CAMPBELL & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR
BRADFORD C. BERGE
J. SCOTT HALL
PETER N. IVES
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JEFFERSON PLACE
SUITE I - 110 NORTH GUADALUPE
POST OFFICE BOX 2208
SANTA FE, NEW MEXICO 87501
TELEPHONE: (505) 988-4421
TELECOPIER: (505) 983-6043

August 30, 1985

Case 8712

HAND DELIVERED

R. L. Stamets, Director
Oil Conservation Division
New Mexico Department of
Energy & Minerals
State Land Office Building
Santa Fe, New Mexico 87503

RE: Application for Hardship Well Classification

Dear Mr. Stamets:

Enclosed is the application of Kimbell Oil Co. of Texas for Hardship Gas Well Classification for the Salazar 4-E Basin-Dakota Well located in Unit E, Section 34, Township 25 North, Range 6 West, in Rio Arriba County. We request that this matter be set for hearing at the next regularly scheduled examiner hearing.

Additionally, we are requesting emergency approval for the relief request on a temporary basis not to exceed ninety days. In this regard, a copy of this application is being forwarded to Frank Chavez in Aztec.

Thank you for your cooperation.

Very truly yours,

J. Scott Hall

JSH/ba
enclosure

cc w/encl: Kimbell Oil Co. of Texas
Attn: Jack Redding, Jr.
Victor Salazar
Frank Chavez, OCD, Aztec

Statement of Certification
Hardship Gas Well Classification
Kimbell Oil Company of Texas
Salazar Well No. 4-E
N½ section 34, T25N., R.6W., N.M.P.M.
Rio Arriba County, New Mexico
Basin Dakota Pool

KIMBELL OIL COMPANY OF TEXAS, OPERATOR, as required by the State of New Mexico Energy and Minerals Department, Oil Conservation Division, certifies that:

1. All information submitted with this application is true and correct to the best of his knowledge;

2. One copy of this application has been submitted to the Farmington District Office of the Oil Conservation Division;

3. Notice of this application has been given to El Paso Natural Gas Company, the transporter and purchaser; and

4. Notice of this application has been given to all offset Basin Dakota operators.

Jack Redding, President

THE STATE OF Texas

COUNTY OF Tarrant

BEFORE ME, Notary Public, on this day personally appeared Jack Redding, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

GIVEN under my hand seal of office this 10th day of September, 1985.

Connie McSpadden
Notary Public

My Commission Expires:

July 18, 1987

CAMPBELL & BLACK, P.A.
LAWYERS

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POST OFFICE BOX 2208
SANTA FE, NEW MEXICO 87501
TELEPHONE: (505) 988-4421
TELECOPIER: (505) 983-6043

October 18, 1985

HAND DELIVERED

Mr. Michael Stogner
New Mexico Oil Conservation Division
New Mexico Department of
Energy and Minerals
310 State Land Office Building
Santa Fe, New Mexico 87501

Re: Case No. 8712: Application of Kimbell Oil Company of Texas for Hardship Gas Well Classification

Dear Mike:

This will confirm that the above-referenced case, previously set for the November 23, 1985 Examiner hearing has been continued to the November 6, 1985 hearing.

Thanks for your cooperation.

Very truly yours,

Scott

J. Scott Hall

JSH/ba

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
AZTEC DISTRICT OFFICE

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

OIL CONSERVATION DIVISION
BOX 2088
SANTA FE, NEW MEXICO 87501

DATE 8-30-85

RE: Proposed MC
Proposed DHC
Proposed NSL
Proposed SWD
Proposed WFX
Proposed PMX
Hardship well application X

Case No.
8712

Gentlemen:

I have examined the application dated 8-22-85

for the Kimbell Oil Co. Salazar #4E F-34-25N-6W
Operator Lease and Well No. Unit, S-T-R

and my recommendations are as follows:

Cannot approve administratively, docket for hearing. No production curves ~~submitted with~~ or correct form of application. From the evidence submitted it is doubtful the well would qualify.

Yours truly,

KIMBELL OIL COMPANY

OF TEXAS

3000 TEXAS AMERICAN BANK BLDG. FT. WORTH, TEXAS 76102 (817) 335-2591

August 20, 1985

M.S.

Mr. Richard Stamets, Director
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87501

Re: Salazar No. 4-E
N/2 Sec. 34, T25N,
R6W, NMPM
Rio Arriba County, N.M.

Dear Mr. Stamets:

The purpose of this letter is to request an Administrative Order granting Kimbell Oil Company of Texas approval to produce the Salazar Well No. 4-E for a minimum of five (5) days or a volume of 13,550 MCF each month until the balancing period has been completed. This well is overproduced and is presently shut-in under the six (6) times over-produced rule.

The Salazar Well No. 4-E produces from the Basin Dakota Reservoir and as shown by the enclosed Engineering Report, irreversible skin damage would occur if this well does not have periodic and regular production to remove the formation water from the wellbore. The report provides technical substantiation of the required flow-rate to prevent damage.

This well is overproduced by 317,158 MCF, which is eleven (11) times over its average allowable. Due to the current low market nominations, the balancing period for this well may be prolonged an additional 15 months and such a long shut-in period would cause formation damage that would be impossible to reverse completely with well treatment. This would result in lost reserves that would be trapped and unproducible from the damaged well.

To protect this well from irrepairable damage and prevent the waste of producible reserves, we therefore, request that the NMOCD approve the scheduling by El Paso Natural Gas Company of monthly minimum production of 13,550 MCF, or 5 days, until such time as this well is in balance with its allowable.

Thank you for your assistance.

Yours very truly,

Jack W. Redding
President

Encl.
JWR:cm

gulram, inc.

2828 12th street nw, suite C
p.o. box 6548
albuquerque, new mexico 87197-6548

petroleum engineering and government regulation consultants

505-345-2351

August 15, 1985

REPORT TO KIMBELL OIL CO. OF TX
FLOWRATE REQUIRED TO PREVENT SKIN DAMAGE OF THE
SALAZAR WELL NO. 4-E
SE¼NW¼ section 34,T.25N.,R.6W., N.M.P.M., Rio Arriba County, NM

SUMMARY

The Salazar Well No. 4-E produces from the Basin Dakota Reservoir, which is subject to irreversible formation (skin) damage if the well remains shut-in over an extended period without production. Producing the well on a regular interval is necessary to remove the water from the well-bore, which can interact with the clay constituents of the Dakota reservoir rocks and cause skin damage. Using the radial flow equation for gas, and setting the pressure drop for skin damage to zero, results in the required flow rate to prevent that damage from occurring and the possible loss of productive reserves. Based upon the June deliverability test, the required flowrate would be 13,550 MCF/month. Thus, this well must be produced for 5 days each month or a volume of about 13,550 MCF to prevent permanent damage.

FORMATION CHARACTERISTICS

The Salazar Well No. 4-E is being produced from the Basin Dakota formation. The basal Dakota "...deposits consist of dark-gray carboneaceous shales, a few thin coal seams, some siltstones, and thin channel sandstones."[1] The next unit consists of "...dark carbonaceous shales, mudstones, and thin siltstones and sandstones ..."[1] The clay materials present in the shales of this formation are capable of migration and clogging of the formation pore spaces if contacted by foreign water or altered formation water (ionic environment shifts are sufficient).

FORMATION DAMAGE

When the clay particles of a formation are disturbed or rearranged, it is impossible to restore the original pore configuration or "permeability." This formation damage should be prevented, since a complete cure is not possible with subsequent well treatments.

Formation damage occurs with the hydration or dehydration of swellable clays, which are present throughout the Dakota formation. The damage mechanism is the reduced "relative permeability," which results from water "wetting" the formation rock. The clay particles swell and move into the pore spaces, "clogging" them, and thus reduce the open space available for the hydrocarbons to travel to the well-bore. The critical area for damage to the formation is the first few feet away from the bore-hole, which affects the radial flow of the hydrocarbons into the hole. In radial flow systems, any reduction in the permeability around the well-bore can result in permanent loss of productivity.

Also, sandstone formations, as excellent depth filters, are highly sensitive to flow rate and pressure differentials. Increased water saturation near the well-bore will cause filtrate invasion or coning of the formation water, which creates a water blockage to hydrocarbon flow. This type of blockage can be corrected by regular water production.

Thus, to prevent permanent damage to the formation and effectively eliminate water blockage, the well must be produced to remove the water from the productive formation face or "skin" in the well-bore. The most effective treatment of well damage is prevention not corrective well treatments after the damage occurs.

FLOWRATE REQUIRED TO PREVENT DAMAGE

To prevent entrapment of reserves in a potentially productive zone, since irreversible formation damage can restrict or prevent effective depletion, we must determine an adequate flow rate to minimize skin damage to this well by removal of formation water.

Using the radial flow equation for gas wells, we will set the p_{skin} (pressure drop due to skin damage) to zero and use the data from the 1985 well deliverability test report dated 6-12-85, which reflects the well's current undamaged condition. We will assume a radial drainage impact of 160 acres for a Dakota well; permeability (undamaged) equal to the pool average; and molecular weight of the gas to be 21.65 since test results show the gas to be "dry with a trace of condensate", indicating that the stream is not pure methane, but contains some liquids. See attached calculation pages for the details of the analysis. The calculation results in a flow rate of 444.34 MCF/day or 13,552 MCF per month. Based upon the 6-12-85 deliverability of 2698 MCF/day, this results in 5.02 days per month.

Thus, this well should be allowed to produce approximately 13,550 MCF per month or 5 days, to prevent permanent formation damage and loss of productive reserves.

Sue E. Umshler

Sue E. Umshler, P.E.

