald S. Walker
1899 W. Littleton Blvd.
Littleton, Colorado 80120
Telephone (303) 794-5300



November 25, 1987

Oil & Gas Conservation Commission
Suite 380 - 1580 Logan Street
Denver, Colorado 80203

Attn: Mr. William R. Smith

Dear Mr. Smith:

Reference is hereby made to J-W Operating Company's letter to you dated November 11, 1987 regarding water disposal on #1-13 McCoy and # 1-18 Salvador in Yuma County, Colorado.

As one of the owners referred to in the above mentioned letter who disagrees with J-W's disposal method I wish to set the record straight as to my "claims" to J-W Operating Company and my conversations with you.

My meeting of July 22, 1987 with Commissioners Smith, Piro, Bicknell and McDowell confirmed my understanding of the Commission's policy on water disposal in the Denver Basin - i.e. if a well produces more than 5 barrels of water per day form OGCC 15 must be filed with the Commission and approval granted by the Commission before the water is pitted. This is what I relayed to J-W Operating Company. I did not ask either you or J-W Operating Company to use unlined earthen pits - although this may well serve the purpose - or to utilize natural drainage as stated in J-W Operating Company's letter to you. I have never in the 25+ years that I have operated wells in this basin asked for a variance to your rules and regulations. I do not now as disposal by evaporative pits is the commonly used method for water disposal in this area. The unusual procedure of hauling the water to a disposal well makes the wells in question uneconomical at this time.

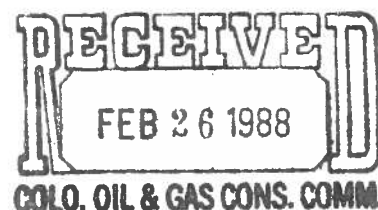
We have many wells in Yuma County which will be economically effected should you decide to make water hauling to a disposal well mandatory in this area and therefore request that you continue to allow pitting water where such pitting is environmentally sound and conforms to your rules and regulations.

Sincerely,

Donald S. Walker

cc: A.R. Weaver
D.L. Sherlock
S. Jones

Talked to Don 4/11/88



WELL FLUID ANALYSIS

API 125-07039

Customer Goodall Oil
Customer Rep. _____
Lease FLB McCoy #1-13
Legals Sec. 13-T5N-R47W SENE
County/State Yuma/Colorado
Formation Niobrara
Depth 2,800
Sample Source _____

Sample Date _____
Report Date 6/22/87
BHT _____ ST _____ TT _____
Daily Gas Prod. _____
Daily Oil Prod. _____
Daily Water Prod. _____
Paraffin Removal _____
Existing Treatments _____

FORMATION WATER ANALYSIS:

Cations:

Calcium	<u>168</u>	mg/L
Magnesium	<u>122</u>	mg/L
Barium	<u>0</u>	mg/L
Total Iron	<u>160</u>	mg/L
Potassium	<u>--</u>	mg/L
Sodium (Est.)	<u>7,700</u>	mg/L

pH 6.3
Specific Gravity --
Stability Index -1.20
(+) Scaling; (-) corrosion

Combination Tendencies (mg/L):

Calcium Carbonate	<u>482</u>
Calcium Sulfate	<u>0</u>
Calcium Chloride	<u>0</u>

FORMATION OIL ANALYSIS:

API Gravity _____
Pour Point _____
Problem Paraffin _____

Anions:

Sulfate	<u>0</u>	mg/L
Chloride	<u>12,400</u>	mg/L
Carbonate	<u>0</u>	mg/L
Bicarbonate	<u>588</u>	mg/L
Carbon Dioxide	<u>418</u>	mg/L
Hydrogen Sulfide	<u>0</u>	mg/L

Total Hardness, CaCO_3 920 mg/L
Total Alkalinity, CaCO_3 482 mg/L
Free Acidity, CaCO_3 0 mg/L

Magnesium Chloride	<u>476</u>
Iron Chloride	<u>442</u>
Sodium Chloride	<u>19,559</u>

BS&W _____
Paraffin Index (by WT.) _____

COMMENTS AND RECOMMENDATION:

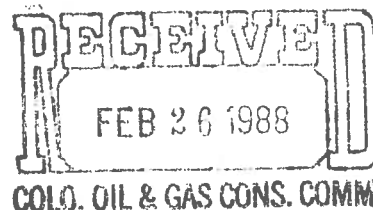
409 CORPORATE CIRCLE
GOLDEN, COLORADO 80401
(303) 279-0865

Paratine Rep. J. Lechman/J. Moser
District Denver
Analyst R. Husa



SERVICE FRACTURING COMPANY

P. O. BOX 1387 - PH. 303 867-3087 - FT. MORGAN, COLO. 80701



WATER ANALYSIS

DATE: 11-Feb-88 SAMPLE #: W-279

OPERATOR: Petron Development Co
1899 Littleton Blvd
Littleton, CO. 80120

LEASE: API 125-07039
Mccoy #1-13
SENE 13 - SN - 47W

FORMATION: NIOBRARA

CATIONS

Sodium, Na: Not Tested
Calcium, Ca: Not Tested
Potassium, K: Not Tested

ANIONS

Chorides, Cl: 10,900.00
Sulfates, SO4: < 50
Bicarbonates, HCO3: 1,586.00

TOTAL DISSOLVED SOLIDS

Total:	17,369.80	Specific Gravity:	1.012
Iron, Fe:	0.00	pH:	7.5
Sulfide As H2S:	0.00	Resistivity (ohms):	0.320
		Total Hardness:	3.00

REMARKS:

Water Analysis For Evaporation Pit.
Cations Not Tested Due To Malfunction Of Ion-Analyzer.

NOTE:

All measurements are in parts-per-millon.

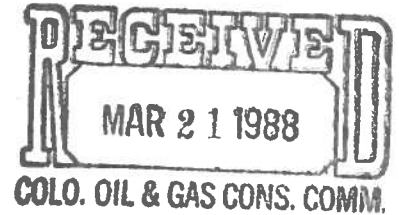
Total dissolved solids and resistivity are calculated measurements.

Sandhills Ground Water Management District

P. O. Box 311
WRAY, COLORADO 80758

March 18, 1988

Colorado Oil and Gas Commission
Mr. William Smith - Director
1580 Logan St., Room 380
Denver, CO 80203



Dear Bill:

On February 23, 1988 you visited with the Board of Directors of the Sandhills Ground Water Management District and myself over the telephone regarding the Commissions requirements for surface ponds for the disposal of gas well brine. The Board of Directors thank you for taking the time to discuss this matter with us.

During this conversation we indicated our concerns of allowing this practice without properly constructed ponds. You indicated that you would probably require lined ponds. The District, as well as many people living in this area, do not feel the allowing of unlined ponds would do our water in the Ogallala Aquifer justice by allowing this brine water to infiltrate to it. We would like to see liners required whereby wild animals, such as deer and antelope, could not penetrate it, thus allowing the water to infiltrate thru the sandy soils. Also, we would suggest covers over these ponds to keep wild and endangered birds from landing on them. In short, we would suggest the Commissions rules and regulations follow closely to the Colorado Department of Healths regulations pertaining to solid waste disposal sites and facilities.

We would like to receive a copy of the rules and regulations of the Commission relating to this matter as well as to the Commissions plans or regulations in the monitoring of these ponds.

Thank you for your sincere concern and assistance in this matter.

Sincerely

Ben Saunders
Ben Saunders
Manager

854-3484

cc: Mr. Chips Berry
Colorado Department of Natural Resources

STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION

DEPARTMENT OF NATURAL RESOURCES
SUITE 380 LOGAN TOWER BUILDING
1580 LOGAN STREET
DENVER, COLORADO 80203

WILLIAM R. SMITH
Director
FRANK J. PIRO
Deputy Director

(303) 866-3531

ROY ROMER
Governor

TO: All Operators of Gas Wells in Yuma, Phillips and
Eastern Washington Counties, Colorado

FROM: William R. Smith, Director-OGCC *WR*

DATE: April 7, 1988

Subject: Disposal of Produced Water

Last November we received letters or comments from J-W Operating, Donald S. Walker and Petron Development regarding the disposal of waters produced with gas from wells completed in the Niobrara formation. We have also been contacted by the Sandhills Ground Water Management District expressing their concern for possible contamination of water in the Ogallala aquifer underlying the above mentioned area.

Although it has been some time since these original discussions, we have been analyzing the overall situation to assure protection of this aquifer and at the same time come up with recommendations that would allow the continued production of these wells. This same matter was considered in 1981 with respect to water produced in the Eckley Field, a copy of that memorandum by Carrol G. McDowell is attached. There has been significant development since that time and I think another complete review is in order.

The Ogallala formation which immediately underlies this area contains water of exceptionally high quality. To the best of my knowledge there is no continuous impermeable barrier between the surface and the water in the aquifer. Any water placed on the surface in unlined pits, except in playa lakes, would infiltrate and reach the water in the aquifer. If this water is of a lesser quality than that in the Ogallala, degradation of the Ogallala water would result.

Although Rule 325 provides that the requirements shall not apply to producing facilities where the volume of water to be disposed of does not exceed five (5) barrels per day on a monthly basis, it further provides that if the Director finds that the waters contained in any retaining pit is of such a quality as to result in contamination or alteration of any waters of the State, the pit shall be constructed, maintained and operated so as to prevent discharge.

Based on the quality of the water in the Ogallala aquifer and the quality of this produced water, it is incumbent on me to restrict any possible discharge, through seepage or any other means, of Niobrara produced water. This can be accomplished in three ways; the water can be placed in properly lined pits of sufficient size to allow evaporation to equal or exceed the amount of water placed in the pit, the water can be disposed of by injection into an approved injection well, or the water can be gathered in impermeable containers such as plastic or concrete tanks and trucked or piped to injection wells or commercial facilities. There are currently four injection wells in the area, two in the Bonny Field and two in the Eckley Field. The nearest commercial facility, which incidentally is administered by the Department of Health and the County in which it is located, is located near Roggen.

One of the problems we experienced in evaluating this situation was the production records and the reporting of produced water. Although it is not uncommon for operators not to report small volumes of produced water, such as one or two barrels per day, in situations such as this, that information is critical to proper administration of Rule 325. Water production is reported, at least by one operator, in most fields in this area with volumes generally on the order of one to five barrels per day. Water production in excess of this minimal amount is reported in Beecher Island, Eckley, Phuma, Rock Creek and Wages with the maximum amount ever reported being less than thirty (30) barrels per day.

In order to get on top of the issue I am asking each operator to check with their pumper and report by letter by April 30, 1988, any lease producing water and an estimate of the volume. Small volumes can be measured with a gallon can and daily rates estimated. A gallon can that fills in approximately 35 minutes indicates a flow of one barrel per day. Blowdown water that is not formation water is not to be included. Upon receipt of this information we will make a field inspection to evaluate the results together with location information.

The industry in general, and you operators in particular, have an excellent relationship with the people in the area, as a matter of fact in most instances you are included in those people. In addition, your operations add significantly to the economy of these areas. I am sure that neither they nor the Oil and Gas Conservation Commission wish to impose any restriction that are not absolutely necessary on your depressed industry.

Your cooperation in this effort is vital to the proper conclusion. If you have any questions please contact me, Jim Kenney or Jim McKee at 303-894-2100.

WRS/clk
5780C

cc: Mr Ben Saunders, Manager
Sandhills Ground Water Management District
P.O. Box 311
Wray, Colorado 80758

Mr. Chips Barry, Executive Director
Department of Natural Resources

STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION

DEPARTMENT OF NATURAL RESOURCES
SUITE 380 LOGAN TOWER BUILDING
1580 LOGAN STREET
DENVER, COLORADO 80203

WILLIAM R. SMITH
Director
FRANK J. PIRO
Deputy Director

(303) 866-3531

ROY ROMER
Governor

April 8, 1988

Comments on Memo by W.R. Smith, dated 4-7-88,
regarding disposal of produced water from the Niobrara
Formation gas wells.

It is doubtful if new updated water analyses
would show any significant downgrading in the quality of
Niobrara Produced Water. Accurate new produced volumes on a
lease basis may justify an order for lined pits and/or
injection into a disposal well. A few operators went to
disposal wells in the early days of production, most did not.
The ones who did not were "permitted" based upon less than 5
BWPD and/or use of a "blowdown" pit only, common on a gas well
lease. I would not expect any change in other parameters that
approved the original pit permits.

It should be clear to those concerned that our
judgement on the original pit permits was based upon the
parameters at the time. If our current produced water figures
are reasonably accurate, Jim Kenney can make a survey to
isolate those leases that indicate a revised pit permit may be
necessary.

JAM/mrb
0499A



STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION

DEPARTMENT OF NATURAL RESOURCES
SUITE 380 LOGAN TOWER BUILDING
1580 LOGAN STREET
DENVER, COLORADO 80203

WILLIAM R. SMITH
Director
FRANK J. PIRO
Deputy Director

(303) 866-3531

ROY ROMER
Governor

TO: All Operators of Gas wells in Yuma, Phillips and
Eastern Washington Counties, Colorado

FROM: William R. Smith, Director-OGCC

DATE: April 27, 1988

SUBJECT: Omission of Enclosure

The enclosed memo was inadvertently omitted from the
memo dated April 7, 1988. We apologize for any inconvenience
this may have caused.

