FLUID SAMPLE DATA

Date	1-10-76
Ticket Number	780806
Kind of Job	OPEN HOLE
Halliburton District	ARTESIA
Tester	MR. RITTER
Witness	MR. SMITH
Drilling Contractor	MORANCO # 8 DR S

Sampler Pressure ______ P.S.I.G. at Surface

Recovery: Cu. Ft. Gas ______

cc. Oil ______

cc. Water ______

cc. Mud ______

Tot. Liquid cc. ______

Gravity 42 ° API @ 60 °F.

Gas/Oil Ratio ______ cu. ft./bbl.

	RESISTIVITY		CHLORIDE CONTENT
Recovery Water	___ @ ___ °F.		ppm
Recovery Mud	___ @ ___ °F.		ppm
Recovery Mud Filtrate	___ @ ___ °F.		ppm
Mud Pit Sample	___ @ ___ °F.		ppm
Mud Pit Sample Filtrate	___ @ ___ °F.		ppm

Mud Weight 11 vis 52 cp

EQUIPMENT & HOLE DATA

Formation Tested	Strawn
Elevation	- Ft.
Net Productive Interval	26' Ft.
All Depths Measured From	Kelly Bushing
Total Depth	11501' Ft.
Main Hole/Casing Size	7 7/8"
Drill Collar Length	533' I.D. 2.25"
Drill Pipe Length	10893' I.D. 3.826"
Packer Depth(s)	11,458-11,464' Ft.
Depth Tester Valve	11,441' Ft.

Legal Location Sec. - Twp. - Rng.	Lease Name	Well No.	Test No.	Field Area	Tested Interval	County	State	Lease Owner/Company Name
36-17-32	AZTEC STATE	3	3	WILDCAT	11464'-11501'	LEA	NEW MEXICO	FRANKLIN-ASTON AND FAIR

Cushion — TYPE: ; AMOUNT: 1500' Fresh water Ft. Depth Back Pres. Valve ______ Surface Choke 1" Adj. Bottom Choke .75"

Meas. From Tester Valve

Recovered 5500 Feet of reversed out oil and gas

Recovered ______ Feet of ______

Recovered ______ Feet of ______

Recovered ______ Feet of ______

Recovered ______ Feet of ______

Remarks SEE PRODUCTION TEST DATA SHEET

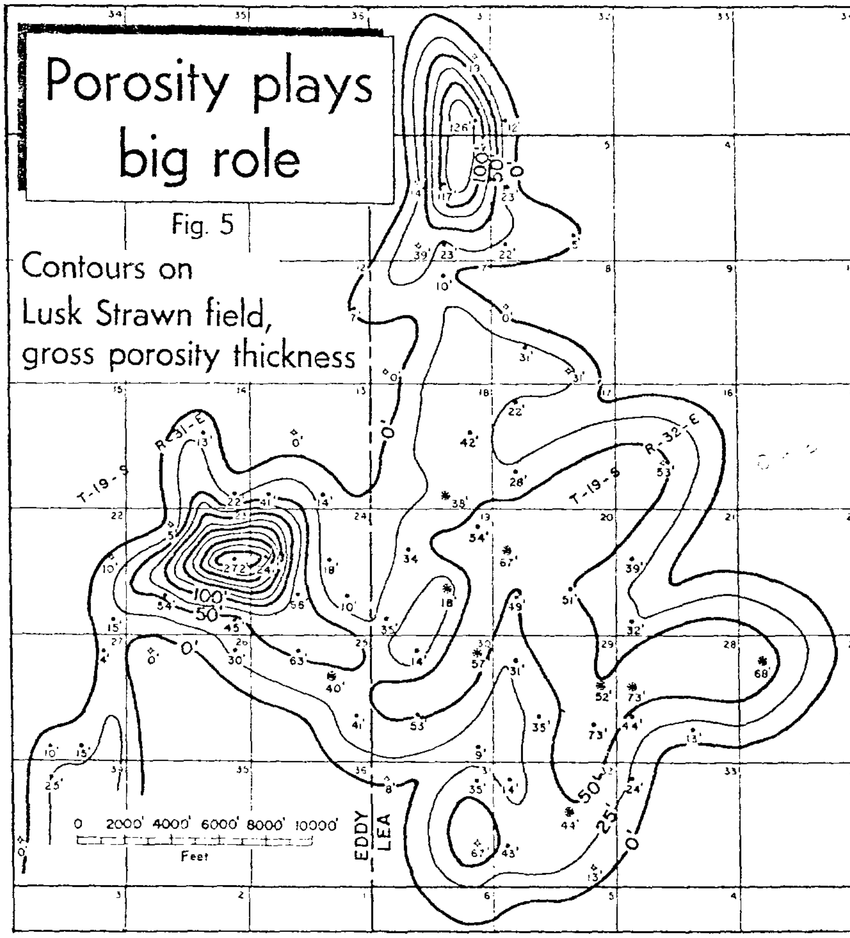
TEMPERATURE	Gauge No. 281 Depth: 11,446 Ft.		Gauge No. 90 Depth: 11497 Ft.		Gauge No. Depth: Ft.		TIME	
Est. °F.	24 Hour Clock Blanked Off No		24 Hour Clock Blanked Off Yes		Hour Clock Blanked Off		Tool Opened 11:30 P.M.	
Actual 142 °F.	Pressures		Pressures		Pressures		Opened Bypass 10:33 P.M.	
	Field	Office	Field	Office	Field	Office	Reported Minutes	Computed Minutes
Initial Hydrostatic	6560	6582	6515	6621				
First Period Flow Initial	194	928	946	927			—	—
First Period Flow Final	2015	2046	2089	2080			30	30
First Period Closed in	6395	6397	6408	6423			60	62
Second Period Flow Initial	2121	2102	2152	2148			—	—
Second Period Flow Final	3291	3330	3355	3357			60	60
Second Period Closed in	6313	6319	6326	6344			510	508
Third Period Flow Initial							—	—
Third Period Flow Final								
Third Period Closed in								
Final Hydrostatic	6539	6574	6615	6610			—	—