REFERENCES

1. W.F. Hoppe, 1978, Basin Dakota Gas Field in Oil & Gas Fields of the Four Corners Area: Four Corners Geological Society, pgs. 204-206.

2. Thomas O. Allen & Alan P. Roberts, 1978, Production Operations, Volume 2, Oil and Gas Consultants, Inc., pgs 95-107.

3. H.C. Slider, 1976, Practical Petroleum Reservoir Engineering Methods, PennWell Books.

4. Craft & Hawkins, 1959, Applied Petroleum Reservoir Engineering, Prentice Hall, Chemical Engineering Series.

$$q_{gas} = \frac{.703\, K_{und}\, h\, (p_e^2 - p_w^2 - \Delta P_{skin}^2)^n}{\mu\, T_F\, z \ln\left(\frac{r_e}{r_w}\right)}$$

q_g = flow rate, mcf/day
K_{un} = undamaged permeability, Darcies
h = net thickness, feet
p_e = External Boundary pressure (initial shut-in), psia
p_w = Flowing pressure (FTP), psia
ΔP_{skin} = pressure drop in damaged zone, psia
μ = viscosity, cp
r_e = external Boundary radius (ultimate drainage impact), feet
r_w = well radius, feet
T_F = formation Temperature, °R
z = gas deviation

Given: $T_f = 18°F + 460 = 640°R$ (well log)
$K_{Basin\ DK} = .175$ md avg or .000175 Darcies (Pool Report)
$h = 90$ feet (Completion Report)
$r_e = 1490$ feet (160 acre drainage radius)
$r_w = .7$ feet (Completion Report)
$P_e = 1350$ psia (back plot of SICP vs. Cum)

6-12-85 well Test Data (well deliverability current)
$p_w = 787$ psia
gravity = .704 ⇒ by charts $\mu = .016$ cp
$z = .885$

Calculate n

$$n = \frac{w}{29(\text{gravity})}$$

Gas is dry w/ trace condensate so Assume MW

		assume gas
w methane =	16.04	70%
w ethane =	30.07	20%
w propane =	44.09	10%

Weighted average $w = 16.04(.70) + 30.07(.20) + 44.09(.10) = 21.65$

So

$$n = \frac{21.65}{29(.704)} = 1.06$$

Set $\Delta P_{skin} = 0$ to determine q_g required to prevent damage to zone.

Calculate q_g.

$$q_g = \frac{.703\,(.000175)(90)(1350^2 - 781^2 - 0^2)^{1.06}}{.016\,(640)(.885)\ln\left(\frac{1490}{.7}\right)}$$

$$= 444.34 \text{ mcf/day}$$

Monthly production

$q_m = 444.341 \times 30.5 =$ 13552.37 mcf/mon.

Deliverability on 6-12-85 was 2698 mcf/day

Calculate No. days for flow

$13552.37 \div 2698 =$ 5.02 days per month

Sue E. Arnold
8-13-85

NEW MEXICO OIL CONSERVATION COMMISSION
WELL DELIVERABILITY TEST REPORT FOR 19 85

Form C122-A
Revised 1-1-66

POOL NAME	POOL SLOPE	FORMATION	COUNTY
Basin Dakota	n= .75	Dakota	Rio Arriba

Meter No. 94-932

COMPANY			WELL NAME AND NUMBER		
Kimbell Oil Company of Texas			Salazar No. 4E		
UNIT LETTER	SECTION	TOWNSHIP	RANGE	PURCHASING PIPELINE	
F	34	25N	6W	El Paso Natural Gas Co.	
CASING O.D. - INCHES	CASING I.D. - INCHES	SET AT DEPTH - FEET	TUBING O.D. - INCHES	TUBING I.D. - INCHES	TOP - TUBING PERF. - FEET
4.500	4.000	6759	2.375	1.995	6422
GAS PAY ZONE		WELL PRODUCING THRU		GAS GRAVITY	GRAVITY X LENGTH
FROM 6422 TO 6672		CASING	TUBING X	.704	4521
DATE OF FLOW TEST			DATE SHUT-IN PRESSURE MEASURED		
FROM 5/27/85 TO 6/4/85			6/12/85		

PRESSURE DATA - ALL PRESSURES IN PSIA

(a) Flowing Casing Pressure (DWt)	(b) Flowing Tubing Pressure (DWt)	(c) Flowing Meter Pressure (DWt)	(d) Flow Chart Static Reading	(e) Meter Error (Item c - Item d)	(f) Friction Loss (a - c) or (b - c)	(g) Average Meter Pressure (Integr.)
932	787	262	256	+6	525	259
(h) Corrected Meter Pressure (g + e)	**(i) Avg. Wellhead Press. P_t = (h+f)**	**(j) Shut-in Casing Pressure (DWt)**	**(k) Shut-in Tubing Pressure (DWt)**	**(l) P_c = higher value of (j) or (k)**	**(m) Del. Pressure P_d = 40 %P_c**	**(n) Separator or Dehydrator Pr. (DWt) for critical flow only**
265	787	1322	1322	1322	529	784

FLOW RATE CORRECTION (METER ERROR)

Integrated Volume - MCF/D	Quotient of $\frac{\text{Item c}}{\text{Item d}}$	$\sqrt{\frac{\text{Item c}}{\text{Item d}}}$	Corrected Volume
2035	1.0234	1.0116	Q = 2059 MCF/D

WORKING PRESSURE CALCULATION

$(1-e^{-s})$	$(F_c\,Q_m)^2\,(1000)$	$R^2 = (1-e^{-s})\,(F_c\,Q_m)^2(1000)$	P_t^2	$P_w^2 = P_t^2 + R^2$	$P_w = \sqrt{P_w^2}$
.280	374,759	104,933	619,369	724,302	851

DELIVERABILITY CALCULATION

$$D = Q\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n = 2059\left[\left(\frac{1,467,843}{1,028,483}\right)^n = (1.4341)^n = 1.3105\right] = 2698 \text{ MCF/D}$$

REMARKS:

This well has critical flow -
Use FTP (b) for P_t (i)

SUMMARY

Item h	265	Psia
P_c	1322	Psia
Q	2059	MCF/D
P_w	851	Psia
P_d	529	Psia
D	2692	MCF/D

Company Kimbell Oil Company of Texas
By E. A. Clement
Title Prod. Supt.
Witnessed By
Company

Form 9-331
(Rev. 5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

5. LEASE DESIGNATION AND SERIAL NO.: SF-080136

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

7. UNIT AGREEMENT NAME:

8. FARM OR LEASE NAME: Salazar

9. WELL NO.: 4-E

10. FIELD AND POOL, OR WILDCAT: Basin Dakota

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec. 34-T25N-R6W

12. COUNTY OR PARISH: Rio Arriba

13. STATE: NM

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR: Curtis J. Little

3. ADDRESS OF OPERATOR: P.O. Box 1258, Farmington, NM 87499

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface: 1630' FNL & 1460' FWL
At top prod. interval reported below:
At total depth: Same

API # - 30-039-23368

14. PERMIT NO.: — DATE ISSUED:

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (Ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
1-16-84	1/27/84	2/21/84	6378' GR	6378

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
6753'	6717'		→	0-6753	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: 6422-6672 KB Dakota

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: IES, GR-CNL-Density

27. WAS WELL CORED: No

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	28	222 KB	12-1/4"	145 sx. (171 cuft. slurry)	none
4-1/2"	11.6	6759	7-7/8"	DV Tool 4574, 600 sx. Poz (774 cuft.) Bond top 5458 KB. 2nd Stage w/ 375 sx. & 75 sx. Class B (1891 cuft.) Top cmt.: 1300 KB	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2-3/8	6548	

31. PERFORATION RECORD (Interval, size and number)
6632-72 KB, 21 holes, 0.33" dia. 24" apart.
6548-76 KB, 6514-28, 6432-36, 6422-26, 29 holes, 0.33" dia. 24" apart.

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
6632-72 Acidize	1200 gals HCL, 41500 lbs. sd., 62930 gals. gel, BDP 2450 psi, ATP 3200 psi, AIR 28 BPM, ISIP 2100 psi. 6576-6422 Acidize 1700 gal. HCL, 60000 lbs. sd., 93780 gals. gel, BDP 1900 psi ATP 3400 psi, AIR 31 BPM, ISIP 2550 psi

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)	WELL STATUS (Producing or shut-in)
2/21/84	Flowing	SI

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
2/21/84	3	3/4"		Trace	623	Trace(Frac	

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
391	787		Trace	4984	0	

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.): To be sold

TEST WITNESSED BY: Joe Elledge

35. LIST OF ATTACHMENTS: None

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Curtis J. Little TITLE Operator DATE 2/24/84

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: "*Sacks Cement*": Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:

SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
Ojo Alamo	1450	1522	Probably Water

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
Ojo Alamo	1450	Same
Kirtland	1522	Same
Fruitland	2033	Same
Pictured Cliffs	2158	Same
Lewis	2252	Same
Cliff House	3713	Same
Menefee	3761	Same
Point Lookout	4368	Same
Mancos	4508	Same
Gallup	5502	Same
Greenhorn	6310	Same
Graneros Shale	6371	Same
Graneros Sand	6411	Same
Dakota	6512	Same

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-683636
GPO 837-497

871-233

Kimbell Oil Co of Tex

Salazar Fed 64 F 34 25N 06W

	Oil	Water	Gas	Days
Jan	666	120	61697	31
Feb	340	92	38233	23
Mar	54	8	649	1
Apr	ø	ø	4696	2
May	425	70	29205	14
Jun	143	30	16285	9
July	ø	ø	ø	ø
Aug	ø	ø	ø	ø
Sept	ø	ø	ø	ø

10/17/85

Memo

From
MICHAEL STOGNER
Petroleum Engineer

To Florene

Please
Continue
Case No. 8712

OK'd
By MLS
m.s.

