W. J. COPPINGER
#1 Beyer Area
Sec. 24-26S-33W
Finney County, Kansas

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Finney County, Kansas

INTRODUCTION

The completion practices recommended in this report are not intended to be obligatory in any way, either on the operating company, or on The Western Company. They do incorporate the results of an extensive chemical, geological, and engineering research program which has been conducted by The Western Company in conjunction with the development of the Hugoton Field.

Obviously, a flat completion recommendation cannot be prepared which will be the best procedure for every well in the field. It is the desire of The Western Company to co-operate with the operating company on each individual well, and after all of the available information for that particular well has been correlated and reviewed, to prepare a recommendation which will represent the best possible acid treatment for that particular well. Even so, such a recommendation should be flexible enough to be modified some by the field personnel as the completion progresses.

GEOLOGICAL INTERPRETATION

Study of the electric log and microscopic examination of the well cuttings reveal that three (3) zones of possible production are present in the Beyer area. These are in descending order the Herrington, Krider, and Winfield. The Towanda and Ft. Riley as interpreted from the electric log are in all probability water bearing and will thus be eliminated from further reference in this report.

As indicated by the electric log and sample analysis the Winfield appears to be the more permeable horizon and the Herrington succeeding the Krider in degree of permeability and porosity.

All zones have a relatively low content of harmful insolubles and from all outward appearances should acidize with very good results.

DISCUSSION

Within the past five (5) years, much research has been directed towards controlling the various characteristic properties and reactions of Hydrochloric Acid as applied to increasing the productivity of oil and gas wells completed in calcareous reservoirs. At the present time it is possible to control, either chemically or mechanically, or by some combination of both, practically every phase of this procedure.

One of the more important elements of control is that of proper distribution of acid across the face of the pay zone (s), often referred to as "Longitudinal" distribution. There are chemical additives to acid available which will, when properly applied, regulate this distribution to a large extent. In the Hugoton Field, however, where several separate and distinct zones exist, it has been rather conclusively proven that the best solution to the longitudinal distribution problem is through the use of bridge plugs and/or packers.

Another major element of control concerns "clean-up", or the ease with which spent acid and residue are removed from the reservoir. That this is an important phase of the completion procedure has long been recognized by operators in the Hugoton Field, and is evidenced by the established procedure of "washing" the reservoir in the vicinity of the well bore after the larger acid treatments. This washing operation would not be necessary if:

(1) The reservoir rock were clean, i.e., no insoluble or slowly soluble residue, or if

(2) The spent acid were removed from the reservoir before the residue drops out of suspension and re-cements, or if

(3) The residue were kept in suspension for a longer period of time.

Obviously it is impossible to change the chemical composition of the reservoir rock. The alternative then must be in increasing the rate of return of the spent acid and/or to keep the residue in suspension longer. Research along these lines has not eliminated the necessity for "wash shots". It is possible, however, to employ certain chemical and mechanical techniques to the larger treatments so that the amount of residue left deposited in the solution channels is decreased.

It is also possible to increase the efficiency of the wash treatments so that fewer washes are necessary and the cleanup time is reduced, resulting in ultimately better wells at a substantial saving in volume of acid and rig time.

One mechanical aspect that is important in accellerating the return of the spent acid, and thereby decreasing the amount of residue deposited is to use a high rate of acid injection into the formation so that the pressure wave created in the reservoir in the vicinity of the well bore will not be dissipated, but will be available to help expell the spent acid.

There are two (2) main chemical aspects critical to easier and faster return of the spent acid and to additionally greater return of residue.

(1) The surface tension of the spent acid may be considerably decreased by the use of certain chemical additives, thereby facilitating its return to the well bore and subsequently to the surface.

(2) The ability of the spent acid solution to carry more residue for a longer period of time may be greatly increased by the use of certain acid additives, thereby enabling a given amount of acid to carry more residue to the surface.

RECOMMENDATION

TYPE ACID

It is recommended that Western Gas Well Low Tension acid be used throughout the completion. For a greater volume percent residue carried to the surface in the returning fluid, the properties of the fluid are changed as follows:

1. The density is slightly increased. This slight increase gives the mixture more tendency to hold the residue, and also spreads the residue out through the mixture more evenly. In this way it will take longer for the residue to fall out of the mixture and be deposited in the open passageway.

2. The surface tension is greatly reduced. In the fluid mixture the lowering of the surface tension enables the fluid to "wet" the formation and to move within the formation with greater ease. This change of property enables the fluid to enter the formation with less pressure and to leave the formation with a higher velocity, with the effect being that the residue is given less time in which to settle out before reaching the well bore.