WRS/clk



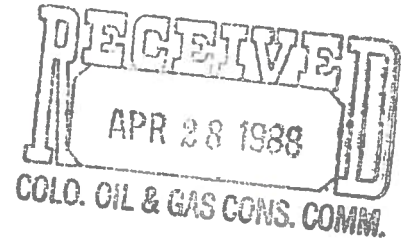
Energy Minerals Corporation

OIL AND GAS EXPLORATION

JJK ✓

April 27, 1988

State of Colorado
Oil & Gas Conservation Commission
Department of Natural Resources
Suite 380, Logan Tower Bldg.
1580 Logan Street
Denver, CO 80203



Re: Disposal of Produced Water:

<u>Name</u>	<u>OGCC #</u>	<u>Name</u>	<u>OGCC #</u>
Baucke #1	69510	Lebsock #1	69515
Baucke #2	69510	Max #1	69467
Brophy #1	69512	Premier #1	69485
Clare #1	69132	RMR Ranch #1	69516
Clyde #1	69514	Rutledge #1	69469
Larson #2	69468	Sport #1	69196

Dear Sirs,

In response to your letter dated April 7, 1988 regarding disposal of produced water in Yuma, Phillips, and Eastern Washington Counties, we have completed a review of water production from the subject properties operated by Energy Minerals Corporation.

With respect to all of these properties other than the Lebsock #1 - OGCC # 69515, all production goes directly from the wellhead into the gas sales line, while the Lebsock #1 has separation facilities. Based on information received from our contract pumper, J-W Operating Company, all of the above wells, with the exception of the Lebsock #1, produce water at a rate of 1 gallon per day, while the Lebsock #1 produces water at a rate of 1 barrel per day.

I trust this information will assist you in your overall review. However, if I can be of further assistance, please advise.

Sincerely,

R. M. Suhowatsky
Contracts/Regulations Manager

RMS/jm

The Sand Hills Society
Niobrara Illuminating
Gas Associates

1580 LINCOLN ST., SUITE 1120
DENVER, COLORADO 80203
TELEPHONE 837-0506

April 28, 1988

Mr. William R. Smith
OIL & GAS CONSERVATION COMMISSION
Suite 380 - Logan Tower Bldg.
1580 Logan Street
Denver, CO 80203

Re: Disposal of Produced
Water

Dear Mr. Smith:

This is to acknowledge receipt of your letter dated
April 7th and received this A.M.

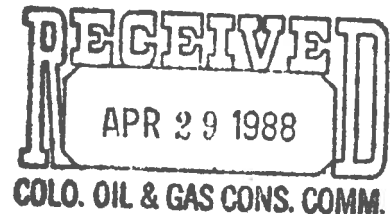
Since talking on the phone with you this morning, I
have been in contact with our engineer, Robert Peterson
and we plan to commence testing our wells next week. Due
both to most of our wells being equipped with plunger lifts
and the low water volumes being produced it will be two to
three weeks before we can submit you an adequate report.

Very truly yours,



William L. Barksdale

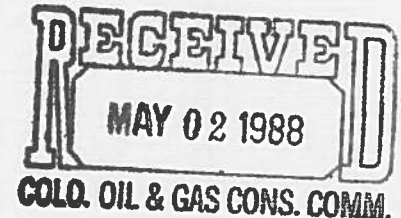
WLB/tw



JJK

April 28, 1988

State of Colorado
Oil and Gas Conservation Commission
Department of Natural Resources
Suite 380 Logan Tower Building
1580 Logan Street
Denver, Colorado 80203
Attn: Mr. Jim Kenney



Re: Niobrara Formation
Water Production
Yuma County, Colorado

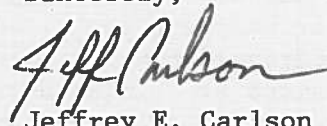
Dear Mr. Kenney,

Plains is in receipt of your letter dated April 7, 1988 regarding production and disposal of Niobrara formation water. In eastern Colorado, Plains operates a total of 29 Niobrara gas wells, the principal concentration of wells being in the Beecher Island Field in Yuma County. Of the 29 wells, two have historically produced water and are equipped with separators and fiberglass saltwater tanks. In the 2½ years since Plains took over as operator of these wells, neither well has produced any water to surface. High line pressure and low demand for the gas have kept the water retained in the formation and wellbore. The remaining 27 wells are producing water-free gas with no surface equipment for water collection. The disposal plans for the produced water are either for evaporation from the tanks or to have the water trucked off lease to a commercial disposal site. The location of the two water producing wells is as follows:

<u>Well Name</u>	<u>Location</u>	<u>Field</u>
Bruder No. 1-7	SE Sec. 7-T2S-R43W	Beecher Island
Lippert No. 1-8	SW/4 Sec. 8-T1S-R44W	Vernon

Please let me know if I can be of additional assistance.

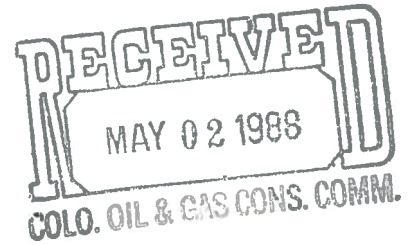
Sincerely,


Jeffrey E. Carlson
Petroleum Engineer

JEC:mks



April 29, 1988



Mr. William R. Smith
State of Colorado
Oil & Gas Conservation Commission
Department of Natural Resources
Logan Tower Building, Ste. 380
1500 Logan Street
Denver, Colorado 80203

Dear Mr. Smith:

We are the operator of five wells located in the Rock Creek field, Yuma County, Colorado. As requested in your letter of April 7, 1988, we have determined the average daily water production from our wells to be the following:

Hillman #1	.9 BWPD
Hillman #2	1.8 "
Korf #1	.8 "
Korf #2	1.7 "
Korf #3	3.7 "

Please let us know if you need any further information.

Yours very truly,

Edmund J. Mainka, Jr.
Area Production Manager

EJMJr:pk

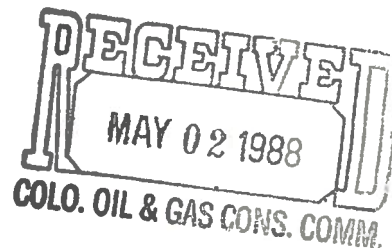


Union Texas Petroleum

14001 East Iliff Avenue
The Forum
Aurora, Colorado 80014
Telephone (303) 695-8778

April 29, 1988

State of Colorado
Oil and Gas Conservation Commission
1580 Logan Street, Suite 380
Denver, Colorado 80203



ATTN: Mr. W.R. Smith

Subject: Disposal of Produced Water

Gentlemen:

Union Texas Petroleum operates three Niobrara gas wells in Washington County. Water production from those wells, as determined by bucket test, is as follows:

Jones No. 6	OGCC Lease No. 53801	1/2 BWPD
JW Jones No. 3	OGCC Lease No. 53802	1/2 BWPD
Jones Dupree No. 7	OGCC Lease No. 53798	5 BWPD

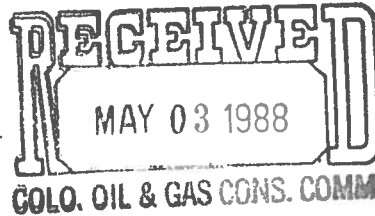
Yours truly,

Don B. Wells
Production Superintendent

MOUNTAIN PETROLEUM CORPORATION

SUITE 324, ORCHARD PLACE 5
7951 EAST MAPLEWOOD AVENUE
ENGLEWOOD, COLORADO 80111
(303) 694-6038

April 29, 1988



Mr. William R. Smith
Director
Colorado Oil & Gas
Conservation Commission
1580 Logan Street
Suite #380
Denver, CO 80203

Re: Produced Water
Niobrara Area, Eastern
Washington, Yuma and
Phillips Counties, CO

Dear Mr. Smith:

This letter is in response to your letter dated April 7, 1988 requesting data on produced water for all operators in the referenced area.

We have checked with our pumpers and the following is a list of the wells operated by Mountain Petroleum Corporation which produce water. The estimate shown for monthly water production is our most current figure.

<u>OGCC Lease No.</u>	<u>Name of Lease</u>	<u>Field & Location</u>	<u>Estimated Water Production</u>
69317	Fitch 1-9	Section 9-5N-46W Phuma	6bbls/month
69508	Salvador 1-10	Section 10-5N-46W Phuma	8bbls/month
44174	Lett 1-23	Section 23-6N-46W Phuma	6bbls/month
69324	Blach 2-19	Section 19-1S-47W Pony Express	10bbls/month
69323	Blach 1-24	Section 24-1S-48W Pony Express	6bbls/month
54019	Axsom 1-26	Section 26-1S-49W Spear	9bbls/month
49260	Allen 2-15	Section 15-1S-49W DeNova	10bbls/month

You will note from the above data that no well produces as much as one barrel per day when the total monthly production is averaged on a daily rate.

Page 2

Mr. William R. Smith
April 29, 1988

Each of the above wells has a separator installed which will hold up to 30 gallons of water. The separator at each well dumps into a buried storage tank made of galvanized steel with a capacity of 1200 gallons. Our pumper advises that he hauls water from the tanks about every three months. These small amounts of water have been sprinkled on Yuma County roads with permission obtained by our pumper from the road boss employed by the County.

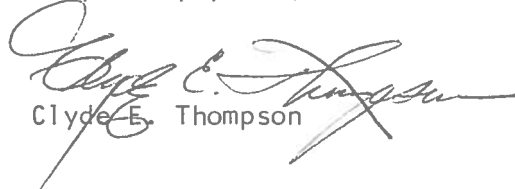
We also operate the 1-35 Cantrall well in Section 35-1S-35W. This well has a separator and fiber glass tank installed on the lease due to small amounts of water production occurring shortly after the well was placed on production. Ben Cantrall is the landowner and also pumps this well. He advised that the well has made no water for over two years.

Because of the substantial number of wells that we operate in the Beecher Island Field (39), I questioned our pumper, Oscar Spelts, about water production. He informs that, with one exception, our wells in this field make so little water that it does not even accumulate in the drip bottles set on the leases by the gas purchaser. The exception to this is our A-1 Strangways well which had a recent water accumulation of approximately 10 gallons in two months.

Based on rechecking with our pumpers we feel the reporting to the COGCC of quantities of water produced (or no water produced) from our Niobrara wells has been reasonably accurate.

Please advise if you require further information.

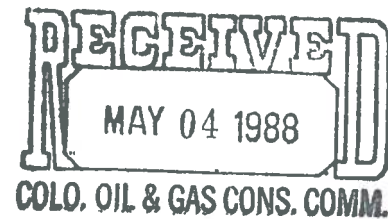
Very truly yours,



Clyde E. Thompson

CET/lde

CABOT



May 2, 1988

State of Colorado
Oil and Gas Conservation Commission
Suite 380, Logan Tower Bldg.
1580 Logan Street
Denver, CO 80203

Re: Disposal of Produced Water

To: William R. Smith
Director-OGCC

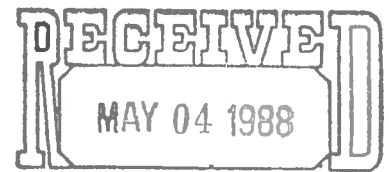
Dear Mr. Smith:

In response to your letter dated April 7, 1988 concerning the above referenced, my apologies for this late response. Please find the information you requested following:

<u>WELL NAME</u>	<u>DAILY WATER PRODUCED</u>
Boden #6-14	0
Boden #16-14	0
Cook #2-12	0
Cook #8-12	0
Cook #16-12	3
Fleer #13-2	0
Helling #2-13	3
Helling #6-13	6
Helling #C8-13	6
Helling #12-13	0
Helling #14-13	1
Langendoerfer #1-15	0
Langendoerfer #9-15	0
Langendoerfer #1-23	0
Langendoerfer #14-24	0
Lengel #11-24	12 7325
Lengel #13-24	12 7325
McKee #16-2	12 7325
Osmus #C4-24	6
Osmus #4-24	9
Osmus #9-24	6
Pfeiler #6-2	12 7325

Cabot Petroleum Corporation
P. O. Box 9999
Amarillo, Texas 79105
806/373-6042

Disposal of Produced Water



COLO. OIL & GAS CONS. COMM.

<u>WELL NAME</u>	<u>DAILY WATER PRODUCED</u>	
Weyerman #3-7	15	7325
Weyerman #14-7	3	
Weyerman #16-7	6	
Weyerman #14-8	3	
Weyerman #14-12	0	
Weyerman #16-12	0	
Weyerman #4-13	0	
Weyerman #8-13	6	
Weyerman #11-13	18	
Weyerman #14-13	27	BURN
Weyerman #16-13	12	43-43
Weyerman #2-17	6	YUMA
Weyerman #4-17	6	
Weyerman #6-17	0	
Weyerman #7-17	12	
Weyerman #2-18	9	
Weyerman #4-18	9	
Weyerman #6-18	6	
Weyerman #8-18	6	
Weyerman #9-18	18	
Weyerman #10-18	9	
Weyerman #11-18	9	
Weyerman #12-18	6	

If anything further is necessary, please let us know.

Sincerely,

Evelyn Farmer
Reg. Assistant

/ef

Puckett-Warren Oil

7800 E. Union, Suite 130 Denver, Colorado 80237
(303) 773-1094

May 4, 1988



Colorado Oil & Gas Conservation Commission
1580 Logan St., Suite 380
Denver, Colorado 80203

Attn: Mr. Jim McKee

RE: Niobrara Gas Wells
Water Production
Yuma County, Colorado

Dear Mr. McKee:

Pursuant to your request, we have estimated daily water production on the following wells:

<u>OGCC Lease #</u>	<u>Well Name</u>	<u>OGCC Operator #</u>	<u>Estimate of Daily Water Production</u>
69442	Reppert #1-30	72555	2.20 bbls
69187	Korf #1-25	72555	5.75 bbls
69189	McCasland #1-10	72555	.75 bbls
69431	Pappenheim #2-7	72555	1.33 bbls
90184	Brown #13-1	72555	1.75 bbls
69511	Robertson #1-31	72555	0 bbls
69530	Haynes #1-26	72555	1.00 bbls
69264	Warren #1-1	24800	0 at present

I hope this information is satisfactory. I would like to point out that only one of these wells flows water constantly (Korf #1-25). The others drain water intermittently from their separators and are difficult to measure.