To

11/6/85
@ the request of Scott Hall

Thanks
M. S.

Oil Conservation Santa Fe, New Mexico

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

November 22, 1985

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

Mr. Scott Hall
Campbell & Black,
Attorneys at Law
Post Office Box 2208
Santa Fe, New Mexico

Re: CASE NO. 8712
ORDER NO. R-8033

Applicant:

Kimbell Oil Company of Texas

Dear Sir:

Enclosed herewith are two copies of the above-referenced Division order recently entered in the subject case.

Sincerely,

R. L. STAMETS
Director

RLS/fd

Copy of order also sent to:

Hobbs OCD X
Artesia OCD X
Aztec OCD X

Other _____

CAMPBELL & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR
BRADFORD C. BERGE
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POST OFFICE BOX 2208
SANTA FE, NEW MEXICO 87501
TELEPHONE: (505) 988-4421
TELECOPIER: (505) 983-6043

September 12, 1985

Case 8712

HAND DELIVERED

R. L. Stamets, Director
Oil Conservation Division
New Mexico Department of
Energy & Minerals
State Land Office Building
Santa Fe, New Mexico 87503

Re: Kimbell Oil Company of Texas - Application for Hardship Gas Well Classification

Dear Mr. Stamets:

In connection with the above-referenced application, I am enclosing to you herewith a submission of supplemental information prepared by Sue E. Umshler, the petroleum engineer for Kimbell Oil Company.

It is my hope that this supplemental submission contains sufficient information for the area supervisor to grant temporary emergency relief for the subject well. In this connection, copies of this information have been supplied to Frank Chavez in Aztec under separate cover.

Thank you for your cooperation.

Very truly yours,

J. Scott Hall

JSH/ba
enclosures

cc: Sue E. Umshler, P.E.
Victor Salazar
Frank Chavez

Supplement to
APPLICATION FOR CLASSIFICATION AS
HARDSHIP GAS WELL
Kimbell Oil Company of Texas
Salazar Well No. 4-E
N½ section 34, T.25N., R.6W., N.M.P.M.
Rio Arriba County, New Mexico
Basin Dakota Pool

1. The applicant expects that total restriction of gas production from this well over an extended period of time will result in "underground waste" (as defined by the General Information Applicable to Hardship Gas Well Classification). This expectation is based on two points discussed below.

   First, this well has produced a regular amount of water, which means that suppression of the gas flow will also suppress removal of this water from the wellbore. As shown in the Report prepared on 8-15-85, this could cause permanent "skin" damage to the formation face. The water production averaged 4.5 bbls/day or an average gas/water ratio of 2.17 bbls/MMCF. Regular production, which will prevent this water from accumulating in the wellbore, is indicated as the only preventative action against permanent formation damage.

   Secondly, the wells in the surrounding area indicate that formation damage due to water accumulation may have occurred. Two of these wells have been abandoned and may have not produced their true potential due to water damage. These wells are the Farming E No. 3-E in D-2-24N-6W and the Salazar No. 4 in H-34-25N-6W. There are two wells in the south half of section 34 which may have suffered damage due to shut-in periods in the last 5 years. These wells are the Federal Wells No. 3 and 3-E. We will attempt to prove that these wells experienced lost productivity and potential recoverable reserves in the hearing. Their performance is documented on the enclosed Production Tables.

   As discussed in the Engineering Report dated 8-15-85 (which calculated a minimum flow rate <u>to prevent</u> damage to this well), unless sufficient gas production and incumbent water production is allowed this water cannot be removed from the wellbore. The exposure to accumulated water could cause permanent formation damage and this would result in loss of gas reserves due to the reduction in permeability. Prolonged shut-in of this well could produce this result and it has already been shut-in since June 1985.

2. The well had not been damaged as of June based on the deliverability test. The potential problem of damage to this well cannot be solved by completion practices because it is just that--a "potential" problem and not an <u>actual</u> problem at this

time. Therefore, no mechanical operations are appropriate until such time as damage has actually occurred. The historical attempt to prevent the problem was full production of this well initially to remove excess frac water and formation water. This led to the overproduced status of the well. Also, El Paso Natural Gas Co. (the purchaser) was contacted when the well was shut-in to determine what preventative steps could be taken to alleviate the overproduction problem and also prevent the possibility of long-term damage to the formation by water accumulation due to lack of production. The result of those contacts was our Administrative Request in August, and upon subsequent discussions with the NMOCD staff in Santa Fe, the scheduling of the hearing and this application for temporary relief. Our motivation is to prevent damage, as being the best cure for formation damage. We seek a minimum flow rate to prevent damage and potential loss of reserves.

3. As illustrated by the attached production table and graph, initial production of this well was on May 12, 1984 and water production has varied from essentially 3.3 to 8.9 bbls/day with water ratios between 1.75 bbls/MMCF and 12.33 bbls/MMCF, with an average of 2.17 bbls/MMCF. This performance indicates that the water influx is a regular occurrence and only regular production of the gas will prevent any water accumulation. The Report dated 8-15-85 shows that gas production of about 13,550 MCF/month is required to prevent the pressure drop which would occur if the well were damaged.

4. Gas Reserves Lost:

   Estimated Original Gas-In-Place:
   Volumetric Calculation = 3.95 BCF
   BHP/Z vs. Cumulative plot = 4.45 BCF

   Recoverable Reserves (assume 85% recovery)
   3.35 to 3.78 BCF

   Preliminary decline curve projection:
   1.8 BCF

   Cumulative Recovered as of 6-85:
   586,993 MCF

   Both the materials balance and decline curve analysis are subject to error at this point, due to the limited production history and pressure tests available.

   Lost reserves are not possible to determine at this point because the well has not suffered the pressure drop and erratic productivity loss resulting from damage. However using the radial flow equation developed in the 8-15-85 Engineering Report and setting the parameters to 1 (indicating no change) except

for q (flow-rate) and pressure drop, one can see that a pressure drop of 50 psi will result in a 75% drop in flowrate. If the portion of this drop due to skin damage equals 10 psi, the reduced flow due to damage would be 20%. Also, according to Allen and Roberts in Production Operations, Vol. 2, a loss of 50% of the producibility will occur with a 5-fold decrease in permeability at the well face due to damage. Thus the resultant loss of reserves could be large with formation and pressure alterations as outlined above. During the hearing we will attempt to show the amount of loss the adjacent wells may have experienced due to water accumulation.

5. The producibility of this well is shown by the attached deliverability tests of 1984 and 1985 and the Production Table and plot. The well has had an average production rate to date of 1947 MCF/day. At present we believe that production is necessary to maintain this potential flow rate and prevent irreversible loss due to damage. But currently available tests show that abnormal producibility decline has not yet occurred.

6. A plat of the area is attached and list of adjacent wells.

7. See attached Production Tables of adjacent wells.

8. This well is overproduced by 317,158 MCF, which is 11 times over its allowable.

Form 9-331
(Rev. 5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

5. LEASE DESIGNATION AND SERIAL NO.: SF-080136

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

7. UNIT AGREEMENT NAME:

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

8. FARM OR LEASE NAME: Salazar

2. NAME OF OPERATOR: Curtis J. Little

9. WELL NO.: 4-E

3. ADDRESS OF OPERATOR: P.O. Box 1258, Farmington, NM 87499

10. FIELD AND POOL, OR WILDCAT: Basin Dakota

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface: 1630' FNL & 1460' FWL
At top prod. interval reported below
At total depth: Same

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec. 34-T25N-R6W

API # - 30-039-23368

14. PERMIT NO. | DATE ISSUED

12. COUNTY OR PARISH: Rio Arriba | 13. STATE: NM

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (Ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
1-16-84	1/27/84	2/21/84	6378' GR	6378'

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
6753'	6717'		→	0-6753	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*
6422-6672 KB Dakota

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN
IES, GR-CNL-Density

27. WAS WELL CORED: No

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	28	222 KB	12-1/4"	145 sx. (171 cuft. slurry)	none
4-1/2"	11.6	6759	7-7/8"	DV Tool 4574, 600 sx. Poz (774 cuft.) Bond top 5458 KB. 2nd Stage w/375 sx. & 75 sx. Glass B (1891 cuft.) Top cmt. 1300 KB	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2-3/8	6548	

31. PERFORATION RECORD (Interval, size and number)
6632-72 KB, 21 holes, 0.33" dia. 24" apart.
6548-76 KB, 6514-28, 6432-36, 6422-26, 29 holes, 0.33" dia. 24" apart.

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
6632-72 Acidize	1200 gals HCL, 41500 lbs. sd., 62930 gals gel, BDP 2450 psi, ATP 3200 psi, AIR 28 BPM, ISIP 2100 psi. 6576-6422 Acidize 1700 gal. HCL, 60000 lbs. sd., 93780 gals. gel, BDP 1900 psi ATP 3400 psi, AIR 31 BPM, ISIP 2550 psi

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)	WELL STATUS (Producing or shut-in)
2/21/84	Flowing	SI

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
2/21/84	3	3/4"		Trace	623	Trace(Frac	

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
391	787		Trace	4984	0	

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.)
To be sold

TEST WITNESSED BY: Joe Elledge

35. LIST OF ATTACHMENTS
None

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Curtis J. Little TITLE Operator DATE 2/24/84

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
Ojo Alamo	1450	1522	Probably Water

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
Ojo Alamo	1450	Same
Kirtland	1522	Same
Fruitland	2033	Same
Pictured Cliffs	2158	Same
Lewis	2252	Same
Cliff House	3713	Same
Menefee	3761	Same
Point Lookout	4368	Same
Mancos	4508	Same
Gallup	5502	Same
Greenhorn	6310	Same
Graneros Shale	6371	Same
Graneros Sand	6411	Same
Dakota	6512	Same

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-683436
GPO 837-497

GEARHART

COMPENSATED DENSITY COMPENSATED NEUTRON LOG

FILING NO.