3. The foaming tendency of the fluid mixture is increased thereby providing it with a greater carrying body.

4. The wash and large stage treating mixtures are retarded in their reaction time. This change allows a deeper penetration of large stage shots without becoming spent, and allows an effective acid to remain in contact with the residue while both entering the formation and returning to the well bore. The same is true of the wash shots, thus any residue "blocks" are removed not only by fluid action, but also by acid water.

5. In the breakdown acid a buffer agent is added to counteract the retarding action without altering the other properties of the additives. This gives the breakdown acid a fast reaction rate and provides large open channels to the well bore withoug very much penetration into the formation. This is done so that the stages which follow will be able to penetrate into the formation with more ease.

6. A strong detergent agent is added to the mixture which coats the residue particles with a water soluble film. The result of this action being to keep any residue left in formation passageways from setting-up into a cemented mass, thereby making the task of removing the residue a much easier one.

7. The property of the acid is changed so that it will react more evenly with lime and dolomite. This gives the results of not producing as much dolomite residue, thereby lowering the chances of forming a formation "block" and enabling the well to be cleaned up faster, easier, and with better results.

The acid usdd in the first or breakdown stage should be either Western Breakdown Low Tension or Western Mud Acid, depending upon the condition of the hole. It is is felt that the face of the formation in any producing zone is covered by a mud cake, caused by lost circulation, then it will probably be advantageous to use Mud Acid, otherwise the regular Breakdown Low Tension acid will be sufficient.

Western's Mud Acid is a solution of Low Surface Tension acid containing a reagent to increase the solvent action. Mud Acid will dissolve anything soluble in regular acid and will react with both lime and dolomite at approximately the same rate as Breakdown Low Tension. In addition it will also

dissolve a small amount of the siliceous compounds used in drilling muds. This acid will destroy the colloidal properties and deflocculate the mud cake normally deposited upon the wall of the bore hole during rotary drilling operations. Therefore, Mud Acid will not only remove the troublesome mud cake, but it will serve the purpose of the breakdown stage.

AMOUNT OF ACID

In general it is difficult to recommend a specific amount of acid to be used in the overall treating of a marginal well or to recommend the number of stage treatments required to produce the optimum amount of gas.

It is our opinion that the breakdown stage for each zone should be of relatively small volume (1000 gallons per zone). The breakdown treatment should be followed by small wash treatments over the entire section. Generally only one wash shot is required to clean the formation after the breakdown, however, if a substantial gain in gas is achieved and the residue is returning spent acid is heavy, an additional wash may be desirable.

Following the breakdown and subsequent wash (es) on marginal wells, it is frequently advantageous to use an intermedial overall stage treatment of 3000 to 5000 gallons if the well is producing less that 2000 to 2500 MCF blowdown. The productive zones should be washed one or more times depending on the increase in gas volume and the amount of residue returning in the spent acid water.

After an intermediate stage, and subsequent washes, a large stage treatment should be used and followed by wash shots. The wash treatments should be staged by starting with a small volume and gradually increasing the amount with each following treatment. Generally, two to four wash shots are sufficient to clean the formation after the large stage.

GENERAL RECOMMENDED PROCEDURE

1. Treat the Winfield with 1000 gallons of Western Breakdown Low Tension or Western Mud Acid which ever is decided to be the most desirable. Clean up the zone until all or most of the spent fluid has returned.

2. Perforate the Herrington-Krider and set a bridge plug below the base of the Krider. Treat the Herrington-Krider with 1000 gallons 15% Breakdown Low Tension or Mud Acid.

3. Drill out the bridge plug and wash all zones with 1000 gallons 7½% Wash Low Tension acid.

4. After this treatment has cleaned up apply an overall intermediate stage of 3000 to 5000 gallons of 15% Low Tension acid with as high an injection rate as is mechanically safe and possible.

5. Wash all zones one or more times with 1000 to 2000 gallons 7½% Wash Low Tension acid.

6. A large stage of 8000 to 10,000 gallons 15% Low Tension is recommended for the overall section. Again, a high injection rate is very desirable on this stage.

7. Following the large stage treatment the well should be washed from two to four times with 2000 to 4000 gallons 7½% Wash Low Tension acid.

This is a broad, general recommendation and at the risk of becoming tiresome, it is repeated that no two wells are alike and that recommendations for a particular well should be made only after all of the available information for that particular well has been carefully studied.