Respectfully submitted,

PUCKETT-WARREN OIL

Anne G. Kremer

Anne G. Kremer, Geologist

AGK:lw

Field Office:

110 S. Main, Yuma, Colorado 80759
303-848-2165

May 17,1988

PROJECT: Determining policy in Northern High Plains
SPECIFICS: High salinity produced water from the Niobrara being disposed of by evaporation pits overlying the Ogallala aquifer.

TALLY SHEET

No. of Producing Wells

<u>Operator</u>	<u>0-1 Bbl/d</u>	<u>1-5 BBl/d</u>	<u>5-10 Bbl/d</u>	<u>10+ Bbl/d</u>
Cabot Petr.	15	4	16	10
Puckett-Warren	3	4	1	-
Energy Minerals	11	1	-	-
Plains Petr.	27	2	-	-
Tesoro	2	3	-	-
Mountain Petr.	46	-	-	-
Union Texas	2	1	-	-
<hr/>				
TOTALS	106	15	16	10

Of those operators which have responded, only Cabot Petr. reports any wells with water production exceeding 10 bbl/day, and all of those wells are in Bonny Field, Yuma County. The other major operator in Bonny Field is Barfield Oil, whom we have not yet received response from.

Both Cabot and Barfield are operating water disposal wells in Bonny Field.

For the most part it should be rather clear that while Niobrara Fm. water is of poor quality, there is minimal daily production. From the information we have received (so far) the conclusion may be that there is no real problem.

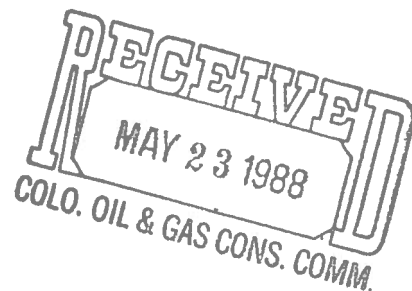
Prepared by JJK for Bill Smith.

Doc. 0082J

McMoRan Oil & Gas Co.

Managing General Partner for

FMP Operating Company, A Limited Partnership



May 19, 1988

State of Colorado
Oil & Gas Conservation Commission
Suite 380 Logan Tower Building
1580 Logan Street
Denver, CO. 80203

RE: DJK #88096
Disposal of Produced Water
N.E. Colorado Area

Regarding the water production of the FMP Operating Company wells in the Niobrara area, the vast majority of these wells only produce such fluid that it is easily contained by the "drip" bottle that precedes every KN meter run. The drips dimensions are 12" x 8", and are generally considered to hold about 30 gallons. The drips are blown on the average of once every 2 weeks of production. The main reason for the absence of measurable fluid from these wells is that back pressure is held on the well to retard the production of well fluids. There are a few wells where the back pressure regulators have been removed and the well allowed to flow at line pressure; these wells are serviced by separators that dump into fiberglass tanks at the wellhead. These wells specifically include:

Rueb 1-16 (NW1/4 16-3S-42W) - during normal production, at 60 PSIG line pressure, this well will make 11 BBL water per day.

Davis 1-6 (SW1/4 6-1N-46W) - not much production history since installation of tubing and separator, estimate well will make between 5 and 10 BBL/day.

Cutler 1-5 (SW1/4 5-1N-46W) - same as Davis 1-6

Dickson 2-26 (SW1/4 26-1S-45W) - last produced at line pressure in 1985 (150 PSIG or less; well would make too much fluid for present separator to handle. Presently, well is not allowed to be pulled under 165 PSIG wellhead pressure and the well makes very little fluid - less than 1 BBL/day.

These are the only wells that presently make any measurable fluids. For your convenience, a list of the wells that we operate is included. All of these wells have been reviewed. If you have any questions, please feel free to call.



Page 2

As indicated when I telephoned your office on May 4, 1988, we did not receive your request for this data until May 3, 1988. The next two weeks were needed to review these operations and compile the above data. I apologize for the tardiness of this response however under the circumstances it could not be avoided.

Sincerely,

A handwritten signature in cursive script, reading "Darrel J. Kempf".

Darrel J. Kempf
Manager Western Area
Operations and Plants

DJK/caa

WELLS WITH FMP OPERATING INTEREST

BEECHER ISLAND

State 1-16-243
Engel 1-5
Cook 1-33
Allen 1-12
Kitzmilller 1-4
Allen 1-7X
Federal 1-7-343
Eckley O&L 2-13 (plastic)
McClung 1-5

REPUBLICAN FIELD

Short 1-23
Stone 1-24
Roundtree 1-17
Stults 1-32
Wakefield 1-13
Tustin 1-29
Fonte 1-22
Jesse 1-33
Maurice 1-12
Rockwell 1-15
Rockwell 1-14
Fonte 1-21
Tustin 1-30
Godsey 1-16
Thomas 1-34X
Pappenheim 1-7X
Fix 1-18
Hatheway 1-11
Stults 2-32 (plastic)
Jesse 2-33 (plastic)

VERNON FIELD

Schafer 1-4
Lawver 1-33
Peters 1-36
Brueggeman 1-6X
Dickson 2-26
Wiltfang 1-28

SHOUT FIELD

Lott 1-35
Pioneer Farms 1-4
Brand 1-27
Brand 11-3

WHISPER FIELD

Hillman 1-9
Vincent 1-8
Blach 1-7
Anderson 1-5
Neuhaus 1-10
Cannon 1-17
Trautman Farms 1-20
Brand 1-15
Pagel 3-3 (plastic)
Neuhaus 2-3 (plastic)
Eyestone 4-3 (plastic)
Hillman 2-9
Blach 1-8 (plastic)

MILDRED FIELD

Rogers 1-19

YODEL FIELD

Woolery/Roundtree 1-34
Pariset 1-12
Pariset 1-11
Woolery/Roundtree 1-33

SCHRAMM FIELD

Stulp 1-2
Collins 1-33
Mill Iron 1-4
Mill Iron 1-3
Bolin 1-8
Cutler 1-5
Davis 1-6
Mill Iron 1-28
Mill Iron 1-11
Meade 2-32
Korf 2-7
Stulp 1-11
State 1-36-247
Stallings 3-12
Beauprez 1-35
Pletcher 1-9 (plastic)
State 2-36-247 (plastic)

BUCKBOARD FIELD

Newbanks 1-15
Meis 1-24
Newbanks 1-14
Goff 1-22
Blach Bros 1-20
Franson 1-24
Newbanks 2-23
State 1-36-447
Giauque 1-9
Probasco 1-10
Hubbard 1-12
Mekelburg 1-12 (plastic)
Newbanks 2-14 (plastic)

INTO J-W's SYSTEM

Mekelburg 1-25
Truatman Farms 1-24
Monk 1-6

ARMEL FIELD

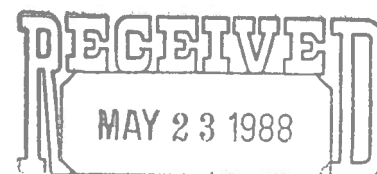
Zweygardt 1-32
Rueb 1-16
Soehner 1-15
K&L Enterprises 1-9
Wilmer Hilt 1
Raile 1-11 (plastic)
Zimbelman 2-31 (plastic)
Zweygardt 2-32 (plastic)
Rueb 2-16 (plastic)

NO NAME FIELDS

Harkins 1-16
Federal 1-9-440

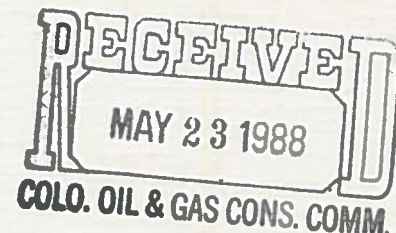
BENKELMAN FIELD

Harkins 1-29
Holzworth 1-1
O'Brien 1-30
M-O-M 1-19



LO. OIL & GAS CONS. COMM.

Petron Development Company
1899 W. Littleton Blvd.
Littleton, Colorado 80120
Telephone (303) 794-5300



May 18, 1988

Colorado Oil and Gas Commission
1580 Logan Tower Building
Denver, Colorado 80203

Attn: Mr. William R. Smith

Re: Water production
Yuma County, CO

Dear Mr. Smith:

In compliance with your letter dated April 7, 1988 we have reevaluated the water production on the wells we operate and calculated daily water production on the date tested to be as follows:

OGCC LEASE NO.	WELL NAME	WATER BBLs/ DAY	OGCC LEASE NO.	WELL NAME	WATER BBLs/ DAY
69183	Helm 1-23	5.1	69185	Mitchell 1-29	4.8
69185	Mitchell 2-29	1.7	69194	Brophy 1-20	0.0
69402	Hickman 1-19	0.5	69407	Hickman 2-13	0.9
69407	Hickman 4-18	0.9	69412	Hickman 2-18	0.3
69417	Hickman 5-18	0.2	69422	Hickman 6-18	0.6
69436	Salvador 1-5	0.0	69436	Salvador 2-5	0.0
69436	Salvador 3-5	0.0	69436	Salvador 4-5	0.0
69459	McCoy 1-13	3.5	69590	Blach Bros. 1-2	0.0
69695	CNB 1-9	0.0	69700	Kirchensclager 1-23	5.1.
69702	McCasland 1-2	1.6	69703	Day 1-24	1.5
69704	McCasland 1-11	0.5	69706	McCasland 2-11	0.4
69711	Ward 2-10	0.0	69724	Ward 3-10	0.8

As you are aware, water production will vary from day to day depending on a variety of circumstances too numerous to list. In reviewing our reports for the last few years we have determined that our reports have accurately reflected the actual production on our wells with the following exceptions. Our calculations may have been high from time to time on the Mitchell 1-29, 2-29, Helm 1-23 and the Hickman 1-19. Our calculations may have been low from time to time on the Hickman 2-13, 4-18 and the Day 1-24. We are making the necessary adjustments.

I apologize for the delay in processing the information requested and I thank you for your patience.

Sincerely,


Ronald S. Walker

:RSW

STELBAR OIL CORPORATION, INC.

155 NORTH MARKET, SUITE 500

WICHITA, KANSAS 67202

(316) 264-8378

May 23, 1988

Mr. William R. Smith, Director
Oil and Gas Conservation Commission
Department of Natural Resources
Suite 380 Logan Tower Building
1580 Logan Street
Denver, CO 80203

RE: Disposal of Produced Water

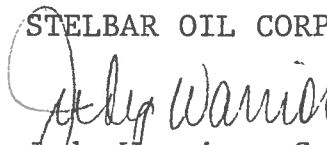
Dear Mr. Smith:

Enclosed is a list of the water produced from our wells in Yuma and Washington County, Colorado in response to your letter of April 7, 1988.

Please accept our apology for being late. The person handling this has been out of town.

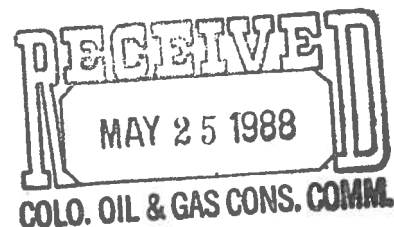
Very truly yours,

STELBAR OIL CORPORATION, INC.



Judy Warrior, Secretary to
Robert W. Patton, Vice-President

Enclosure



Report of Production of Water

	Barrels per day	Barrels per mo.
✓ Price 1-13	1.42	42
✓ McCauley 1-18	.47	14
✓ Price 2-13	.47	14
✓ Price 1-12	.23	7
✓ Price 1-10	.47	14
✓ McCauley 1-22	.28	8.5
✓ Price 3-7	0	0
✓ Price 1-7	.33	10
✓ Price 2-7	0	0
✓ Price 1-18	.93	28
✓ Rhim 1-7	.93	28
✓ Price 2-18	.47	14
✓ Price 4-18	.70	21
✓ Price 3-18	2.86	86
✓ Price 1-20	.47	14
✓ Price 2-20	1.16	35
✓ Upon 1-19	.47	14
✓ Mathies 2-19	0	0
✓ Mathies 3-19	.47	14
✓ Mathies 1-19	.23	7
✓ Rhim 4-14	1.90	57
✓ Mathies 1-13	2.86	86
✓ Upon 1-24	1.43	43
✓ Rhim 3-14	1.66	50
✓ Rhim 1-23	.93	28

Banals per day

Banals per Mo.

✓ thin 2-23	1.42	42
✓ Atom 1-23	.47	14
✓ young 1-22	.47	14
✓ thin 1-14	.93	28
✓ thin 2-14X	0	0
✓ Maggard 1-10	4.28	129
✓ Maggard 1-11	.93	28
✓ Maggard 2-11	.93	28
✓ Maggard 3-11	1.16	35
✓ Maggard 4-11	.93	28
✓ Tungatead #1	0	0
✓ Green 1-6	0	0
✓ Allison Green #1	.47	14
✓ Green 2-6	.47	14

Wards Wells

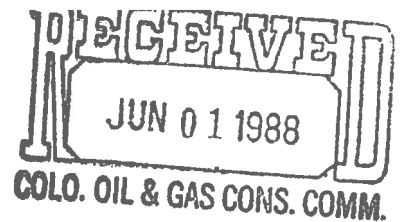
✓ Pauli 1-7	0	0
✓ Monk 1-9	1.42	42
✓ Monk 2-9	1.42	42
✓ Monk 1-5	0	0
✓ Crossland 1-2	1.42	42
✓ Clark fork 1-3	5.7	170
✓ Clark 1-3	0	0
✓ Spillman 1-4	1.42	42
✓ 4 quarter 4-15	0	0
✓ 4 quarter 3-15	1.42	42

	Barsels per Day	Barsels per Mo
✓ 4 quarters 1-15	2.86	86
✓ 4 quarters 2-15	1.42	42
✓ 4 quarters 1-10	0	0
✓ 4 quarters 2-10	0	0

RECEIVED
 MAY 25 1988
 COLO. OIL & GAS CONS. COMM.