COMPANY CURTIS J. LITTLE

WELL SALAZAR NO.4-R

FIELD BASIN DAKOTA

COUNTY RIO ARRIBA STATE NEW MEXICO

LOCATION: 1630'FNL x 1460'FWL

SEC 34 TWP 25N RGE 6W

Other Services: IEL/GR

Permanent Datum GROUND LEVEL Elev. 6378

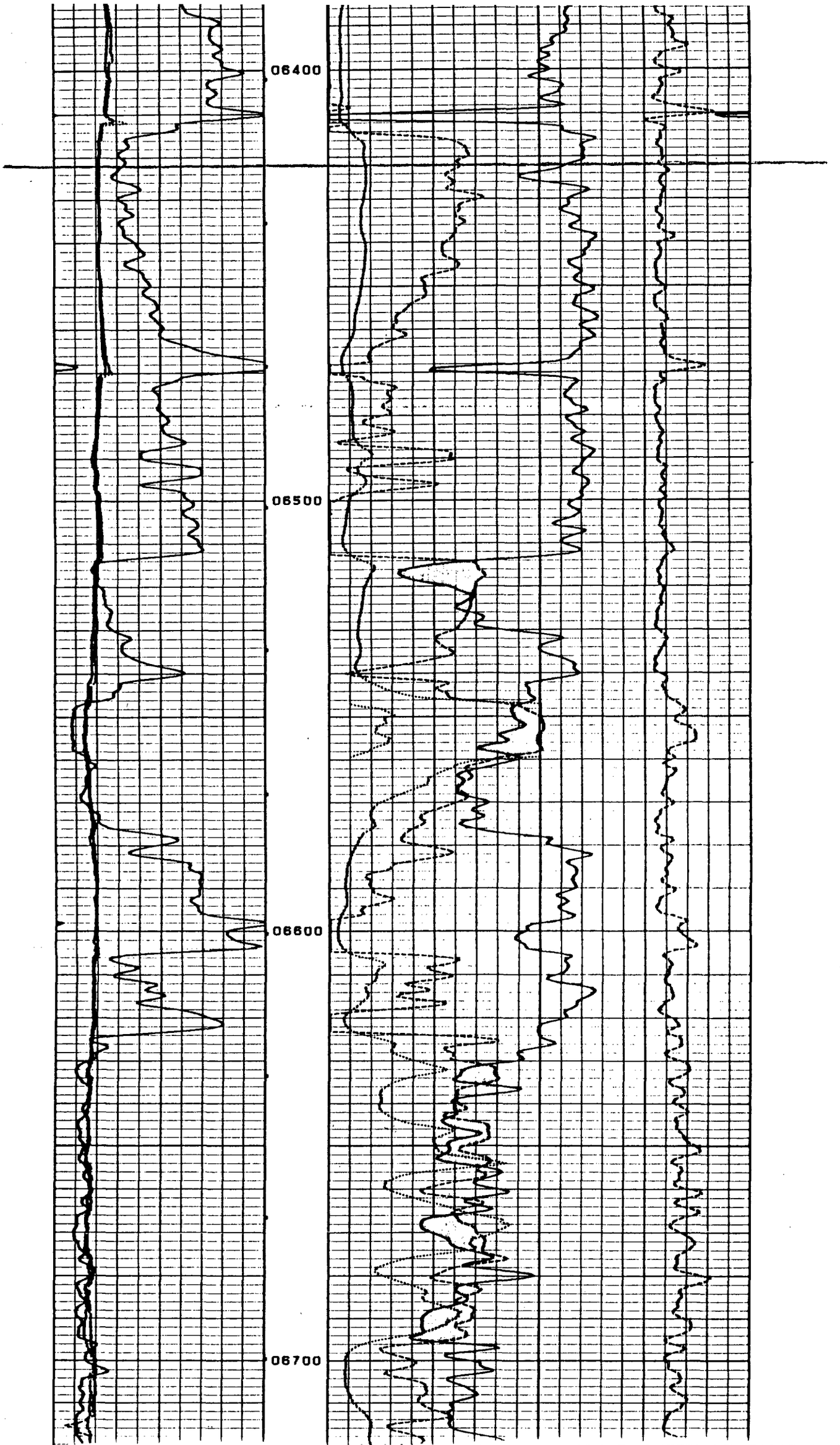
Log Measured from K.B. , 13 Ft. Above Perm. Datum

Drilling Measured from K.B.

Elev.: K.B. 6391 D.F. 6390 G.L. 6378

Date	1-27-84			
Run No.	ONE			
Depth – Driller	6753			
Depth-Logger	6753			
Bottom logged interval	6752			
Top logged interval	6150			
Type fluid in hole	GEL			
Density / Visc.	9.0 / 60			
pH / Fluid Loss	7.5 / 7			
Max rec. temp., deg F.	180 °F	°F	°F	°F
Source of Samples	Mud Pit			
Rm @ Meas. Temp.	1.8 @ 74 °F	@ °F	@ °F	@ °F
Rmf @ Meas. Temp.	1.4 @ 69 °F	@ °F	@ °F	@ °F
Rmc @ Meas. Temp.	1.2 @ 68 °F	@ °F	@ °F	@ °F
Source Rmf / Source Rmc	M / M			
Time: End Circulation	20:00			
Time: Logger on Bottom	02:45			
Recorded By	Mease			
Witnessed By	Mr.Curtis Little			

Run No.	Bore-Hole Record: Bit	From	To	Casing Record: Size	Wgt.	From	To
One	12¼	Surface	222	8 5/8	---	Surface	222
One	7 7/8	222	6753				


06400
06500
06600
06700

GEARHART

INDUCTION ELECTRICAL LOG

FILING NO.

COMPANY CURTIS J. LITTLE

WELL SALAZAR NO.4-R

FIELD BASIN DAKOTA

COUNTY RIO ARRIBA STATE NEW MEXICO

LOCATION: 1630'FNL x 1460'FWL

SEC 34 TWP 25N RGE 6W

Other Services

CDL/CNL/GR

Permanent Datum GROUND LEVEL Elev. 6378

Log Measured from K.B., 13 Ft. Above Permanent Datum

Drilling Measured from K.B.

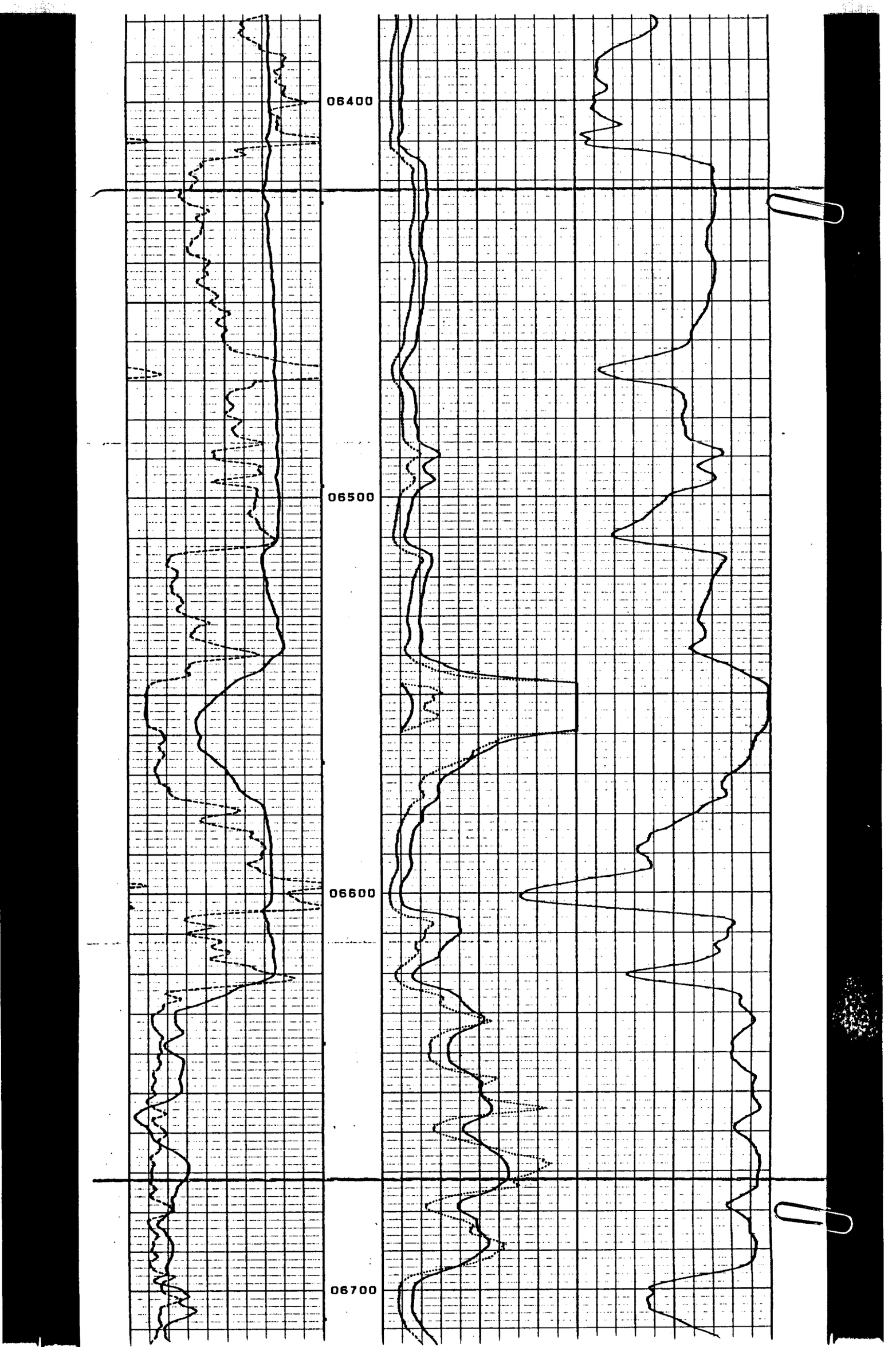
Elevations:

KB 6391

DF 6390

GL 6378

Date	1-27-84			
Run No.	ONE			
Depth-Driller	6753			
Depth-Logger	6753			
Bottom Logged Interval	6752			
Top Logged Interval	211			
Casing-Driller	8 5/8 @ 222	@	@	@
Casing-Logger	211			
Bit Size	7 7/8			
Type Fluid in Hole	GEL			
Density and Viscosity	9.0 | 60			
pH and Fluid Loss	7.5 | 7 cc	cc	cc	cc
Source of Sample	Mud Pit			
Rm @ Meas. Temp.	1.8 @ 74 °F	@ °F	@ °F	@ °F
Rmf @ Meas. Temp.	1.4 @ 69 °F	@ °F	@ °F	@ °F
Rmc @ Meas. Temp.	1.2 @ 68 °F	@ °F	@ °F	@ °F
Source of Rmf and Rmc	M | M			
Rm @ BHT	----@ 180 °F	@ °F	@ °F	@ °F
Time: End Circulation	20:00			
Time: Logger on Bottom	02:47			
Max. Rec. Temp. Deg. F.	180 °F	°F	°F	°F
Equip. No. and Location	7607 | 29-062			
Recorded By	Mease			
Witnessed By	Mr.Curtis Little			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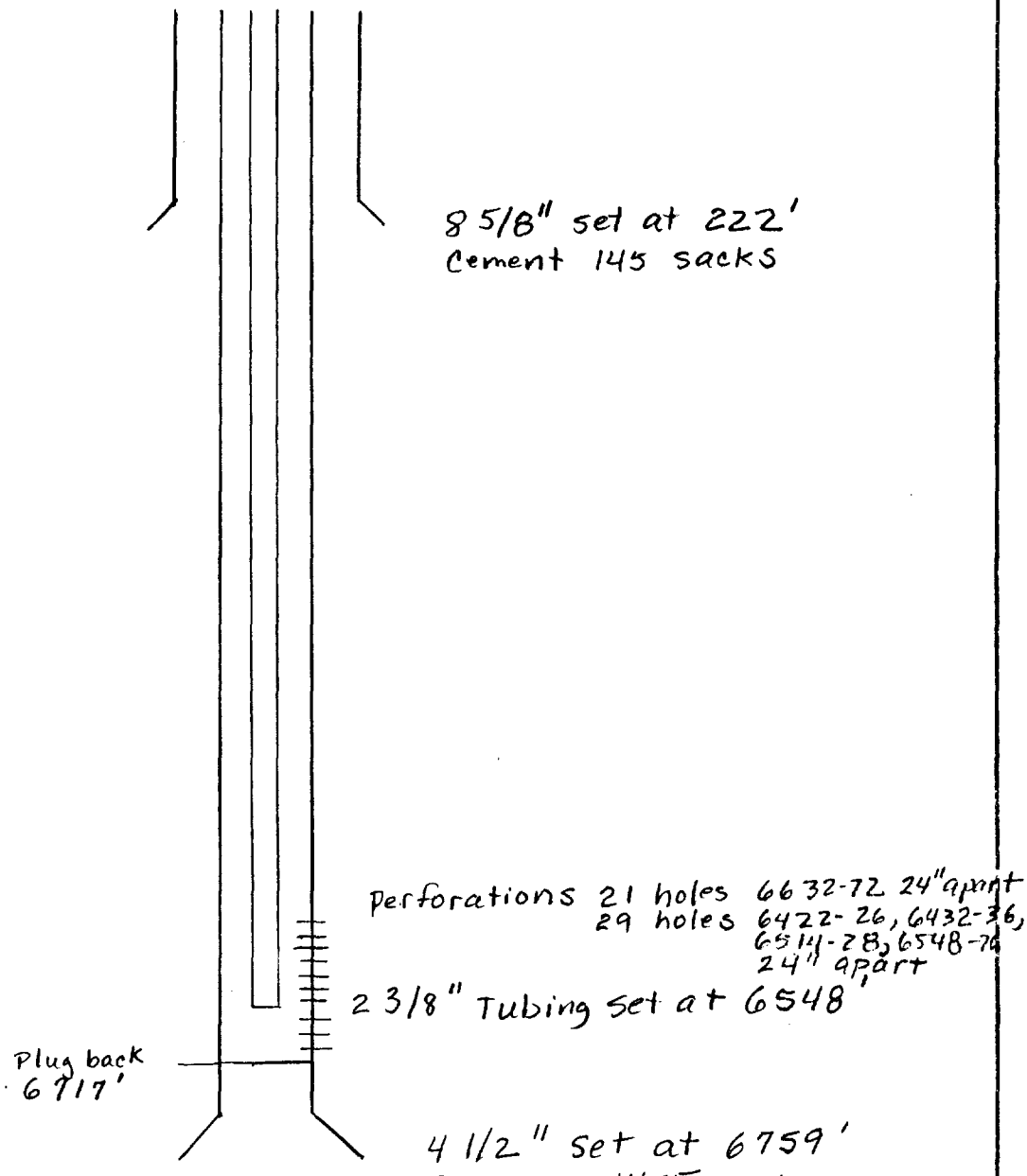
06700