Respectfully submitted,

THE WESTERN COMPANY

L. J. Harp.

L. J. Harp
District Geologist

OIL PRODUCER

DRILLING CONTRACTOR

File

Sec. 24
26S R 33W

W. J. COPPINGER
320 UNION NATIONAL BANK BLDG.
WICHITA 2, KANSAS

Office Phone 57443

September 4, 1952

Cable Tool Completion
Beyer #1

Set 5½" OD 15.5#, J-55 casing at 4730 cemented w/ 160 sx. of 50% Strata-Crete cement plus 4% gel. Meas. from Bradenhead to rotary bushing is 6.0 feet. Placed centralizers on pipe at 4729, 4520, 4480, 4395, 4320, 4290 and 4260.

Moved in cable tools and swabbed rotary mud. Drilled cement to 4700. Ran Lane-Wells combination R-A log from 3800-4700 with collar locator.

Perforated with 18 shots using Lane-Wells bullet gun from 4684-90. Swabbed back load and well swabbed 5 bbls. saltwater per hour for 6 hours with a very slight show of oil and gas. Well filled 1234' salt water in 6 hours.

Set Baker cast iron plug at 4450.

Perforated with 20 shots using Lane-Wells bullet gun from 4398-4406. Swabbed back load and well started swabbing 30 bbls. per hour oil 400' above perforations. Swabbed for 7 hours. Ran bailer and found 60 gals. salt water. Let well fill up.

Hole filled 2500' oil in 2 hrs. with 80 gals. salt water.

Hole filled 3150' oil in 5 hrs. with 30 gals. salt water.

Hole stabilized with 3338' oil above perforations in 8 hrs. Oil check 30°API at 60° F. Estimated BHP 1260 psi.

Ran 10 gals, plastic on Baker plug and lost 2'. PB TD 4442. Let plastic set 3 hrs. and bailed 60 gals. S. W. off bottom. Swabbed 19 bbls. oil from top and shut down for 1 hour. Ran bailer and recovered 10 gals. salt water. Well produced approximately 13 bbls. oil and 10 gals. salt water.

Re-perforated with 24 shots from 4398-4406 using Lane-Wells bullets. Ran 2" EUE tubing spaced 4' off bottom. Well shut in awaiting pumping unit, rods and tank battery, to take State Potential Test.

DISCUSSION

There has been some controversy as to whether there is communications from the zone above, from 4376-88 where the good drill stem test was obtained or whether the oil is coming from the zone from 4398-4406 which was perforated.

It is my own personal opinion that there is no communication in this well. However, there is the possibility that there could be communication behind the pipe.

OIL PRODUCER

DRILLING CONTRACTOR

W. J. COPPINGER

320 UNION NATIONAL BANK BLDG.

WICHITA 2, KANSAS

Because of this possibility it is extremely important from an operational standpoint to know whether we have communications or not. Because of possible contamination of samples from above after running a drill stem test, it is difficult to evaluate the shows of oil in the zone from 4393-4410. From the swabbing test it doem not contain water or gas in appreciable amounts; from the samples it does have porosity and from the micro-log it shows comparable permeability to the zone above from 4376-88 where the good drill stem test was run. Now if it does not contain oil, water or gas and if it has porosity and permeability, what does it contain? Is it a void; a thief: It is doubtful. But if it is a thief zone, it should be squeezed.

The only practical method to determine whether there is communcation or not is to mix an oil soluble radio-active isotope and inject it into the well to be followed by a radio-activity survey. It there is communication between these two zones, an abnormally high reading will be obtained above the present perforations.