J-W OPERATING COMPANY

P. O. BOX 305
WRAY, COLORADO 80758



Oil and Gas Property Management

303 332-3151

May 31, 1988

State of Colorado
Oil & Gas Conservation Commission
Department of Natural Resources
1580 Logan Street
Suite 380
Denver, CO 80203

Attn: Mr. William R. Smith

RE: Disposal of Produced Water

Dear Mr. Smith:

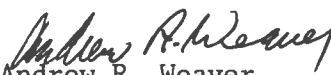
Per your request included in your memo of April 7, 1988 concerning the above referenced subject, attached please find a complete list of the wells operated by J-W Operating Company detailing the average amount of water produced per day.

The attached information was obtained from one of three sources; 1) actual water being transported from the well, 2) tank guages or 3) Barrel tests. Additionally, this information is based on the wells flowing under normal operating conditions. We are also currently conducting our annual water tests for these wells.

If you should have any questions or require any additional information concerning this matter, please feel free to contact this office.

Sincerely,

J-W OPERATING COMPANY

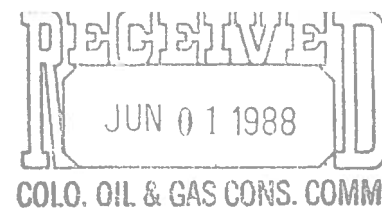

Andrew R. Weaver
District Manager

ARW/cc

attachments

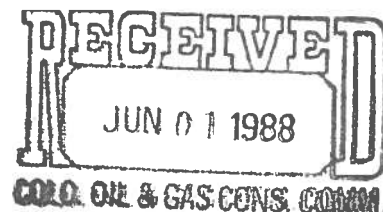
cc: D. L. Sherlock - Wray
P. D. Westerman - Dallas
S. K. Jones - Dallas
file

Daily Water Production
Page 1

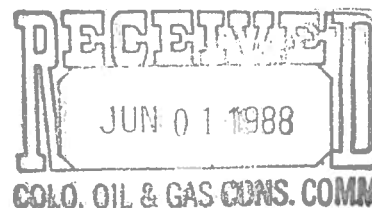


<u>WELL NAME & NO.</u>	<u>LOCATION</u>	<u>AVER. BBLs/DAY</u>
M. Akey #1	SW/4, Sec. 32, T1S, R43W	2.92
M. Akey #2	NW/4, Sec. 32, T1S, R43W	.40
M. Akey #3	NE/4, Sec. 32, T1S, R43W	.40
M. Akey #1-25	SW/4, Sec. 25, T1S, R44W	.80
A. Bagley #1	SW/4, Sec. 1, T2S, R46W	.98
Brazelton #1-8	SW/4, Sec. 8, T5N, R46W	5.66
Brazelton #2-7	SE/4, Sec. 7, T5N, R46W	14.67
G. Brethauer #1	SW/4, Sec. 24, T5N, R47W	3.30
W. Brethauer #1	SE/4, Sec. 24, T5N, R47W	1.25
J. Brophy #2	NE/4, Sec. 26, T4N, R46W	2.45
J. Brophy 33	NE/4, Sec. 27, T4N, R46W	1.03
J. Brophy #4	NW/4, Sec. 5, T3N, R46W	.70
J. Brophy #6-34	SW/4, Sec. 34, T4N, R46W	.50
J. Brophy #7-29	SW/4, Sec. 29, T4N, R46W	.43
J. Brophy #8-26	SE/4, Sec. 26, T4N, R46W	.40
J. Brophy #9-22	SE/4, Sec. 22, T4N, R46W	1.90
J. Brophy #10-26	NW/4, Sec. 26, T4N, R46W	.20
J. Brophy #11-20	SE/4, Sec. 20, T4N, R46W	.93
T. Brophy #1	SE/4, Sec. 31, T4N, R46W	.19
T. Brophy #2	SW/4, Sec. 20, T4N, R46W	.54
T. Brophy #3	SW/4, Sec. 21, T4N, R46W	.60
T. Brophy #4	NE/4, Sec. 22, T4N, R46W	1.07
T. Brophy #5	NE/4, Sec. 23, T4N, R46W	.18
T. Brophy #6	SW/4, Sec. 24, T4N, R46W	3.80
T. Brophy #7	SE/4, Sec. 12, T4N, R46W	.43
T. Brophy #8	SE/4, Sec. 13, T4N, R46W	.30
T. Brophy #9	NW/4, Sec. 18, T4N, R45W	.04
T. Brophy #11	NW/4, Sec. 17, T4N, R45W	.18
T. Brophy #12	NW/4, Sec. 19, T4N, R45W	.22
T. Brophy #13	SE/4, Sec. 20, T4N, R45W	.54
T. Brophy #19	SW/4, Sec. 22, T4N, R45W	.95
T. Brophy #21	SW/4, Sec. 7, T4N, R45W	1.60
T. Brophy #24	NW/4, Sec. 14, T4N, R46W	.45
T. Brophy #25	NW/4, Sec. 32, T5N, R46W	.45
T. Brophy #27-14	SE/4, Sec. 14, T4N, R46W	.45
T. Brophy #28-33	NW/4, Sec. 33, T4N, R46W	1.18
T. Brophy #30-14	SW/4, Sec. 14, T4N, R46W	.76
T. Brophy #31-19	SW/4, Sec. 19, T4N, R46W	.46
T. Brophy #32-12	NE/4, Sec. 12, T4N, R46W	1.11
T. Brophy #33-13	SW/4, Sec. 13, T4N, R46W	.40
T. Brophy #34-23	SE/4, Sec. 23, T4N, R46W	1.55
T. Brophy #36-29	NE/4, Sec. 29, T4N, R46W	.18
T. Brophy #37-6	NW/4, Sec. 6, T3N, R46W	.70
T. Brophy #38-18	SW/4, Sec. 18, T4N, R45W	.80
T. Brophy #39-24	NW/4, Sec. 24, T4N, R46W	1.05
T. Brophy #41-20	SW/4, Sec. 20, T4N, R45W	10.90
T. Brophy #42-22	NW/4, Sec. 22, T4N, R46W	.25
T. Brophy #43-23	NW/4, Sec. 23, T4N, R46W	.20
T. Brophy #44-23	SW/4, Sec. 23, T4N, R46W	.10
T. Brophy #45-24	NE/4, Sec. 24, T4N, R46W	2.53
T. Brophy #46-15	SW/4, Sec. 15, T5N, R46W	4.14
T. Brophy #48-29	NW/4, Sec. 29, T4N, R46W	.16
T. Brophy #49-31	SW/4, Sec. 31, T4N, R46W	.16

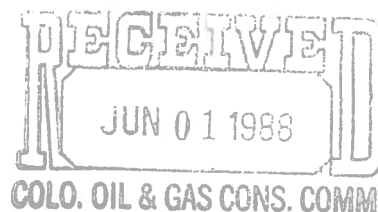
Daily Water Production
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<u>WELL NAME & NO.</u>	<u>LOCATION</u>	<u>AVER. BBLs/DAY</u>
T. Brophy #50-31	NW/4, Sec. 31, T4N, R46W	.16
T. Brophy #51-31	NE/4, Sec. 31, T4N, R46W	.16
T. Brophy #52-22	NW/4, Sec. 22, T5N, R46W	2.72
V. Brueggeman #2-26	NE/4, Sec. 26, T1S, R44W	.20
Chapman #1-33	SE/4, Sec. 33, T5N, R46W	.45
Chapman #1-34	SW/4, Sec. 34, T5N, R46W	.78
S. Clarke #1-17	SW/4, Sec. 17, T5N, R46W	2.71
Conrad #1-1	NW/4, Sec. 1, T3N, R46W	1.10
Conrad #1-5	SW/4, Sec. 5, T3N, R45W	.56
Conrad #1-30	SW/4, Sec. 30, T4N, R45W	2.12
Conrad #1-31	NW/4, Sec. 31, T4N, R45W	2.20
Conrad #1-32	NW/4, Sec. 32, T4N, R45W	.40
Conrad #2-5	SW/4, Sec. 5, T3N, R45W	2.89
Conrad #2-25	NW/4, Sec. 25, T4N, R46W	2.28
Conrad #2-30	NW/4, Sec. 30, T4N, R45W	3.41
Conrad #2-31	NW/4, Sec. 31, T4N, R45W	2.86
Conrad #2-32	NW/4, Sec. 32, T4N, R45W	1.82
Conrad #3	NE/4, Sec. 31, T4N, R45W	1.21
Conrad #3-25	SW/4, Sec. 25, T4N, R46W	1.95
Conrad #4-19	SW/4, Sec. 19, T4N, R45W	.98
Conrad #4-25	NE/4, Sec. 25, T4N, R46W	2.29
Conrad #5-19	SE/4, Sec. 19, T4N, R45W	1.12
Conrad #5-25	NW/4, Sec. 25, T4N, R46W	2.09
Conrad #6-24	SE/4, Sec. 24, T4N, R46W	.90
Conrad #6-25	SW/4, Sec. 25, T4N, R46W	1.98
Conrad #7-31	NE/4, Sec. 31, T4N, R45W	2.50
Conrad #8-25	NE/4, Sec. 25, T4N, R46W	3.63
Conrad Federal #1-30	SE/4, Sec. 30, T4N, R45W	2.90
Conrad Federal #2-30	SE/4, Sec. 30, T4N, R45W	1.16
A. Crossland #1	NE/4, Sec. 31, T5N, R46W	3.46
A. Crossland #2-31	NE/4, Sec. 31, T5N, R46W	1.65
A. Crossland #3-15	NE/4, Sec. 15, T5N, R46W	3.80
D. Crossland #1	NW/4, Sec. 26, T5N, R46W	2.00
D. Crossland #3-26	NE/4, Sec. 26, T5N, R46W	.21
M. Crossland #1-21	NE/4, Sec. 21, T5N, R46W	3.89
Dunning #1	NW/4, Sec. 24, T2S, R46W	.10
Eckberg #1	SE/4, Sec. 32, T1S, R43W	2.64
Eckley Conrad #1-6	NE/4, Sec. 6, T3N, R45W	3.26
Eckley Conrad #1-25	SE/4, Sec. 25, T4N, R46W	.80
Eckley Conrad #2-6	SE/4, Sec. 6, T3N, R45W	3.25
Eckley Conrad #3-6	NE/4, Sec. 6, T3N, R45W	2.44
Eckley Conrad #4-6	SE/4, Sec. 6, T3N, R45W	9.80
Eckley Conrad #7-25	SE/4, Sec. 25, T4N, R46W	1.19
Eckley Federal #1-1	NE/4, Sec. 1, T3N, R46W	2.56
Eckley Federal #1-6	NW/4, Sec. 6, T3N, R45W	2.31
Eckley Federal #1-29	SE/4, Sec. 29, T4N, R45W	1.88
Eckley Federal #1-31	SE/4, Sec. 31, T4N, R45W	2.80
Eckley Federal #2-1	NE/4, Sec. 1, T3N, R46W	2.50
Eckley Federal #2-6	NW/4, Sec. 6, T3N, R45W	2.45
Eckley Federal #2-28	NW/4, Sec. 28, T4N, R45W	5.60
Eckley Federal #2-29	SW/4, Sec. 29, T4N, R45W	4.50
Eckley Federal #2-30	NE/4, Sec. 30, T4N, R45W	13.52
Eckley Federal #2-31	SW/4, Sec. 31, T4N, R45W	2.90



<u>WELL NAME & NO.</u>	<u>LOCATION</u>	<u>AVER. BBLs/DAY</u>
Eckley Federal #3-28	NW/4, Sec. 28, T4N, R45W	5.96
Eckley Federal #3-29	NE/4, Sec. 29, T4N, R45W	2.56
Eckley Federal #3-30	NE/4, Sec. 30, T4N, R45W	8.60
Eckley Federal #3-31	SW/4, Sec. 31, T4N, R45W	5.52
Eckley Federal #4-29	NW/4, Sec. 29, T4N, R45W	5.08
Eckley Federal #4-31	SE/4, Sec. 31, T4N, R45W	2.75
Eckley Federal #5-29	SW/4, Sec. 29, T4N, R45W	1.21
Eckley Federal #6-29	SE/4, Sec. 29, T4N, R45W	3.41
Eckley Federal #7-29	NE/4, Sec. 29, T4N, R45W	2.85
Eckley Kitzmiller #1-5	SE/4, Sec. 5, T3N, R45W	5.05
Eckley Kitzmiller #1-28	SW/4, Sec. 28, T4N, R45W	2.80
Eckley Kitzmiller #1-32	SW/4, Sec. 32, T4N, R45W	1.82
Eckley Kitzmiller #2-5	SE/4, Sec. 5, T3N, R45W	6.50
Eckley Kitzmiller #2-28	SE/4, Sec. 28, T4N, R45W	8.94
Eckley Kitzmiller #2-33	SE/4, Sec. 33, T4N, R45W	1.27
Eckley Kitzmiller #3-28	SW/4, Sec. 28, T4N, R45W	3.93
Eckley Kitzmiller #3-32	SW/4, Sec. 32, T4N, R45W	5.40
Eckley Kitzmiller #4-28	SE/4, Sec. 28, T4N, R45W	5.55
Eckley State #1-36	SE/4, Sec. 36, T4N, R46W	2.96
Eckley State #2-36	NE/4, Sec. 36, T4N, R46W	1.16
Eckley State #3-36	NW/4, Sec. 36, T4N, R46W	2.55
Eckley State #4-36	SW/4, Sec. 36, T4N, R46W	3.77
Eckley State #5-36	NW/4, Sec. 36, T4N, R46W	6.10
Eckley State #6-36	NE/4, Sec. 36, T4N, R46W	.10
Eckley State #7-36	SE/4, Sec. 36, T4N, R46W	2.98
Eckley State #8-36	SW/4, Sec. 36, T4N, R46W	2.86
M. Edwards #1-31	SE/4, Sec. 31, T1S, R43W	2.01
M. Edwards #3-31	SW/4, Sec. 31, T1S, R43W	.15
Federal #1-5	NW/4, Sec. 5, T3N, R45W	1.15
Federal #1-6	SW/4, Sec. 6, T3N, R45W	3.90
Federal #2-5	NW/4, Sec. 5, T3N, R45W	3.30
Federal #3-6	SW/4, Sec. 6, T3N, R45W	4.42
Federal Kitzmiller #1-28	NE/4, Sec. 28, T4N, R45W	4.29
Federal Kitzmiller #1-32	NE/4, Sec. 32, T4N, R45W	3.30
Federal Kitzmiller #2-32	NE/4, Sec. 32, T4N, R45W	2.42
Hansen #1-8	NW/4, Sec. 8, T5N, R46W	12.95
V. Harding #1	SE/4, Sec. 27, T5N, R46W	.21
V. Harding #2-27	NE/4, Sec. 27, T5N, R46W	1.20
B. L. Henderson #1	NE/4, Sec. 6, T3N, R46W	.55
R. Henderson #1-6	SE/4, Sec. 6, T3N, R46W	.18
Henik #1	SE/4, Sec. 1, T3N, R47W	.42
Henik #2-1	NE/4, Sec. 1, T3N, R47W	.38
JER #1-9	SW/4, Sec. 9, T4N, R46W	.82
JER #2-9	NE/4, Sec. 9, T4N, R46W	.25
JER #3-9	SW/4, Sec. 9, T4N, R46W	.60
JER #4-9	SW/4, Sec. 9, T4N, R46W	1.30
JER #5-9	NE/4, Sec. 9, T4N, R46W	.25
JER #6-9	SW/4, Sec. 9, T4N, R46W	.60
Johnson #1	SW/4, Sec. 15, T2S, R46W	.75
Jones #1	SE/4, Sec. 18, T1N, R44W	.30
Jones #2	NE/4, Sec. 19, T1N, R44W	.25
Jones #3	SW/4, Sec. 17, T1N, R44W	.50
C. Josh #1-33	SW/4, Sec. 33, T5N, R46W	.25