Kimbell Oil of TX | Well-Bore Sketch



PRODUCTION TABLE

WELL NAME Salazar Federal 4-E

WELL LOCATION F-34-25N-6W

Perfs 6422-6672

Completion Date 2-21-84

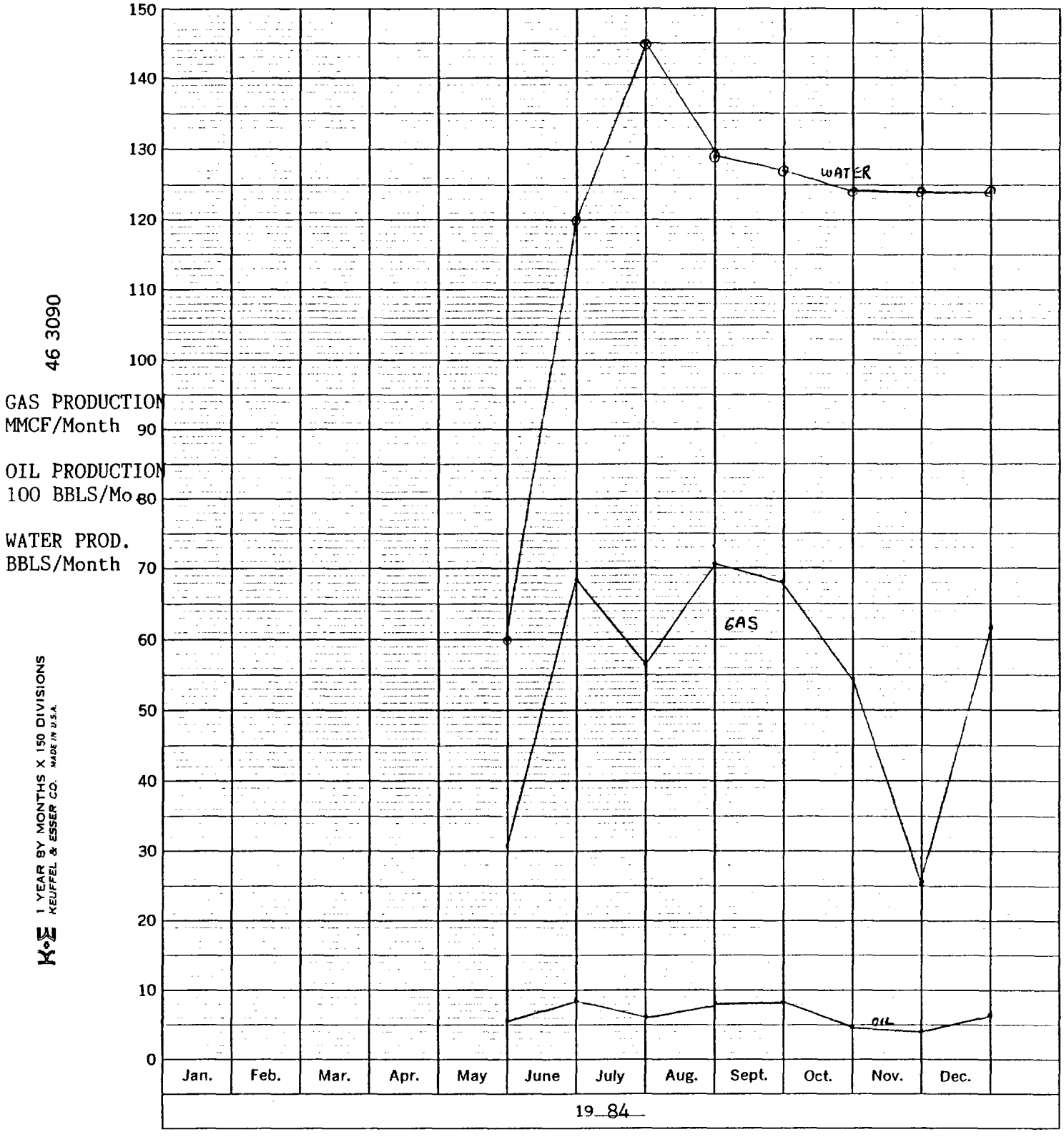
Initial Potential 4984 MCF/day

Initial Pressure CP= 787

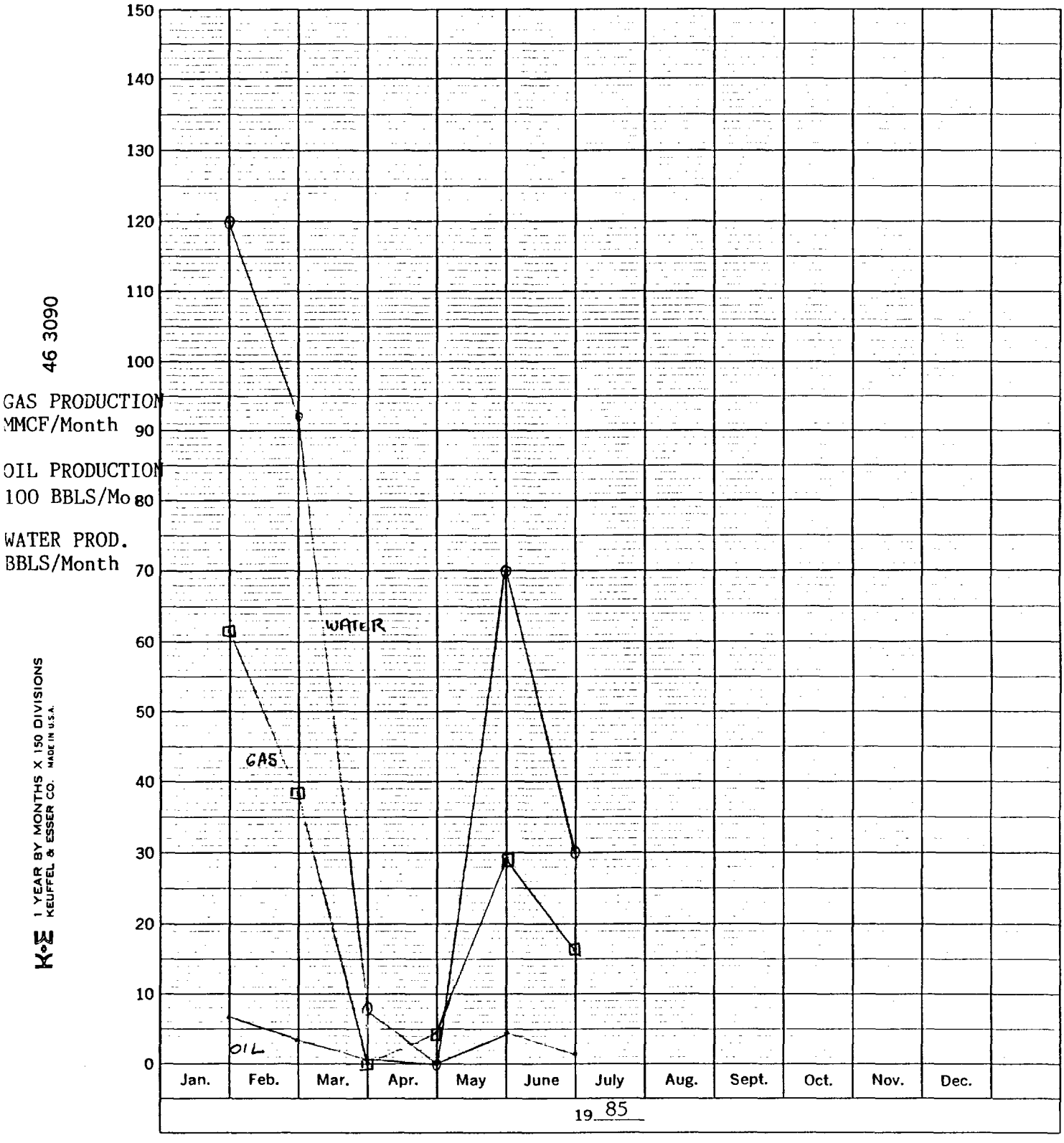
Initial GOR/Gravity -----

SICP	DATE	PRODUCTION DAYS / SHUT-IN		OIL /H_2O PRODUCTION BBLS		RATE /Day WATER	CUMULATIVE WATER BBLS	GAS PRODUCTION MCF	RATE /Day	CUMULATIVE MCF
	1984									
	5-84	16	15	592	60	3.75	60	30623	1914	30623
	6-84	30	0	886	120	4.00	180	68512	2284	99135
7-27-84	7-84	24	7	627	145	6.04	325	56585	2358	155720
1337	8-84	31	0	817	129	4.16	454	70303	2268	226023
	9-84	30	0	826	127	4.23	581	68117	2271	294140
	10-84	31	0	494	124	4.00	705	54225	1749	348365
	11-84	14	16	410	124	8.86	829	26494	1892	374859
	12-84	31	0	663	124	4.00	953	61491	1984	436350
	1985									
	1-85	31	0	666	120	3.87	1073	61697	1990	498047
	2-85	23	5	340	92	4.00	1165	38233	1662	536280
	3-85	1	30	54	8	8.00	1173	649	649	536929
	4-85	2	28	0	0	0.00	1173	4696	2348	541625
	5-85	14	17	425	70	5.00	1243	29085	2078	570710
6-11-85	6-85	9	21	143	30	3.33	1273	16283	1809	586993
1322	7-85	0	31	0	0	0.00	1273	0	0	586993
	8-85	0	31	0	0	0.00	1273	0	0	586993

Basin Dakota
Kimbell Oil Co. of TX
Salazar Federal Well No. 4-E
F-34-25N-6W
Rio Arriba, New Mexico
Date Production began: May 1984



Salazar Federal Well No. 4-E
Continued



NEW MEXICO OIL CONSERVATION COMMISSION

WELL DELIVERABILITY TEST REPORT FOR 19 84

Form C122-A
Revised 1-1-66

POOL NAME	POOL SLOPE	FORMATION	COUNTY
Basin Dakota	n= .75	Dakota	Rio Arriba

COMPANY			WELL NAME AND NUMBER		
Sims Oil Company, Inc.			Salazar 4E		
UNIT LETTER	SECTION	TOWNSHIP	RANGE	PURCHASING PIPELINE	
F	34	25N	6W	El Paso Natural Gas Co.	
CASING O.D. - INCHES	CASING I.D. - INCHES	SET AT DEPTH - FEET	TUBING O.D. - INCHES	TUBING I.D. - INCHES	TOP - TUBING PERF. - FEET
4.500	4.000	6759	2.375	1.995	6422
GAS PAY ZONE		WELL PRODUCING THRU		GAS GRAVITY	GRAVITY X LENGTH
FROM 6422 TO 6672		CASING	TUBING X	.661	4245
DATE OF FLOW TEST			DATE SHUT-IN PRESSURE MEASURED		
FROM 7-12-84 TO 7-20-84			7-27-84		

PRESSURE DATA - ALL PRESSURES IN PSIA

(a) Flowing Casing Pressure (DWt)	(b) Flowing Tubing Pressure (DWt)	(c) Flowing Meter Pressure (DWt)	(d) Flow Chart Static Reading	(e) Meter Error (Item c - Item d)	(f) Friction Loss (a - c) or (b - c)	(g) Average Meter Pressure (Integr.)
812	637	322	317	+5	315	311
(h) Corrected Meter Pressure (g + e)	**(i) Avg. Wellhead Press. P_t = (h + f)**	**(j) Shut-In Casing Pressure (DWt)**	**(k) Shut-In Tubing Pressure (DWt)**	**(l) P_c = higher value of (j) or (k)**	**(m) Del. Pressure P_d = 50 %P_c**	**(n) Separator or Dehydrator Pr. (DWt) for critical flow only**
316	637	1337	1337	1337	669	635

FLOW RATE CORRECTION (METER ERROR)

Integrated Volume - MCF/D	Quotient of $\frac{\text{Item c}}{\text{Item d}}$	$\sqrt{\frac{\text{Item c}}{\text{Item d}}}$	Corrected Volume
2295	1.0158	1.0079	Q = 2313 MCF/D

WORKING PRESSURE CALCULATION

$(1-e^{-s})$	$(F_c Q_m)^2 (1000)$	$R^2 = \frac{(F_c Q_m)^2 (1000)}{(1-e^{-s})}$	P_t^2	$P_w^2 = P_t^2 + R^2$	$P_w = \sqrt{P_w^2}$
.266	472,923	125,798	405,769	531,567	729

DELIVERABILITY CALCULATION

$$D = Q\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n = 2313\left[\left(\frac{1,340,008}{1,256,128}\right)^n = (1.0667)^n = 1.0496\right] = 2428 \text{ MCF/D}$$

REMARKS:

This well has critical flow -
Use FTP (b) for P_t (i).