A. J. Carter

A. J. Carter bas

AJC:bas

Copies to Morris Mizel
Joe Teichman
Wood River
Stanolind

THE WESTERN COMPANY

Engineered Acidizing

SOLUBILITY REPORT

Date 8-18-52 Operator Coppinger

Lease Beyer Well No. 1 Field Hugoton

Type Acid Used 15% Tested by L. Harp

DEPTH FROM	DEPTH TO	% SOLUBLE	REACTION TIME	OIL SHOW ON SPENT ACID	DESCRIPTION OF INSOLUBLES
2600	05	48	16		Shale - Anhydrite
	10	43	16		Shale - Shaley Sand - Anhydrite
	15	31	15		Shale - Anhydrite - Shaley Sand
	20	77	11		Anhydrite - Chert - Trace Sand
	25	81	12		Anhydrite - Chert - Sand
	30	68	13		Anhydrite - Chert - Sand
	35	37	12		Anhydrite - Chert - Shale
	40	43	12		Anhydrite - Chert - Shale
	45	86	20		Anhydrite - Shale
	50	82	20		Anhydrite - Trace Shale
	55	91	19		Anhydrite
	60	65	23		Shale - Anhydrite
	65	33	21		Shale - Anhydrite - Trace Sand
	70	12	19		Shale - Anhydrite - Trace Sand
	75	79	30		Chert - Sand - Anhydrite
	80	48	28		Shale - Chert - Sand
	85	63	29		Chert - Sand - Shale
	90	57	29		Shale - Sand - Anhydrite
	95	85	28		Anhydrite - Trace Sand - Shale
	2700	65	27		Shale - Anhydrite
	05	39	26		Shale - Anhydrite
	10	37	24		Shale - Sand - Anhydrite
	15	29	23		Shale - Sand - Anhydrite - Trace Chert
	20	29	23		Shale - Anhydrite
	25	35	22		Shale - Sand - Anhydrite
	30	41	23		Shale - Sand -Anhydrite
	35	77	23		Chert - Anhydrite
	40	73	22		Chert - Sand - Anhydrite
	45	83	22		Chert - Sand - Anhydrite
	50	75	22		Chret - Anhydrite - Sand
	55	59	20		Chert - Sand - Anhydrite
	60	70	17		Chert - Sand - Anhydrite
	65	72	17		Chert - Anhydrite - Sand
	70	71	17		Chert - Sand - Anhydrite
	75	51	18		Shale - Anhydrite - Chert - Trace Sand
	80	43	17		Shale - Anhydrite - Sand - Chert
	85	41	16		Shale - Anhydrite - Sand - Chert
	90	64	15		Sand - Chert - Shale - Anhydrite
	95	68	15		Sand - Chert - Shale - Anhydrite
	2800	72	13		Sand - Chert - Shale - Anhydrite

THE WESTERN COMPANY

Engineered Acidizing & Perforating

GENERAL OFFICE - MIDLAND, TEXAS

Coppinger COMPANY	Boyer LEASE	1 WELL NO.	Hugoton AREA	Finney COUNTY	1 PAGE
LOCATION 24-26-33		ELEV:		EXAM. BY LH	
		DRILLED WITH Rotary		DATE: 8-15-52	

FROM	TO	% LIME & DOLO DENSE	% LIME & DOLO GRANULAR	ANHY	CHERT	SAND	SHALE	REMARKS
2600	05	60		15			25	Dense Gray Shaley Dolomite (Hollenburg)
	10	55	Tr	10		5	30	Some Slightly Sandy Dolomite
	15	50	Tr	15		Trs	35	Shaley Gray Dolomite
	20	60	15	15	10			(Herrington) Cream Colored Very Slightly Sandy Cherty Dolomite Finely Porous to Tight
	25	50	35	10	5			Slightly Sandy Dolomite Finely Porous to Tight - Trace Finely Porous
	30	40	30	15	15		Tr	Slightly Sandy Dolomite Finely Porous to Tight Trace Finely Porous
	35	45	10	15	20		10	Gray Shaley Dolomite Tight
	40	60	5	10	10		15	(Top Krider) Gray Shaley Dolomite Tight - Trace Finely Porous to Tight
	45	60	30	10	Tr		Tr	Gray Mottled Dolomite Finely Porous to Tight - Trace Finely Porous
	50	35	55	10				Finely Porous
	55	35	55	10				Finely Porous
	60	40	15	15			30	Red & Gray Shale Finely Porous to Tight
	65	35	Tr	15		Trs	50	Red Sandy Shale Gray Shale
	70	10		10		Trs	80	Red Sandy Shale
	75	55	25	Tr	10	10		(Winfield) Cream to Tan Sandy Dolomite Finely Porous to Tight Trace Finely Porous
	80	50	10	Tr	15	Trs	25	Gray Shale Finely Porous to Tight - Trace Finely Porous
	85	55	15	5	10	15	Trs	Sandy and Shaley Dolomite Finely Porous to Tight Trace Finely Porous
	90	40	25	10		25	Tr	Sandy and Shaley Dolomite Finely Porous - Trace Finely Porous to Fair

THE WESTERN COMPANY

Engineered Acidizing & Perforating

GENERAL OFFICE - MIDLAND, TEXAS

Coppinger (COMPANY)	Beyer (LEASE)	1 (WELL NO.)	Hugoton (AREA)	Finney (COUNTY)	2 (PAGE)
LOCATION 24-26-33		ELEV:	DRILLED WITH Rotary	EXAM. BY LH	DATE: 8-15-52