<u>WELL NAME & NO.</u>	<u>LOCATION</u>	<u>AVER. BBLs/DAY</u>
C. Josh #2-32	SW/4, Sec. 32, T5N, R46W	.68
C. Josh #3-34	SE/4, Sec. 34, T5N, R46W	.20
C. Josh #4-32	SE/4, Sec. 32, T5N, R46W	.02
C. Josh #5-15	SW/4, Sec. 15, T4N, R46W	.15
K. D. Farms #1	NE/4, Sec. 22, T2S, R46W	.40
Keller #1	SE/4, Sec. 14, T2S, R46W	1.27
Keller #3	SW/4, Sec. 12, T2S, R46W	.35
Keller #5	NW/4, Sec. 13, T2S, R46W	.10
Keller #6	NW/4, Sec. 23, T2S, R46W	2.20
Keller #8	SE/4, Sec. 11, T2S, R46W	.40
Keller #10	SE/4, Sec. 13, T2S, R46W	1.27
Kitzmilller #1-4	SW/4, Sec. 4, T3N, R45W	3.52
Kitzmilller #2	NW/4, Sec. 4, T3N, R45W	.45
Kitzmilller #2-4	SW/4, Sec. 4, T3N, R45W	6.01
Kitzmmiler #2-33	NW/4, Sec. 33, T4N, R45W	2.90
Kitzmilller #3-33	NE/4, Sec. 33, T4N, R45W	3.52
Kitzmilller #4-33	NW/4, Sec. 33, T4N, R45W	6.48
Kitzmilller #5-33	NE/4, Sec. 33, T4N, R45W	1.10
Kitzmilller #7	SE/4, Sec. 32, T4N, R45W	1.10
Kitzmilller #8	SW/4, Sec. 33, T4N, R45W	.56
Kitzmilller #11-32	SE/4, Sec. 32, T4N, R45W	1.87
Kitzmilller #12-33	SW/4, Sec. 33, T4N, R45W	1.24
Klinzmann #1	SW/4, Sec. 11, T4N, R46W	.10
Klinzmann #2-11	NW/4, Sec. 11, T4N, R46W	.55
Klinzmann #3-2	SE/4, Sec. 2, T4N, R46W	6.90
C. Korf #1	SW/4, Sec. 19, T5N, R46W	2.60
C. Korf #2-19	SW/4, Sec. 19, T5N, R46W	1.60
R. Korf #1	NE/4, Sec. 17, T4N, R46W	.16
R. Korf #2	SE/4, Sec. 8, T4N, R46W	.22
R. Korf #3-25	NE/4, Sec. 25, T5N, R47W	2.31
R. Korf #4-8	NE/4, Sec. 8, T4N, R46W	.35
Lengel #1-18	NW/4, Sec. 18, T4S, R43W	.18
F. Lett #1	SW/4, Sec. 20, T5N, R46W	.71
F. Lett #2	NW/4, Sec. 29, T5N, R46W	.64
F. Lett #3	NW/4, Sec. 20, T5N, R46W	2.50
F. Lett #4-20	NE/4, Sec. 20, T5N, R46W	.06
F. Lett #5-20	SE/4, Sec. 20, T5N, R46W	.08
H. Lett #2-15	SE/4, Sec. 15, T5N, R46W	3.86
O. Lueking #1	NE/4, Sec. 30, T5N, R46W	2.35
O. Lueking #2	SE/4, Sec. 19, T5N, R46W	2.90
O. Lueking #3	NE/4, Sec. 19, T5N, R46W	.44
O. Lueking #4	NW/4, Sec. 19, T5N, R46W	.70
O. Lueking #5	NW/4, Sec. 30, T5N, R46W	1.71
O. Lueking #6	SE/4, Sec. 30, T5N, R46W	1.19
O. Lueking #8-30	NE/4, Sec. 30, T5N, R46W	1.92
O. Lueking #9-30	SE/4, Sec. 30, T5N, R46W	.82
O. Lueking #10-19	SE/4, Sec. 19, T5N, R46W	2.20
O. Lueking #11-30	NW/4, Sec. 30, T5N, R46W	2.42
McCoy FLB #1-13	NE/4, Sec. 13, T5N, R47W	5.87
Mekelburg #1-20	NW/4, Sec. 20, T4N, R46W	.16
Murrain #1	SE/4, Sec. 30, T4N, R46W	.46
Murrain #2	SE/4, Sec. 19, T4N, R46W	.25
Murrain #3-30	NE/4, Sec. 30, T4N, R46W	.38

Daily Water Production
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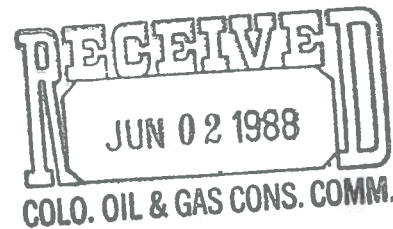
<u>WELL NAME & NO.</u>	<u>LOCATION</u>	<u>AVER. BBLs/DAY</u>
MurRAIN #4-30	NW/4, Sec. 30, T4N, R46W	.38
MurRAIN #5-30	SW/4, Sec. 30, T4N, R46W	1.51
Murrell #1-25	NW/4, Sec. 25, T1S, R44W	2.90
C. Salvador #1-18	NW/4, Sec. 18, T5N, R46W	4.16
H. Salvador #1-17	SE/4, Sec. 17, T5N, R46W	1.15
W. Salvador #1-14	NW/4, Sec. 14, T5N, R46W	4.78
Schmidt #1-18	SW/4, Sec. 18, T5N, R46W	1.30
State of Colorado #2	NW/4, Sec. 16, T4N, R46W	.36
State of Colorado #10	NE/4, Sec. 36, T5N, R47W	3.36
State of Colorado #11	SE/4, Sec. 36, T5N, R47W	.75
State of Colorado #12	NW/4, Sec. 36, T5N, R47W	1.41
State of Colorado #13	SW/4, Sec. 36, T5N, R47W	1.15
State of Colorado #24-16	NE/4, Sec. 16, T4N, R46W	.14
State of Colorado #28-36	NW/4, Sec. 36, T5N, R47W	2.95
State of Colorado #29-36	NE/4, Sec. 36, T5N, R47W	2.43
State of Colorado #30-36	SW/4, Sec. 36, T5N, R47W	.95
State of Colorado #31-36	SE/4, Sec. 36, T5N, R47W	2.75
Tuell #1-35	NE/4, Sec. 35, T4N, R46W	1.76
Tuell #2-35	NW/4, Sec. 35, T4N, R46W	2.31
Tuell #3-35	NE/4, Sec. 35, T4N, R46W	4.67
Tuell #4-35	NW/4, Sec. 35, T4N, R46W	4.29
H. Tuell #1	NW/4, Sec. 32, T4N, R46W	1.14
H. Tuell #2-32	SW/4, Sec. 32, T4N, R46W	.26
Tuelland #1-1	NW/4, Sec. 1, T3N, R46W	1.80
Tuelland #1-2	SW/4, Sec. 2, T4N, R46W	.20
Tuelland #1-35	SE/4, Sec. 35, T4N, R46W	2.31
Tuelland #2-26	SW/4, Sec. 26, T4N, R46W	.85
Tuelland #2-35	SE/4, Sec. 35, T4N, R46W	1.98
U. S. A. #3	NE/4, Sec. 5, T3N, R45W	.70
U. S. A. #704	NW/4, Sec. 4, T3N, R45W	.56
U. S. A. #8-5	NE/4, Sec. 5, T3N, R45W	3.04
Vorce #1	NE/4, Sec. 28, T1S, R49W	.10
Vorce #2-28	SE/4, Sec. 28, T1S, R49W	.25
White Star Farms #1-19	NE/4, Sec. 19, T4N, R46W	.27
YCOCO #1-10	SW/4, Sec. 10, T4N, R46W	.41
YCOCO #2-10	NW/4, Sec. 10, T4N, R46W	.77
YCOCO #3-10	NE/4, Sec. 10, T4N, R46W	.77
YCOCO #4-10	SW/4, Sec. 10, T4N, R46W	.50
YCOCO #5-10	NW/4, Sec. 10, T4N, R46W	.41
YCOCO #6-10	NE/4, Sec. 10, T4N, R46W	.75
YCOCO #4-3	SE/4, Sec. 3, T4N, R46W	1.54
YCOCO #5-3	SW/4, Sec. 3, T4N, R46W	.62
C. Yenter #1-21	NW/4, Sec. 21, T4N, R46W	.25
C. Yenter #2-21	NE/4, Sec. 21, T4N, R46W	.43



OXY USA INC.

110 South Main, #800
Wichita, KS 67202

Mr. Jim Kenny
Oil and Gas Conservation Commission
Department of Natural Resources
Suite 380, Logan Tower Building
1580 Logan Street
Denver, Colorado 80203



May 31, 1988

Dear Mr. Kenny,

This letter is in response to Mr. William R. Smith's letter of April 7, 1988, requesting produced water estimates from wells producing in the Niobrara formation in Eastern Colorado. The following is a list of produced water estimates from OXY USA Niobrara wells that are located in Washington County, Colorado:

<u>Well Name</u>	<u>Estimated Water Production</u>
State "A" #1	5 bbls per month
State "B" #2	2 bbls per month
Christenson "A" #1	5 bbls per month
Christenson "A" #2	3 bbls per month
McCreath "C" #1	1 bbls per month
McCreath "A" #1	2 bbls per month
Mathies "A" #1 and "A" #2	.5 bbls per month
Snyder "A" #1	7 bbls per month
Maggard "A" #1	2 bbls per month
Maggard "A" #2	2 bbls per month
Axsom "C" #1	.5 bbls per month
Austin "A" #1	.5 bbls per month

If you have any questions concerning the included data, please contact me at 316-265-5624.