SUMMARY

Item h	316	Psia
P_c	1337	Psia
Q	2313	MCF/D
P_w	729	Psia
P_d	669	Psia
D	2428	MCF/D

Company SIMS OIL COMPANY, INC.
By E. A. Clement
Title Prod. Supt.
Witnessed By
Company

NEW MEXICO OIL CONSERVATION COMMISSION
WELL DELIVERABILITY TEST REPORT FOR 19 85

Form C122-A
Revised 1-1-66

POOL NAME	POOL SLOPE	FORMATION	COUNTY
Basin Dakota	n= .75	Dakota	Rio Arriba

Meter No. 94-932

COMPANY			WELL NAME AND NUMBER		
Kimbell Oil Company of Texas			Salazar No. 4E		
UNIT LETTER	SECTION	TOWNSHIP	RANGE	PURCHASING PIPELINE	
F	34	25N	6W	El Paso Natural Gas Co.	
CASING O.D. - INCHES	CASING I.D. - INCHES	SET AT DEPTH - FEET	TUBING O.D. - INCHES	TUBING I.D. - INCHES	TOP - TUBING PERF. - FEET
4.500	4.000	6759	2.375	1.995	6422
GAS PAY ZONE		WELL PRODUCING THRU		GAS GRAVITY	GRAVITY X LENGTH
FROM 6422 TO 6672		CASING	TUBING X	.704	4521
DATE OF FLOW TEST			DATE SHUT-IN PRESSURE MEASURED		
FROM 5/27/85 TO 6/4/85			6/13/85		

PRESSURE DATA - ALL PRESSURES IN PSIA

(a) Flowing Casing Pressure (DWt)	(b) Flowing Tubing Pressure (DWt)	(c) Flowing Meter Pressure (DWt)	(d) Flow Chart Static Reading	(e) Meter Error (Item c - Item d)	(f) Friction Loss (a - c) or (b - c)	(g) Average Meter Pressure (Integr.)
932	787	262	256	+6	525	259
(h) Corrected Meter Pressure (g + e)	**(i) Avg. Wellhead Press. P_t = (h + f)**	**(j) Shut-In Casing Pressure (DWt)**	**(k) Shut-In Tubing Pressure (DWt)**	**(l) P_c = higher value of (j) or (k)**	**(m) Del. Pressure P_d = 40 %P_c**	**(n) Separator or Dehydrator Pr. (DWt) for critical flow only**
265	787	1322	1322	1322	529	784

FLOW RATE CORRECTION (METER ERROR)

Integrated Volume - MCF/D	Quotient of $\frac{\text{Item c}}{\text{Item d}}$	$\sqrt{\frac{\text{Item c}}{\text{Item d}}}$	Corrected Volume
2035	1.0234	1.0116	Q = 2059 MCF/D

WORKING PRESSURE CALCULATION

$(1-e^{-s})$	$(F_c\,Q_m)^2\,(1000)$	$R^2 = (1-e^{-s})(F_c\,Q_m)^2(1000)$	P_t^2	$P_w^2 = P_t^2 + R^2$	$P_w = \sqrt{P_w^2}$
.280	374,759	104,933	619,369	724,302	851

DELIVERABILITY CALCULATION

$$D = Q\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n = 2059\left[\left(\frac{1,467,843}{1,028,483}\right)^n = (1.4341)^n = 1.3105\right] = 2698 \text{ MCF/D}$$

REMARKS:

This well has critical flow -
Use FTP (b) for P_t (1)

SUMMARY

Item h	265	Psia
P_c	1322	Psia
Q	2059	MCF/D
P_w	851	Psia
P_d	529	Psia
D	2692	MCF/D

Company Kimbell Oil Company of Texas
By E. A. Clement
Title Prod. Supt.
Witnessed By
Company

$$G = 43560\,(\phi)(1-S_w)\,\frac{(BHP/z)}{T_R}\,(35.3)\,(A)\,(h)$$

G = original gas in place, cf
ϕ = porosity
S_w = water saturation
BHP/z = initial Bottom hole Pressure / z, psi
TR = temperature Reservoir, °R
A = Area of drainage, acres
h = thickness, feet

Given:

BHP/z_{est} = 1900 psi
T_R = 640 °R
h = 90 ft

Assume:

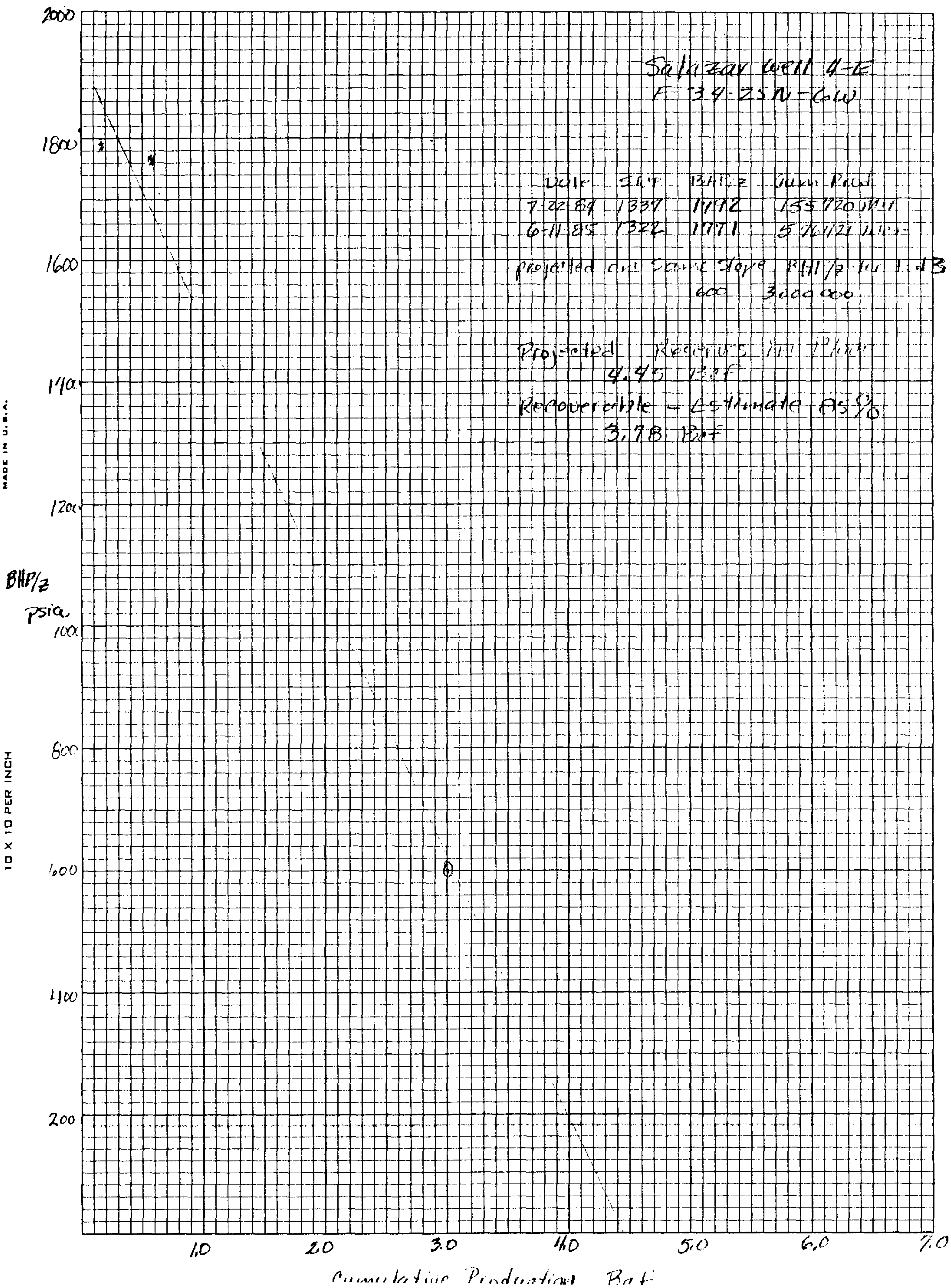
ϕ = 10% (field avg)
S_w = 40% (" ")
A = 160 acres

Solution:

$$G = 43560(.10)(1-.40)\frac{(1900)}{640}(35.3)(160)(90)$$

$$= 3,944,188,420 \text{ cf}$$

or 3.95 Bcf



PRODUCTION TABLE

WELL NAME Farming E No. 3-E

WELL LOCATION D-2-24N-6W

Perfs _____

_____

Completion Date 1981

Initial Potential _____

Initial Pressure _____

Initial GOR/Gravity _____

SICP psia	DATE	PRODUCTION DAYS / SHUT-IN	OIL/H_2O PRODUCTION BBLS		RATE /Day WATER	CUMULATIVE WATER BBLS	GAS PRODUCTION MCF	RATE /Day	CUMULATIVE MCF
	1981								
	03-81		375	0	0.00	0	32192		32192
4-24-81	04-81		333	0	0.00	0	38024		70216
1445	05-81		240	5750		5750	37108		107324
	06-81		144	7750		13500	21278		128602
	07-81		50	6500		20000	5819		134421
	08-81	0 31	0	0	0.00	20000	0	0.00	134421
	09-81	0 30	0	0	0.00	20000	0	0.00	134421
	10-81	0 31	0	0	0.00	20000	0	0.00	134421
	11-81	0 30	0	0	0.00	20000	0	0.00	134421
	12-81	0 31	0	0	0.00	20000	0	0.00	134421
	total		1142	20000			134421		
	1982								
	01-82	0 31	0	0	0.00	20000	0	0.00	134421
	02-82	0 28	0	0	0.00	20000	0	0.00	134421
	03-82	0 31	0	0	0.00	20000	0	0.00	134421
	04-82	0 30	0	0	0.00	20000	0	0.00	134421
	05-82		0	0	0.00	20000	35		134456
	06-82	0 30	0	0	0.00	20000	0	0.00	134456
	Zone Abandoned								