FROM	TO	% LIME & DOLO DENSE	% LIME & DOLO GRANULAR	ANHY	CHERT	SAND	SHALE	REMARKS
2690	95	40	50	10		Tr		Finely Porous - Some
								Finely Porous to Fair
	2700	35	40	10		Trs	15	Finely Porous - Traces
								Finely Porous to Fair
	05	40	20	10	Tr	Tr	30	(Winfield Carrying Over in Samples)
	10	25	Trs	5		20	50	Gray Shaley Sand - Red Shale
	15	10	Trs	5	5	15	65	Red Shale - Gray Sandy Shale
	20	15		10	Tr	5	70	Red Shale
	25	30		5	Tr	10	55	Red Shale
	30	25	10	5	Tr	15	45	Sandy Dolomite - Brown Shaley Sand Tight
Towanda	35	65	20	5	10	Tr		Tan to Brown Coarse Crystalline Dolomite
								Finely Porous to Tight
	40	50	30	Tr	10	10		Tan to Brown Coarse Crystalline Dolomite
								Finely Porous to Tight
								Traces Finely Porous
	45	65	25	Tr	5	5		Tan to Brown Coarse Crystalline Dolomite
								Finely Porous to Tight
								Traces Finely Porous
	50	60	15	Trs	15	10		Tan to Brown Coarse Crystalline Dolomite - Som
								Sandy Dolomite Finely Porous to Tight
	55	45	20	Trs	20	15		Gray Silty and Sandy Dolomite
								Finely Porous to Tight -
								Some Finely Porous
	60	45	25	Tr	25	5		Gray Silty and Cherty Dolomite
								Finely Porous to Tight -
								Some Finely Porous
	65	35	35	10	20	Tr		Finely Porous
8	70	40	35	5	15	5		Finely Porous-Traces Fair
	75	30	15	5	10	Tr	40	Finely Porous
	80	20	15	10	5	10	40	Finely Porous to Tight -
								Trace Finely Porous
	85	20	15	10	5	20	30	Finely Porous-Trace Fair