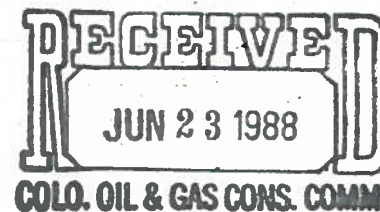
Sincerely,

M. D. Harrison
Operations Manager

cc: Mr. Jim Vaughan

esMDH/mlr

HALLIBURTON SERVICES
Box 1510.
Evansville, Wyoming 82636



Date March 22, 1984

To Mr. W. C. Maddox
Halliburton Services
Sterling, CO

Report No. W84-0256

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Burns

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.016</u>
pH	<u>7.5</u>
Iron (Fe)	<u>1</u>
Potassium (K)	<u>85</u>
Sodium (Na)	<u>8100</u>
Calcium (Ca)	<u>94</u>
Magnesium (Mg)	<u>41</u>
Chlorides (Cl)	<u>10430</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1769</u>
Total Dissolved Solids	<u>19623</u>
Resistivity	<u>0.1</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By DP Kunkel

NOTICE:

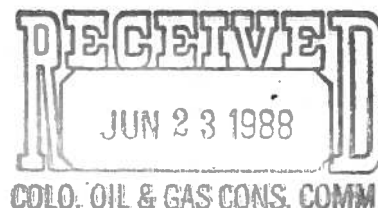
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510

Evansville, Wyoming 82636



Date March 22, 1984

To Mr. W. C. Maddox

Report No. W84-0255

Halliburton Services

Sterling, CO

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Perry

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.014</u>
pH	<u>7.3</u>
Iron (Fe)	<u>3</u>
Potassium (K)	<u>265</u>
Sodium (Na)	<u>7200</u>
Calcium (Ca)	<u>189</u>
Magnesium (Mg)	<u>98</u>
Chlorides (Cl)	<u>9466</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1327</u>
Total Dissolved Solids	<u>17875</u>
Resistivity	<u>0.46</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By DPK

NOTICE:

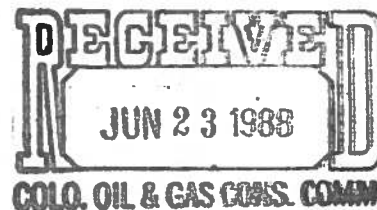
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510

Evansville, Wyoming 82636

Date March 22, 1984

To Mr. W. C. Maddox
Halliburton Services
Sterling, CO

Report No. W84-0254Submitted By P & M Petroleum Management Date Received 3-19-84Well No. State 2-11Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.012</u>
pH	<u>7.5</u>
Iron (Fe)	<u>4</u>
Potassium (K)	<u>110</u>
Sodium (Na)	<u>6600</u>
Calcium (Ca)	<u>36</u>
Magnesium (Mg)	<u>26</u>
Chlorides (Cl)	<u>8573</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1312</u>
Total Dissolved Solids	<u>15996</u>
Resistivity	<u>0.53</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By DP Kuntz

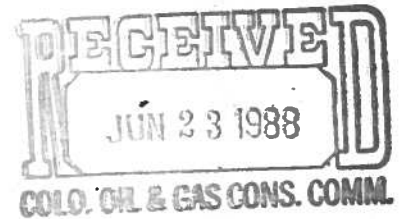
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510
Evansville, Wyoming 82636



Date March 22, 1984

To Mr. W. C. Maddox
Halliburton Services
Sterling, CO

Report No. W84-0253

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Price 7-9

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.014</u>
pH	<u>7.5</u>
Iron (Fe)	<u>3</u>
Potassium (K)	<u>200</u>
Sodium (Na)	<u>6200</u>
Calcium (Ca)	<u>65</u>
Magnesium (Mg)	<u>29</u>
Chlorides (Cl)	<u>8324</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1373</u>
Total Dissolved Solids	<u>15498</u>
Resistivity	<u>0.55</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By

DP Kunkel

NOTICE:

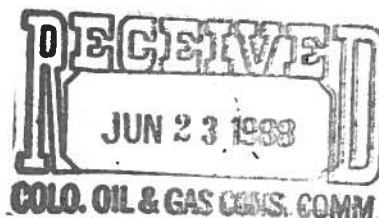
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510

Evansville, Wyoming 82636

Date March 22, 1984To Mr. W. C. MaddoxReport No. W84-0252Halliburton ServicesSterling, COSubmitted By P & M Petroleum Management Date Received 3-19-84Well No. Small 1-35Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.014</u>
pH	<u>7.6</u>
Iron (Fe)	<u>1</u>
Potassium (K)	<u>95</u>
Sodium (Na)	<u>7400</u>
Calcium (Ca)	<u>114</u>
Magnesium (Mg)	<u>52</u>
Chlorides (Cl)	<u>9716</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1220</u>
Total Dissolved Solids	<u>17979</u>
Resistivity	<u>0.45</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By DP Kuntz**NOTICE:**

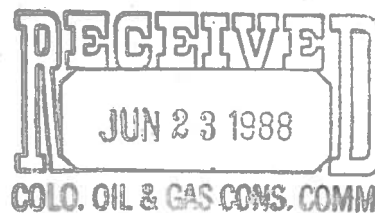
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510

Evansville, Wyoming 82636



Date March 22, 1984

To Mr. W. C. Maddox
Halliburton Services
Sterling, CO

Report No. W84-0251

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Allen 4-17

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.014</u>
pH	<u>7.5</u>
Iron (Fe)	<u>2</u>
Potassium (K)	<u>95</u>
Sodium (Na)	<u>7100</u>
Calcium (Ca)	<u>82</u>
Magnesium (Mg)	<u>43</u>
Chlorides (Cl)	<u>8894</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1510</u>
Total Dissolved Solids	<u>16960</u>
Resistivity	<u>0.48</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

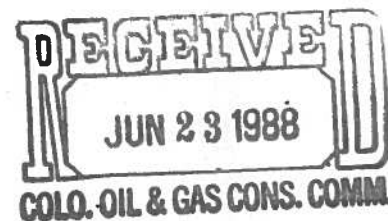
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By DP Kunkert

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HALLIBURTON SERVICES
Box 1510.
Evansville, Wyoming 82636



Date March 23, 1984

To Mr. W. C. Maddox
Halliburton Services
Sterling, CO

Report No. W84-0250

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Statekomatz

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.013</u>
pH	<u>7.0</u>
Iron (Fe)	<u>7</u>
Potassium (K)	<u>135</u>
Sodium (Na)	<u>6900</u>
Calcium (Ca)	<u>70</u>
Magnesium (Mg)	<u>33</u>
Chlorides (Cl)	<u>9470</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>854</u>
Total Dissolved Solids	<u>17036</u>
Resistivity	<u>0.47</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By DP Kumbert

NOTICE:

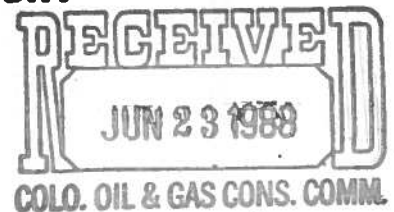
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510

Evansville, Wyoming 82636



Date March 22, 1984

To Mr. W. C. Maddox

Report No. W84-0249

Halliburton Services

Sterling, CO

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Axsom #5

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.010</u>
pH	<u>7.3</u>
Iron (Fe)	<u>less than 1</u>
Potassium (K)	<u>220</u>
Sodium (Na)	<u>6500</u>
Calcium (Ca)	<u>59</u>
Magnesium (Mg)	<u>31</u>
Chlorides (Cl)	<u>7983</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>778</u>
Total Dissolved Solids	<u>15177</u>
Resistivity	<u>0.50</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

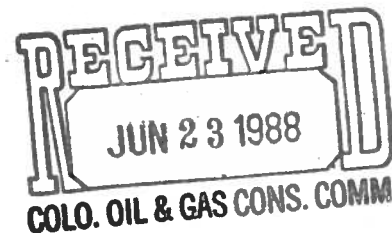
By

DP Kunder

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HALLIBURTON SERVICES
Box 1510
Evansville, Wyoming 82636



Date March 22, 1984

To Mr. W. C. Maddox
Halliburton Services
Sterling, CO

Report No. W84-0246

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Burns

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.013</u>
pH	<u>7.2</u>
Iron (Fe)	<u>less than 1</u>
Potassium (K)	<u>160</u>
Sodium (Na)	<u>6900</u>
Calcium (Ca)	<u>30</u>
Magnesium (Mg)	<u>24</u>
Chlorides (Cl)	<u>8818</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1144</u>
Total Dissolved Solids	<u>16496</u>
Resistivity	<u>0.48</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By D.P. Kurland

NOTICE:

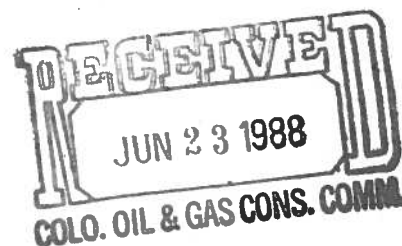
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510

Evansville, Wyoming 82636



Date March 22, 1984

To Mr. W. C. Maddox

Report No. W84-0245

Halliburton Services

Sterling, CO

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Price 2-8

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.016</u>
pH	<u>7.2</u>
Iron (Fe)	<u>9</u>
Potassium (K)	<u>105</u>
Sodium (Na)	<u>6800</u>
Calcium (Ca)	<u>85</u>
Magnesium (Mg)	<u>46</u>
Chlorides (Cl)	<u>8609</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1556</u>
Total Dissolved Solids	<u>16421</u>
Resistivity	<u>0.50</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

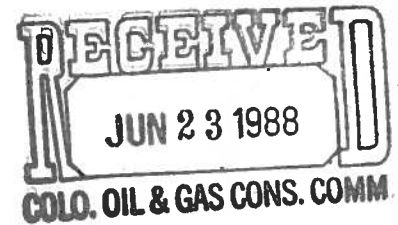
By DP Kumbert

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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES
Box 1510
Evansville, Wyoming 82636



Date March 22, 1984

To Mr. W. C. Maddox
Halliburton Services
Sterling, CO

Report No. W84-0244

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Christianson #1

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.014</u>
pH	<u>7.5</u>
Iron (Fe)	<u>4</u>
Potassium (K)	<u>160</u>
Sodium (Na)	<u>6900</u>
Calcium (Ca)	<u>45</u>
Magnesium (Mg)	<u>29</u>
Chlorides (Cl)	<u>8557</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1312</u>
Total Dissolved Solids	<u>16342</u>
Resistivity	<u>0.49</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By D. P. Kunder

NOTICE:

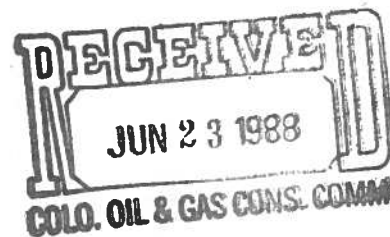
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510.

Evansville, Wyoming 82636



Date March 21, 1984

To Mr. W. C. Maddox ✓

Report No. W84-0248

Halliburton Services

Sterling, CO

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Allen 3-17

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.011</u>
pH	<u>7.1</u>
Iron (Fe)	<u>less than 1</u>
Potassium (K)	<u>200</u>
Sodium (Na)	<u>5600</u>
Calcium (Ca)	<u>50</u>
Magnesium (Mg)	<u>23</u>
Chlorides (Cl)	<u>6600</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1007</u>
Total Dissolved Solids	<u>12969</u>
Resistivity	<u>0.59</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By DP Kumbert

NOTICE:

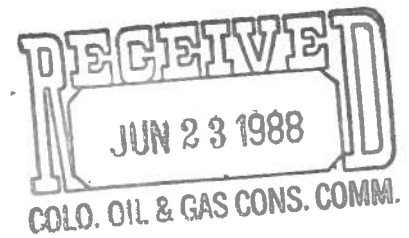
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510 .

Evansville, Wyoming 82636



Date March 21, 1984

To Mr. W. C. Maddox ✓

Report No. W84-0247

Halliburton Services

Sterling, CO

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Christianson 1-2

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.013</u>
pH	<u>7.5</u>
Iron (Fe)	<u>less than 1</u>
Potassium (K)	<u>165</u>
Sodium (Na)	<u>6600</u>
Calcium (Ca)	<u>95</u>
Magnesium (Mg)	<u>25</u>
Chlorides (Cl)	<u>8583</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1159</u>
Total Dissolved Solids	<u>16039</u>
Resistivity	<u>0.49</u>

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MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By D. P. Kunkel

NOTICE:

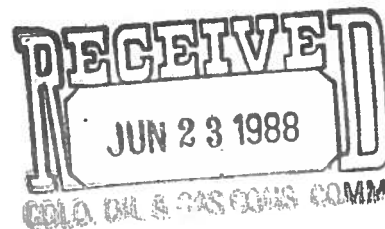
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510.

Evansville, Wyoming 82636



Date March 21, 1984

To Mr. W. C. Maddox

Report No. W84-0243

Halliburton Services

Sterling, CO

Submitted By P & M Petroleum Management Date Received 3-19-84

Well No. Price #6

Location Yuma Co., CO Formation Niobrara

Specific Gravity	<u>1.028</u>
pH	<u>7.6</u>
Iron (Fe)	<u>less than 1</u>
Potassium (K)	<u>345</u>
Sodium (Na)	<u>15000</u>
Calcium (Ca)	<u>109</u>
Magnesium (Mg)	<u>50</u>
Chlorides (Cl)	<u>20283</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>3355</u>
Total Dissolved Solids	<u>37441</u>
Resistivity	<u>0.25</u>

This report is the property of Halliburton Services, a Division of Halliburton Company, and neither this report nor any part hereof may be disclosed to any third party without the express written approval of Halliburton Services

MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

By D P Kunder

NOTICE:

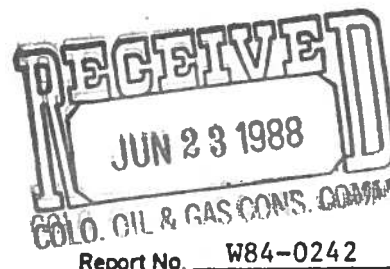
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HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES

Box 1510

Evansville, Wyoming 82636

Date March 21, 1984To Mr. W. C. Maddox ✓Halliburton ServicesSterling, COSubmitted By P & M Petroleum Management Date Received 3-19-84Well No. Hickert 1-33Location Yuma Co., COFormation Niobrara

Specific Gravity	<u>1.014</u>
pH	<u>7.1</u>
Iron (Fe)	<u>less than 1</u>
Potassium (K)	<u>190</u>
Sodium (Na)	<u>7200</u>
Calcium (Ca)	<u>116</u>
Magnesium (Mg)	<u>56</u>
Chlorides (Cl)	<u>9366</u>
Sulfates (SO ₄)	<u>less than 10</u>
Carbonates (CO ₃)	<u>nil</u>
Bicarbonates (HCO ₃)	<u>1342</u>
Total Dissolved Solids	<u>17590</u>
Resistivity	<u>0.47</u>

This report is the property of Halliburton Services, a Division of Halliburton Company, and neither this report nor any part hereof may be disclosed to any third party without the express written approval of Halliburton Services.

MILLIGRAMS PER LITER

Ohms/M²/M at 70 °F

Remarks:

xc: D. E. Bailey

Respectfully submitted,

HALLIBURTON SERVICES

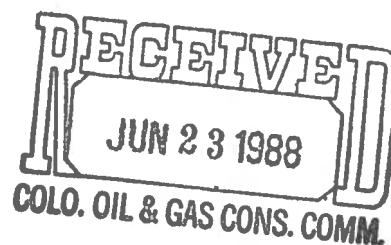
By D. P. Kunder

NOTICE:

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The Sand Hills Society
Niobrara Illuminating
Gas Associates

1580 LINCOLN ST., SUITE 1120
DENVER, COLORADO 80203
TELEPHONE 837-0506



May 3, 1988

Mr. Robert Peterson
P & M Petroleum Management
1600 Broadway - Suite 1700
Denver, Colorado 80202

Re: Water Disposal for
Niobrara Gas Wells
Washington Co., Colo.