PRODUCTION TABLE

WELL NAME Salazar Well No. 4 — Completion Date _____

WELL LOCATION H-34-25N-6W — Initial Potential _____

Perfs _____ — Initial Pressure _____

_____ — Initial GOR/Gravity _____

SICP psia	DATE	PRODUCTION DAYS / SHUT-IN ~~estimated~~		OIL/H_2O PRODUCTION BBLS		RATE /Day WATER	CUMULATIVE WATER BBLS	GAS PRODUCTION MCF	RATE /Day	CUMULATIVE MCF
1065	1965	358	7	611	0	0.00	0	94245	263	742389
	1970	365	0	270	0	0.00	0	42348	116	1046600
1-15-74	1973	365	0	146	0	0.00	0	28568	78	1148050
827	1974	358	7	114	351	.98	351	18662	52	1166712
	1975	365	0	33	358	.98	709	24036	66	1190748
	1976	365	0	105	359	.98	1068	27918	76	1218666
	1977	365	0	63	343	.94	1411	21953	60	1240619
5-29-79	1978	365	0	76	348	.95	1759	25159	69	1265778
612	1979	358	7	50	346	.97	2105	15083	42	1280861
	1980	365	0	81	369	1.01	2474	17114	47	1297975
	1981	255	110	105	250	.98	2724	14134	55	1312109
	1982	80	285	48	164	2.05	2888	2415	30	1314524
	1983	33	332	183	17	.52	2905	1630	49	1316154
	1984	0	365	0	0	0.00	2905	0	0	1316154
	Zone	abandoned								

PRODUCTION TABLE

WELL NAME Federal Well No. 3

WELL LOCATION L-34-25N-6W

Perfs 6518-6662

Completion Date 11-1-63

Initial Potential 6152 MCF/Day

Initial Pressure SICP = 2322

Initial GOR/Gravity

SICP psia	DATE	PRODUCTION DAYS / SHUT-IN ~~estimated~~		OIL/H_2O PRODUCTION BBLS		RATE /Day WATER	CUMULATIVE WATER BBLS	GAS PRODUCTION MCF	RATE /Day	CUMULATIVE MCF
	1965	365	0	4350	0	0.00	0	182813	501	434736
1512	1970	335	30	2104	0	0.00	0	138997	415	1643882
1262	1973	358	7	2304	0	0.00	0	265392	741	2647309
	1974	365	0	2446	0	0.00	0	230591	632	2608809
1092 (75)	1976	365	0	1918	0	0.00	0	191954	526	3007041
	1977	365	0	1713	0	0.00	0	190858	523	3197890
	1978	365	0	1541	353	.97	353	181755	498	3379654
2-5-81	1980	365	0	1194	368	1.01	1117	160931	441	3698353
1037										
5-12-81	1981	314	51	1372	307	.98	1424	129774	414	3828127
992	1982	231	134	1209	267	1.16	1691	96681	419	3924808
7-12-83	1983	150	215	838	127	.85	1818	75708	505	4000517
1132	1984	115	250	555	163	1.42	1981	60147	523	4060663
	1985	69	51	475	105	1.52	2086	39034	566	4099697
	(through April)									

PRODUCTION TABLE

WELL NAME Federal Well No. 3-E

WELL LOCATION I-34-2N-6W

Perfs 6509-6720

Completion Date 6-9-80

Initial Potential 2227 MCF/Day

Initial Pressure CP= 385

Initial GOR/Gravity

SICP psia	DATE	PRODUCTION DAYS / SHUT-IN ~~estimated~~		OIL/H_2O PRODUCTION BBLS		RATE /Day WATER	CUMULATIVE WATER BBLS	GAS PRODUCTION MCF	RATE /Day	CUMULATIVE MCF
12-5-80 1312	1980	130	23	473	216	1.66	216	59500	458	59500
5-13-82 812	1981	305	60	568	111	.36	327	115893	380	175393
10-13-83 1132	1982	250	115	576	134	.54	461	79921	320	255314
5-5-84 1112	1983	140	225	374	81	.58	542	50768	363	306082
	1984	165	250	425	120	.73	662	56757	344	362839
	1985 (through April)	77	43	109	51	.66	713	28946	376	391785

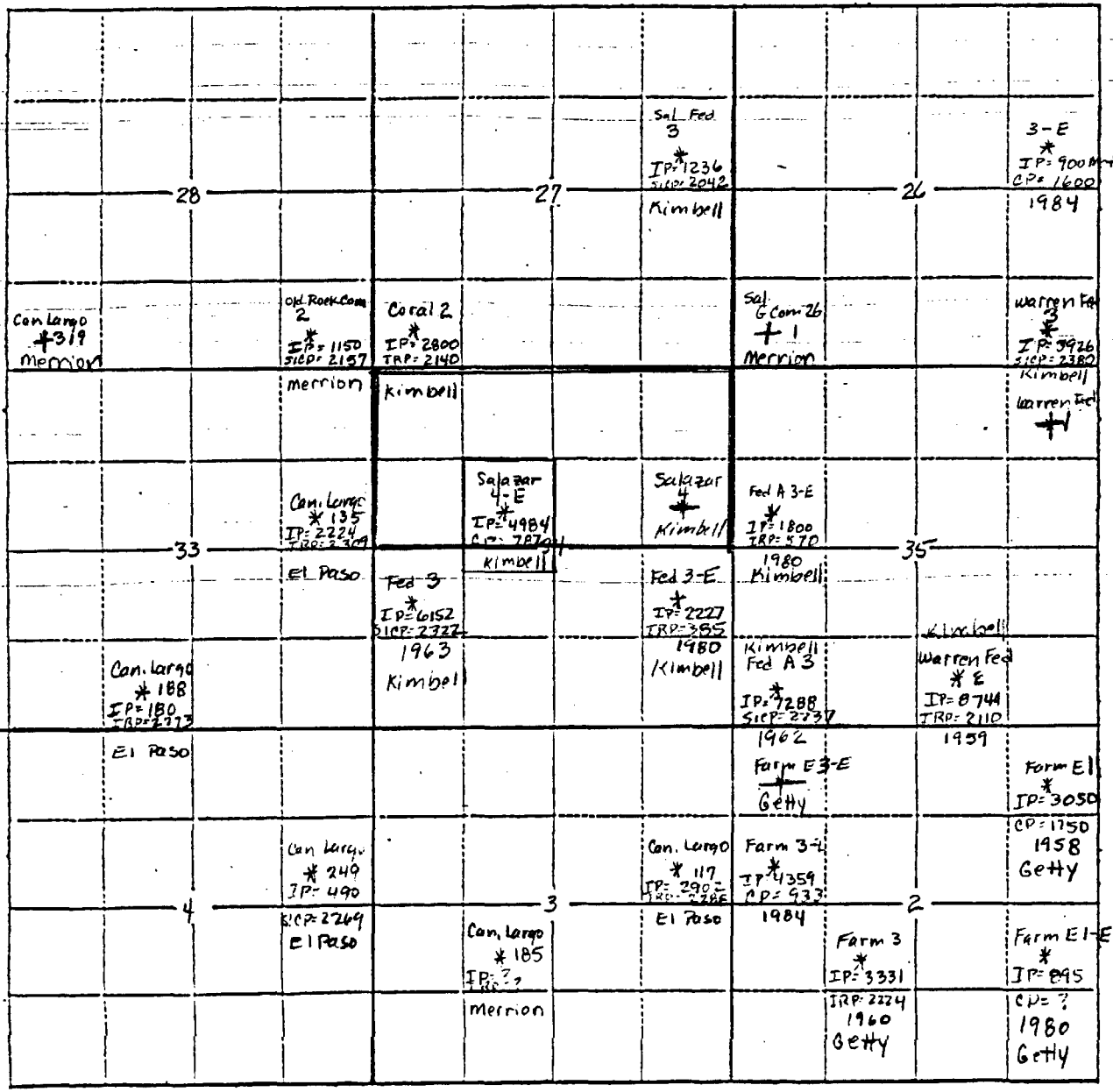
LIST OF ADJACENT WELLS/OPERATORS

Operator	Well Name	Well Location	Proration Unit
Merrion (abd)	Sal. G. Com 26 1	m-26-25N-6W	W½ section 26
Kimbell	Sal. Fed. 3	h-27-25N-6W	E½ section 27
Kimbell	Coral 2	m-27-25N-6W	W½ section 27
Merrion	Old Rock Com 2	p-28-25N-6W	E½ section 28
El Paso	Can. Largo Ut 135	h-33-25N-6W	E½ section 33
Kimbell	Federal 3 Federal 3-E	1-34-25N-6W i-34-25N-6W	S½ section 34
Kimbell	Federal A 3 Federal A 3-E	m-35-25N-6W e-35-25N-6W	W½ section 25

Salazar Well 4-E

1630N 1460W Section 34

Township 25 N, Range 6W, _____ Meridian, _____



Dakota Wells

Notes

24N-6W

D-2 Farming E3-E Abd Getty
Cum gas: 134456 Mcf water = 20,000 bbls
oil = 1142 bbls

25N-6W

M-26 Sal. G. Com 26 #1 Merrion
Abd Cum gas: 809686 Mcf water = 288 bbls
oil = 730 bbls

M-28 Canyon Largo 319 Abd Merrion
cum gas: 205241 Mcf Cum water 22 bbls
oil = 23169 bbls

H-34 Salazar 4 DK Abd Merrion/Kimb
cum gas: 1316154 Mcf Cum water = 2905
oil = 1040A bbls

Estate of K,
A-35 Warren Fed 1 Abd Kimbell
Cum gas: 33302 Mcf Cum water = 0
Cum oil = 104 bbls.