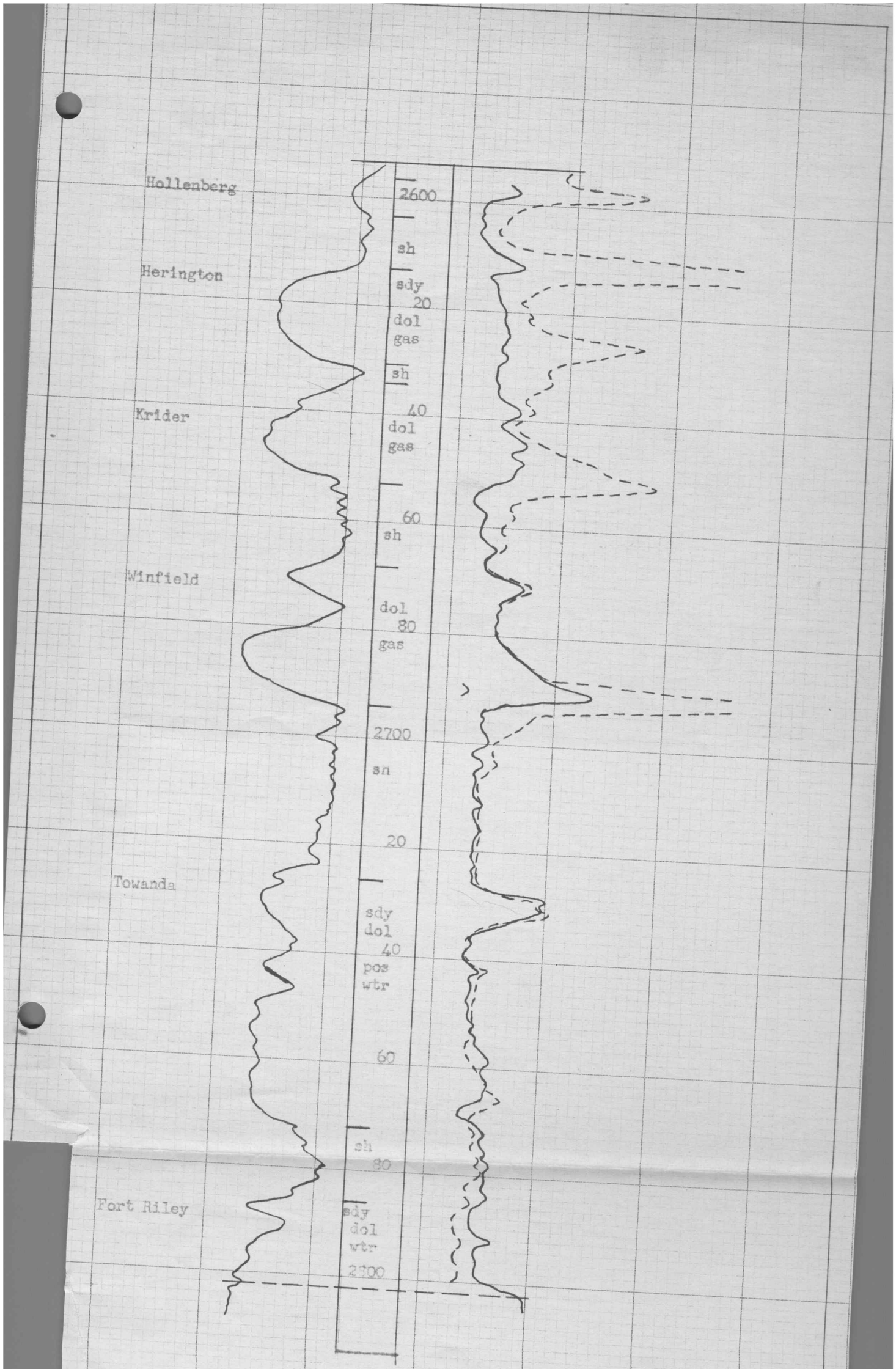
THE WESTERN COMPANY

Engineered Acidizing & Perforating

GENERAL OFFICE - MIDLAND, TEXAS

Coppinger COMPANY	Dayer LEASE	1 WELL NO.	Hugoton AREA	Finney COUNTY	3 PAGE
LOCATION 21-26-33		ELEV:		EXAM. BY LH	
		DRILLED WITH Rotary		DATE: 8-15-52	

FROM	TO	% LIME & DOLO DENSE	% LIME & DOLO GRANULAR	ANHY	CHERT	SAND	SHALE	REMARKS
2785	90	45	15	Tr	10	30	Trs	Ft. Riley Gray Sandy & Silty Finely Porous to Tight - Traces Finely Porous
	95	50	20	Tr	10	20	Trs	Gray Silty Sandy Dolomite Finely Porous to Tight - Some Finely Porous
	2800	55	20	Tr	10	15	Trs	Gray Silty Sandy Dolomite Finely Porous to Tight - Some Finely Porous
Circ	2800	60	25		5	10		Gray Silty Dolomite Finely Porous



W. J. COPPINGER
BEYER # D
Hugoton Field
Finney County, Kansas
Sec 24 - 26S - 33W

T. D. Logged 2802'
T. D. Driller 2800'
K. B. Elev. 2925'

COPPINGER COMPANY
No. 1 Beyer
24-26-33
Finney Co., Kansas

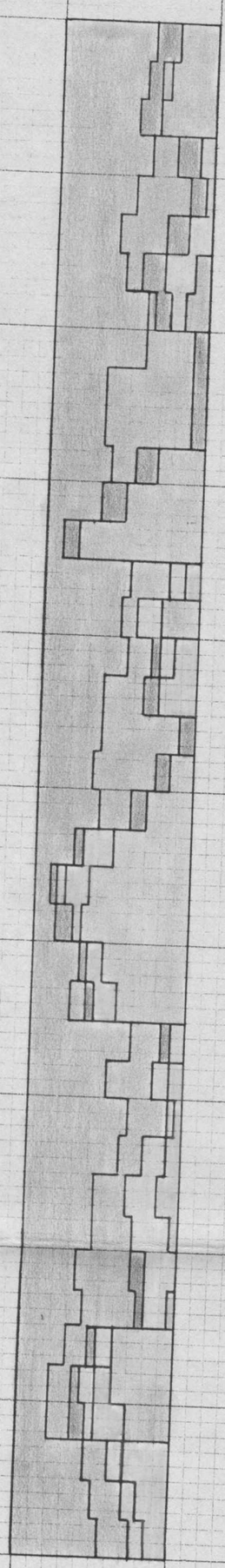
Percentage
Sample Log

Relative Porosity

0 100

Fine to Tight
Finely Porous
Fine to Fair

2600
20
40
60
80
2700
20
40
60
80
2800



Dense dolomite
Porous dolomite
Anhydrite
Chert