Dear Bob:

Enclosed please find copies of two Schlumberger Compensated Neutron-Litho Density Logs from our #8 Price and #4 State, both located in the DeNova Niobrara gas field, Washington County, Colorado. These two wells were specifically logged to the surface following your recommendations made in a letter dated November 15, 1983 concerning the Ogallala Aquifer.

The unit in question overlies the aquifer and is the upper Ogallala formation of Miocene age and varies from 150'-200' in this portion of Washington County. The formation is composed of various fluvial deposits of variegated claystones, clay shales and occasional lenticular argillaceous sandstones. Our Schlumberger log demonstrates the barrier effect this unit has on vertical migration. This is also supported from the samples I have observed in the field. As you know, Wilbur Allen, our field supervisor, has examined the zone from approximately 50 wells in the immediate area, as he is responsible for the setting of the surface pipe. He is in agreement with the above opinion.

Very truly yours,

A handwritten signature in cursive script, appearing to read "William L. Barksdale".

William L. Barksdale
Petroleum Geologist

WLB/tw

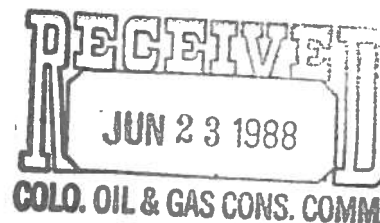
Enclosures



PETROLEUM MANAGEMENT

SUITE 1700 • 1600 BROADWAY • DENVER • COLORADO 80202 • PHONE (303) 861-2470

June 22, 1988



Mr. William R. Smith
Colorado Oil & Gas Conservation
Commission
1580 Logan Street, Suite 380
Denver, CO 80203

RE: Disposal of Produced Niobrara
Chalk Formation water from
Washington County, CO Gas Wells

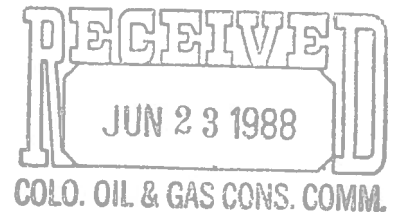
Dear Mr. Smith:

We have been concerned about the disposal of the produced water from the Niobrara Illuminating Gas Associates and Sand Hills Society gas wells that produce from the Niobrara Chalk formation in Washington County since we started producing the wells in January 1980. In 1983 we took representative water samples in each producing area and we had a routine analysis run on each sample. Copies of these water analyses are enclosed. We also ran Gamma Ray-Neutron logs through the surface pipe on two of the last wells we drilled. These logs didn't indicate any continuous water sands between the top of the Ogallala sand and the surface. I am enclosing a letter from Leigh Barksdale, Petroleum Geologist and a working interest owner, who has done the geology on all of the wells in question and he explains that the formation between the Ogallala sand and the surface is composed of claystones, clay shales and occasional lenticular argillaceous sandstones. These impervious formations should prevent any vertical migration from surface waters and the Ogallala aquifer located 150 to 200' below the surface.

We obtained an isopach map of the Ogallala aquifer from the State of Colorado Department of Natural Resources, Division of Water Resources. A copy of this map is enclosed and it shows that the area in which NIGA and SHS producing wells are located is on the western edge of the Ogallala aquifer and most of the area is not underlain by the Ogallala aquifer. The isopach maps are confirmed by our Field Supervisor who is very familiar with the water aquifer in the area. The estimated monthly barrels of water produced is marked on the map. The water production is measured from each well by bucket tests and the monthly total production is estimated from these tests.

The average total dissolved solids for the 15 wells that NIGA and SHS operate, and we have water analyses on, is 17,963 ppm and if you eliminate the Price #6 analysis, the average is 16,577 ppm. Our field supervisor lets his cattle drink the produced Niobrara water so any possible contamination would not be very harmful to the sub-surface water in the Ogallala aquifer.

William R. Smith
Colorado Oil & Gas
Conservation Commission
June 22, 1988
Page 2



In summary, I don't believe the Niobrara produced water is a hazard to the high quality water in the Ogallala formation for the following reasons:

- (1) The claystones, clay shales, and argillaceous sandstones should make an impervious barrier to any fluid migration between the surface and the Ogallala aquifer.
- (2) The continuous development of the Ogallala aquifer is further to the east of the NIGA and SHS wells and there are only isolated pods of sand in the area in question. From the Colorado Division of Natural Resources Division of Water Resources Isopach map I would estimate that only about 15 per cent of NIGA's and SHS's acreage is underlain with the Ogallala aquifer.
- (3) The amount of water produced from these wells is relatively small. The average water produced per well is less than 3 barrels per month for the 35 producing wells.
- (4) The total dissolved solids of the produced water is relatively low.

If you need any further information or if you would like to discuss the water disposal situation, please let me know.

Sincerely,

A handwritten signature in cursive script that reads "Robert W. Peterson".

Robert W. Peterson

RPW/bj

enclosures: Water analyses
Barksdale letter
Isopach map of Ogallala aquifer



TRETOLITE DIVISION

389 Marshall Avenue / Saint Louis, Missouri 63118
(314) WO 1-3500/TWX 910-780-1860/Telex 44-2417

WATER ANALYSIS REPORT

COMPANY J & W Operating ADDRESS _____ DATE: 1-10-89

SOURCE Korf #1 Separator bottom DATE SAMPLED 1-10-89 ANALYSIS NO. _____

Assoc- API 125-06397

1. pH 6.8

2. H₂S (Qualitative) _____

3. Specific Gravity 1.005

4. Dissolved Solids _____

5. Suspended Solids _____

6. Phenolphthalein Alkalinity (CaCO₃) _____

7. Methyl Orange Alkalinity (CaCO₃) _____

8. Bicarbonate (HCO₃) _____

9. Chlorides (Cl) _____

10. Sulfates (SO₄) _____

11. Calcium (Ca) _____

12. Magnesium (Mg) _____

13. Total Hardness (CaCO₃) _____

14. Total Iron (Fe) _____

15. Barium (Qualitative) _____

16. Strontium _____

*Milli equivalents per liter

SESU 25-5N-47W

Niobrara

6010

1200

HCO ₃	1460	÷ 61	24	HCO ₃
Cl	2530	÷ 35.5	71	Cl
SO ₄	0	÷ 48	0	SO ₄
Ca	200	÷ 20	10	Ca
Mg	150	÷ 12.2	12	Mg
	1100			
	0.2ppm			

PROBABLE MINERAL COMPOSITION

10	Ca	←	HCO ₃	24
12	Mg	←	SO ₄	0
73	Na	←	Cl	71

Saturation Values	Distilled Water 20°C
Ca CO ₃	13 Mg/L
Ca SO ₄ • 2H ₂ O	2,090 Mg/L
Mg CO ₃	103 Mg/L

Compound	Equiv. Wt.	X	Meq/L	=	Mg/L
Ca (HCO ₃) ₂	81.04		10		810
Ca SO ₄	68.07				
Ca Cl ₂	55.50				
Mg (HCO ₃) ₂	73.17		12		880
Mg SO ₄	60.19				
Mg Cl ₂	47.62				
Na HCO ₃	84.00		2		170
Na ₂ SO ₄	71.03				
Na Cl	58.46		71		4150

REMARKS _____

Respectfully submitted
TRETOLITE COMPANY

Pete Mueller

PETROLITE
CORPORATION

TRETOLITE DIVISION

369 Marshall Avenue / Saint Louis, Missouri 63119
(314) WD 1-3500/TWX 910-760-1860/Telex 44-2417**WATER ANALYSIS REPORT**COMPANY J & W Operating ADDRESS _____ DATE: 1-10-89SOURCE Hillman #2 - water tank DATE SAMPLED 1-10-89 ANALYSIS NO. _____

Assoc API 125-070-77 Analysis

1. pH 6.8
 2. H₂S (Qualitative) -
 3. Specific Gravity 1.015
 4. Dissolved Solids _____
 5. Suspended Solids _____
 6. Phenolphthalein Alkalinity (CaCO₃) _____
 7. Methyl Orange Alkalinity (CaCO₃) _____
 8. Bicarbonate (HCO₃) _____
 9. Chlorides (Cl) _____
 10. Sulfates (SO₄) _____
 11. Calcium (Ca) _____
 12. Magnesium (Mg) _____
 13. Total Hardness (CaCO₃) _____
 14. Total Iron (Fe) _____
 15. Barium (Qualitative) _____
 16. Strontium _____
- *Milli equivalents per liter

NWSE 25 - SW - 47W

Niobrara

	19,670		
	1,350		
HCO ₃	1,650	÷ 61	27 HCO ₃
Cl	10,580	÷ 35.5	298 Cl
SO ₄	0	÷ 48	0 SO ₄
Ca	40	÷ 20	2 Ca
Mg	20	÷ 12.2	1 Mg
	170		
	0.2 ppm		

PROBABLE MINERAL COMPOSITION

2	Ca	←	HCO ₃	27
1	Mg	→	SO ₄	0
322	Na	→	Cl	298

Saturation Values	Distilled Water 20°C
Ca CO ₃	13 Mg/L
Ca SO ₄ • 2H ₂ O	2,090 Mg/L
Mg CO ₃	103 Mg/L

Compound	Equiv. Wt.	X	Meq/L	=	Mg/L
Ca (HCO ₃) ₂	81.04		2		160
Ca SO ₄	68.07				
Ca Cl ₂	55.50				
Mg (HCO ₃) ₂	73.17		1		70
Mg SO ₄	60.19				
Mg Cl ₂	47.62				
Na HCO ₃	84.00		24		2020
Na ₂ SO ₄	71.03				
Na Cl	58.46		298		17,420

REMARKS _____

_____Respectfully submitted
TRETOLITE COMPANY*Pete Mueller*

WATER ANALYSIS REPORT

COMPANY J & W Operating ADDRESS _____ DATE: 1-10-89

SOURCE Korf #2 - water tank DATE SAMPLED 1-10-89 ANALYSIS NO. _____

API 125-07076 Analysis

1. pH 6.8

2. H₂S (Qualitative) -

3. Specific Gravity 1.015

4. Dissolved Solids _____

5. Suspended Solids _____

6. Phenolphthalein Alkalinity (CaCO₃) _____

7. Methyl Orange Alkalinity (CaCO₃) _____

8. Bicarbonate (HCO₃) _____

9. Chlorides (Cl) _____

10. Sulfates (SO₄) _____

11. Calcium (Ca) _____

12. Magnesium (Mg) _____

13. Total Hardness (CaCO₃) _____

14. Total Iron (Fe) _____

15. Barium (Qualitative) _____

16. Strontium _____

*Milli equivalents per liter

NWSW 25-5N-47W

NIOBRARA

19,750

1,380

HCO₃ 1,680 ÷ 61 28 HCO₃

Cl 10,580 ÷ 35.5 298 Cl

SO₄ 0 ÷ 48 0 SO₄

Ca 40 ÷ 20 2 Ca

Mg 20 ÷ 12.2 1 Mg

170

1.5 ppm

RECEIVED

FEB 22 1989

WATER ANAL. & LAB. CORP. CORP.

PROBABLE MINERAL COMPOSITION

2	Ca	←	HCO ₃	28
1	Mg	←	SO ₄	0
323	Na	←	Cl	298

Saturation Values Distilled Water 20°C

Ca CO₃ 13 Mg/L

Ca SO₄ • 2H₂O 2,090 Mg/L

Mg CO₃ 103 Mg/L

Compound	Equiv. Wt.	X	Meq/L	=	Mg/L
Ca (HCO ₃) ₂	81.04		2		160
Ca SO ₄	68.07				
Ca Cl ₂	55.50				
Mg (HCO ₃) ₂	73.17		1		70
Mg SO ₄	60.19				
Mg Cl ₂	47.62				
Na HCO ₃	84.00		25		2100
Na ₂ SO ₄	71.03				
Na Cl	58.46		298		17,400

REMARKS _____



TRETOLITE DIVISION
388 Marshall Avenue / Saint Louis, Missouri 63119
(314) WO 1-3500/TWX 910-780-1660/Telex 44-2417



WATER ANALYSIS REPORT

COMPANY J-W Operating Company ADDRESS Wray, CO 80758 DATE: 1/10/89

SOURCE Hillman #1 DATE SAMPLED 1/10/89 ANALYSIS NO. _____
API 125-06396 Analysis _____
Mg/L _____ *Meq/L _____

SESE 25-SN-47W
NIOBRARA

1. pH 6.0
 2. H₂S (Qualitative) _____
 3. Specific Gravity 1.010
 4. Dissolved Solids _____
 5. Suspended Solids _____
 6. Phenolphthalein Alkalinity (CaCO₃) _____
 7. Methyl Orange Alkalinity (CaCO₃) _____
 8. Bicarbonate (HCO₃) _____
 9. Chlorides (Cl) _____
 10. Sulfates (SO₄) _____
 11. Calcium (Ca) _____
 12. Magnesium (Mg) _____
 13. Total Hardness (CaCO₃) _____
 14. Total Iron (Fe) _____
 15. Barium (Qualitative) _____
 16. Strontium _____
- *Milli equivalents per liter

20.080

950

HCO ₃	<u>1160</u>	÷ 61	<u>19</u>	HCO ₃
Cl	<u>11.270</u>	÷ 35.5	<u>317</u>	Cl
SO ₄	<u>0</u>	÷ 48	<u>0</u>	SO ₄
Ca	<u>200</u>	÷ 20	<u>10</u>	Ca
Mg	<u>20</u>	÷ 12.2	<u>2</u>	Mg
	<u>600</u>			
	<u>10.0 ppm</u>			

PROBABLE MINERAL COMPOSITION

10	Ca	←	HCO ₃	19
2	Mg	←	SO ₄	0
324	Na	←	Cl	317

Saturation Values Distilled Water 20°C
Ca CO₃ 13 Mg/L
Ca SO₄ • 2H₂O 2,090 Mg/L
Mg CO₃ 103 Mg/L

Compound	Equiv. Wt.	X	Meq/L	=	Mg/L
Ca (HCO ₃) ₂	81.04	10			810
Ca SO ₄	68.07				
Ca Cl ₂	55.50				
Mg (HCO ₃) ₂	73.17	2			150
Mg SO ₄	60.19				
Mg Cl ₂	47.62				
Na HCO ₃	84.00	7			590
Na ₂ SO ₄	71.03				
Na Cl	58.46	317			18530

REMARKS _____

Respectfully submitted
TRETOLITE COMPANY

PETROLITE
CORPORATION

TRETOLITE DIVISION

369 Marshall Avenue / Saint Louis, Missouri 63119
(314) WO 1-3500/TWX 910-780-1660/Telex 44-2417

WATER ANALYSIS REPORT

COMPANY J-W Operating Company ADDRESS Wray, CO 80758 DATE 1/10/89SOURCE Korf #3 DATE SAMPLED 1/10/89 ANALYSIS NO. _____API # 25-07158 Analysis

Mg/L

*Meq/L

1. pH 6.32. H₂S (Qualitative) _____3. Specific Gravity 1.010

4. Dissolved Solids _____

5. Suspended Solids _____

6. Phenolphthalein Alkalinity (CaCO₃) _____7. Methyl Orange Alkalinity (CaCO₃) _____8. Bicarbonate (HCO₃) _____

9. Chlorides (Cl) _____

10. Sulfates (SO₄) _____

11. Calcium (Ca) _____

12. Magnesium (Mg) _____

13. Total Hardness (CaCO₃) _____

14. Total Iron (Fe) _____

15. Barium (Qualitative) _____

16. Strontium _____

*Milli equivalents per liter

NENE 26 - SN - 47W

Niobrara

20,1301400HCO₃ 1710 ÷ 61 28 HCO₃Cl 10801 ÷ 35.5 305 ClSO₄ 0 ÷ 48 0 SO₄Ca 200 ÷ 20 10 CaMg 20 ÷ 12.2 2 Mg6005.5 ppm

PROBABLE MINERAL COMPOSITION

10	Ca	←	HCO ₃	28
2	Mg	←	SO ₄	0
321	Na	←	Cl	305

Saturation Values Distilled Water 20°C

Ca CO₃ 13 Mg/LCa SO₄ • 2H₂O 2,090 Mg/LMg CO₃ 103 Mg/L

Compound	Equiv. Wt.	X	Meq/L	=	Mg/L
Ca (HCO ₃) ₂	81.04	<u>10</u>			<u>810</u>
Ca SO ₄	68.07				
Ca Cl ₂	55.50				
Mg (HCO ₃) ₂	73.17	<u>2</u>			<u>150</u>
Mg SO ₄	60.19				
Mg Cl ₂	47.62				
Na HCO ₃	84.00	<u>16</u>			<u>1340</u>
Na ₂ SO ₄	71.03				
Na Cl	58.46	<u>305</u>			<u>17830</u>

REMARKS _____

Respectfully submitted
TRETOLITE COMPANY

RECEIVED ✓

JAN 03 1989



ANALYTICAL LABORATORY REPORT

COLD. OIL & GAS CONS. COMM

AL WARD & SON
JOES, COLORADO

D Sd.

15-DEC-88

API 125-05022 BENNETT WELLHEAD
Bennett #1

SESE 22 - 35 - 48W

Page 1

>>> Oil Field Water Analysis <<<

DISSOLVED SOLIDS

Cations		mg/l	meq/l		mg/l
		=====	=====		=====
Sodium	Na+	900.1	39.1	as NaCl	
Calcium	Ca++	24.0	1.2	as CaCO3	60.0
Magnesium	Mg++	4.9	0.4	as CaCO3	20.0
Barium	Ba++			as CaCO3	
Strontium	Sr++			as CaCO3	
Total Cations		929.0	40.7		

Anions		mg/l	meq/l		mg/l
		=====	=====		=====
Chloride	Cl-	895.3	25.2	as NaCl	1,475.0
Sulfate	SO4=	13.5	0.3	as Na2SO4	20.0
Carbonate	CO3=			as CaCO3	
Bicarb.	HCO3-	927.2	15.2	as CaCO3	760.0
Total Anions		1,836.0	40.7		

Total Solids 2,765.0

METALS

Total Iron, Fe			
Acid to Phen, CO2	22.0	as Fe	
		as CaCO3	50.0

OTHER PROPERTIES

pH	7.4
Specific Gravity	1.0
Turbidity	
Oxygen, as O2 ppm	
Sulfide as H2S ppm	
Temperature F	

NALCO CHEMICAL COMPANY

ANALYTICAL LABORATORIES

Form 738 (2-88)

One Nalco Center
Naperville, IL 60566-1024P. O. Box 87
Sugar Land, Texas 77497



WATER ANALYSIS

AP' 125-06242

Kansas Nebraska Natural Gas Co.

#1-25 McKelburg

SWNE

Sec. 25, T3N, R48W

Yuma County, Colorado

NIOBRARA

The following information was received from the Halliburton Services Co. from a test run on June 6, 1980:

Sq	1.005
pH	8.5
Iron	0
Potassium	475
Sodium	4750
Calcium	31
Magnesium	43
Chloride	5993
Sulfur	less than 10
Carbonates	45
Bicarbonates	885
Rw	0.60

TDS 12,222 est.

J. W. Operating Co.

R. Crossland #1

CSW

Sec. 35, T5N, R46W

Yuma County, Colorado

NIOBRARA

Test run July 24, 1980

Sq	1.005
pH	7.0
Chlorides	4200
TDS	7000
Resistivity	.8 c 72°F



02091901

To: Jim Kenney
From: Bill Smith *Bill*
Date: August 30, 1989
Subject: Niobrara Water in eastern Colorado

In March of 1988 Ben Saunders, Manager of the Sandhills Ground Water Management District, contacted this office expressing concern about produced water being placed in earthen pits overlying the Ogallala aquifer in Phillips and Yuma Counties.

As a result of Ben's inquiry, we did a rather extensive investigation into the production and disposition of water produced with the gas in those areas. Where there might have been some small ponding we were satisfied, following our investigation, that there was no problems and all significant quantities of produced water were being disposed of by injection. I so advised Ben and he was in concurrence.

This file reflects the cooperation of the many operators in the area and the amount of water produced from the various leases. I would recommend that you keep this file together for future reference.

98258	YOUNG OIL CO* MARSHALL R	15,272	15,423	9,311
	* * * COUNTY TOTAL * * *	263,010	261,791	1,196,779

HE ABOVE TOTALS ARE FOR MORGAN COUNTY

PHILLIPS

60890	MOUNTAIN PETROLEUM CORP	0	0	3,602
	* * * COUNTY TOTAL * * *	0	0	3,602

HE ABOVE TOTALS ARE FOR PHILLIPS COUNTY

PROMERS

3092	ANR PRODUCTION CO	0	0	138,236
8005	BERRY ENERGY INC	972	1,024	258,915
8253	BIG FOUR PETROLEUM CO	4,044	3,860	380,648
11050	BROWN INC* TOM	129	307	38,243
15550	CHAMPLIN PETROLEUM COMPANY	20	0	259
16910	CHURCHILL ENERGY INC	775	559	23,756
17780	COASTAL OIL & GAS CORP	0	0	13,569
53800	MARLIN OIL CO* THE	1,696	1,729	61,141
61650	MUREIN DRILLING CO	1,045	985	173,358
90635	TUTHILL & BARBE	394	376	267,655
90735	TXO PRODUCTION CORP	12	0	308,522
	* * * COUNTY TOTAL * * *	9,087	8,840	1,664,302

HE ABOVE TOTALS ARE FOR PROMERS COUNTY

RIO BLANCO				
220	A J OIL CO	2,654	2,864	0

88370	TIMEKA RESOURCES LTD	806	2,725	11,692
88380	TINDALL OPERATING CO	2,902	4,027	65,808
89080	TPET INC	4,344	199	278
90615	TUDEX PETROLEUM INC	325	8,878	74,906
90735	TXO PRODUCTION CORP	8,851	1,995	0
90920	UNDERWOOD* C A	1,687	32,600	229,452
90950	UNIOIL	34,930	41,383	344,756
91100	UNION PACIFIC RESOURCES CO	41,962	0	18,483
91500	UNION TEXAS PETROLEUM	11	5,337	18,013
91725	UNITED PETROLEUM CORP	5,238	455	3,766
91790	UNIVERSAL OIL & GAS CO	536	3,568	18,019
92400	VANTAGE OIL CO	3,356	48,012	2,876,564
93200	VESSELS OIL & GAS CO	47,705	1,220	3,249
93390	VISUAL OPTICS INC	1,201	620	63,763
94100	WALSH* FRANK H	574	217	794
94300	WARD & SON* AL	250	381	352
95370	WEPCO ENERGY CO	456	220	955
95570	WESTERN BASINS PETROLEUM	83	197	9,003
95580	WESTERN ENERGY DEV CO	106	1,612	55,675
95715	WESTERN PRODUCTION COMPANY	1,706	1,900	32,779
96675	WILLETT* H L	2,153	411	2,044
97100	WINTERSHALL CORPORATION	673	195	3,884
97610	WRIGHT* JIM	658	0	0
97710	WYATT PETROLEUM CORP	92	5,978,879	68,081,703
*** COUNTY TOTAL ***				
		6,097,902		

THE ABOVE TOTALS ARE FOR WELD COUNTY

YUMA				
6385	BARFIELD OIL CORP	0	0	800,633
12825	CABOT PETROLEUM CORP	0	0	677,148
14855	CENTRAL OPERATING INC	0	0	9,435
24800	DONZOLL INC	0	0	3,972
27550	ENERGY MINERALS CORP	0	0	293,667
57125	EMP OPERATING CO	0	0	638,059
		0	0	68,147

44350	J-M OPERATING CO	0	0	6,043,798
60890	MOUNTAIN PETROLEUM CORP	0	0	1,091,848
70510	PLAINS PETROLEUM CO	0	0	476,329
72555	BUCKETT-WARREN OIL CO	0	0	90,509
83470	STELBAR OIL CORP INC	0	0	389,669
86600	TESORO PETROLEUM CORP	0	0	44,284
90730	TWIN RICHFIELD OILS INC	0	0	342,818
93750	WALKER# DONALD S	0	0	287,022
* * * * * COUNTY TOTAL * * *		0	0	11,257,338

THE ABOVE TOTALS ARE FOR YUMA COUNTY

* * * * *	COLORADO TOTAL * * *	29,164,568	28,964,198	184,273,217	16
* * * * *	COLORADO TOTAL - CO2 * *			271,925,812	27

3/1/88 Bill Smith from John Lockridge

APPLICATION FOR UNDERGROUND
DISPOSAL OF WATER - RULE 329
LOCKRIDGE, ET AL, #1 BONNY DISPOSAL WELL

NW NW NW SECTION 31-T4S-R43W
YUMA COUNTY, COLORADO

- 329 (a) The following plats and diagrams are attached:
- (1) Plat showing location of disposal well, gas wells and owners of record.
 - (2) Plat showing usage of surface within a two mile radius of disposal well.
 - (3) Plat showing location and depth of domestic and irrigation wells within a two mile radius of disposal well.
 - (4) Diagram of disposal well showing formations, casing, cement, perforations, etc.
- 329(b) Water is to be injected into the Cretaceous Lakota, a fine to medium grained sandstone, at a depth of 3108 to 3156 feet.
- 329(c) Copies of the Schlumberger DI-SFL and FDC/CNL logs which were run in open hole, and a cement bond log run in the cased hole are enclosed as Exhibits 329(c)(1)(2)&(3).
- 329(d) The proposed disposal well has the following casing cemented therein:
- Surface casing from 0 to 388 feet (10 joints) is new 8 5/8", 24#, cemented with 140 sacks of regular cement. The surface casing was run to a depth 69 feet below the base of the Ogallala sand which was encountered at 320 feet. Cement returns were obtained in the annulus between the 8 5/8" casing and 12 1/4" hole, and as the cement settled slightly in the annulus, 4 sacks of cement were added around the top of the surface casing. A period of 11 1/2 hours was allowed prior to drilling out through the surface casing.
- Long string from 0 to 3223 feet (80 joints) is new 5 1/2", 14#, J-55 cemented with 140 sacks Halco Light and 85 sacks class "G". Eight Centralizers were placed on the 5 1/2" casing. The 5 1/2" casing is hung in a 8 5/8" x 5 1/2" Huber casing head with a rating of 4000psi.
- A 2 3/8" tubing string is utilized as a temporary injection flow stream. The 2 3/8" tubing is set at 3099 feet in the 5 1/2" casing with a packer at a depth of 3067 feet. The 2 3/8" tubing will be replaced with plastic coated 2 7/8" tubing after approval of this application.
- 329(e) The source of the injected water is the Cretaceous Niobrara chalk at a depth of 1400 to 2000 feet in gas wells in the Bonny field, T4 and 5S-R43 and 44W, Yuma Co., Colorado. An analysis of the Niobrara and Lakota water follows:

	Niobrara	Lakota
Sodium	6350	2971
Calcium	67	52
Magnesium		13
Iron	Tr	2.89
Pottasium	84.1	170
Chloride	10,900	2287.2
Bicarbonate	2,401	1606
Sulfate	1,900	2125
Carbonate		99
Hydroxide		< 0.5
Total Dissolved Solids	20,300	9326

The injected water will be filtered and treated as necessary for removal of oxygen.