FORM 181 R1—PRINTED IN U.S.A.

FORMATION TEST DATA

LITTLE'S 95671 10M 8/74

sary for production from these wells.



Porosity plays big role

Fig. 5
Contours on Lusk Strawn field, gross porosity thickness

Basic reservoir data

The field produces from a depletion-drive mechanism from an average depth of 11,300 ft. The original bottom-hole pressure was 5,862 psi at −7,800 ft. The initial GOR in the field was 2,359:1. The gravity of the oil averages 46°.

Combinations of core data, electrical and sonic logs were utilized for the determination of the productive data limits. The porosity minimum for production contribution is believed to 2.5%.

A summary of the average rock properties is as follows:

1. Porosity 4.85%
2. Permeability 21.6 md.
3. Initial water saturation 30.4%
4. Oil saturation 4.12% (core analysis)
5. Net pay 38 ft

Production history

There are 58 producing Strawn wells in Lusk field covering a productive area of approximately 10,240 acres. From the present data, it appears that the outline of productive areal extent has been almost completed.

The original oil in place has been calculated at 50 million st tk bbl by volumetric calculations based on hydrocarbon pore volume.

The ultimate primary recovery of Lusk Strawn field is predicted to be 14.75 million st tk bbl of oil or 29.5% of the original oil in place.

The following chart shows the production history and development of the Lusk Strawn field by years.

Year	No. of prod. wells	Oil production Yearly	Oil production Cumulative	Gas production (Mcf) Yearly	Gas production (Mcf) Cumulative
1960	1	5,597	5,597	......	......
1961	3	123,672	129,269	78,286	78,286
1962	6	326,621	455,890	506,305	584,591
1963	15	1,305,361	1,761,251	2,601,032	3,185,623
1964	41	2,975,491	4,740,555	6,672,054	9,857,677
1965	58	4,830,845	9,571,400	12,056,649	21,914,326

The discovery well, El Paso Natural Gas Co. 1 Lusk Deep Unit, has produced 538,498 bbl of oil in 5 years and is currently producing 10,302 bbl of oil per month (338 bo/d flowing).

Completion practices

All the operators in the field have followed very similar completion procedures. The entire Strawn zone is usually penetrated, electrical and/or sonic logs are run and casing is set on bottom. Some wells have been drill-stem-tested before casing is set. These tests were usually run on wells drilled near the outer productive limits where the presence of porosity or the presence of water were questioned.

After casing is cemented, the productive zone is perforated in the zones of higher porosity. The wells usually flow naturally, however, stimulation with mud acid and/or regular acid up to 5,000 gal is used so allowable production can be maintained. To date, wells which were drilled near the edge of the porosity development and encountered low permeability have been stimulated with very little success.

In summary, Lusk Strawn field is a northwest-southeast trending anticlinal feature with an excess of 650 ft of relief. The producing zone is the Pennsylvanian lower Des Moines or Strawn limestone of upper Cherokee age. Production is from approximately 11,300 ft in depth. The productive rock is a biostromal type limestone with very local biohermal growths on the west and north flanks of the feature.

Porosity development in the productive zone is intercrystalline and vuggy and the producing area is indicated to be highly fractured. Fracturing in the reservoir is believed to have played an important role in creating effective porosity and permeability. On the east and south flanks of the fetaure, the productive perimeter is bound by an oil-water contact and on the north and west flanks, the productive area ends with the loss of porosity and permeability.

To Jan. 1, 1966, the field has produced 9,571,400 bbl of oil and 21,914,326 Mcf gas from 58 producing wells covering approximately 10,240 surface acres. There have been 17 dry holes drilled around the perimeter of the field.

Of the original 50 million st tk bbl of oil in place, the reservoir is crystalline limestone section thins slightly over the crest of the anticline.

Very localized biohermal reef occur on the west and north flanks of the anticline, Figs. 3, 4. These biohermal growths extend from the base of the Strawn to the top or near the top of the Strawn. There is no correlative log marker in the bioherm with the top of the adjacent biostrome.

This indicates continuous biohermal growth contemporaneous with the adjacent biostrome development. The continued upward growth of the bioherm adjacent to the lagoonal type stratigraphic sequence above the biostrome was due to local environmental continuity.

This local environmental continuity was probably due to local contemporaneous structural adjustment. Post Strawn structural movement and differential compaction increased the vertical relief of the Lusk feature to the present-day structure.

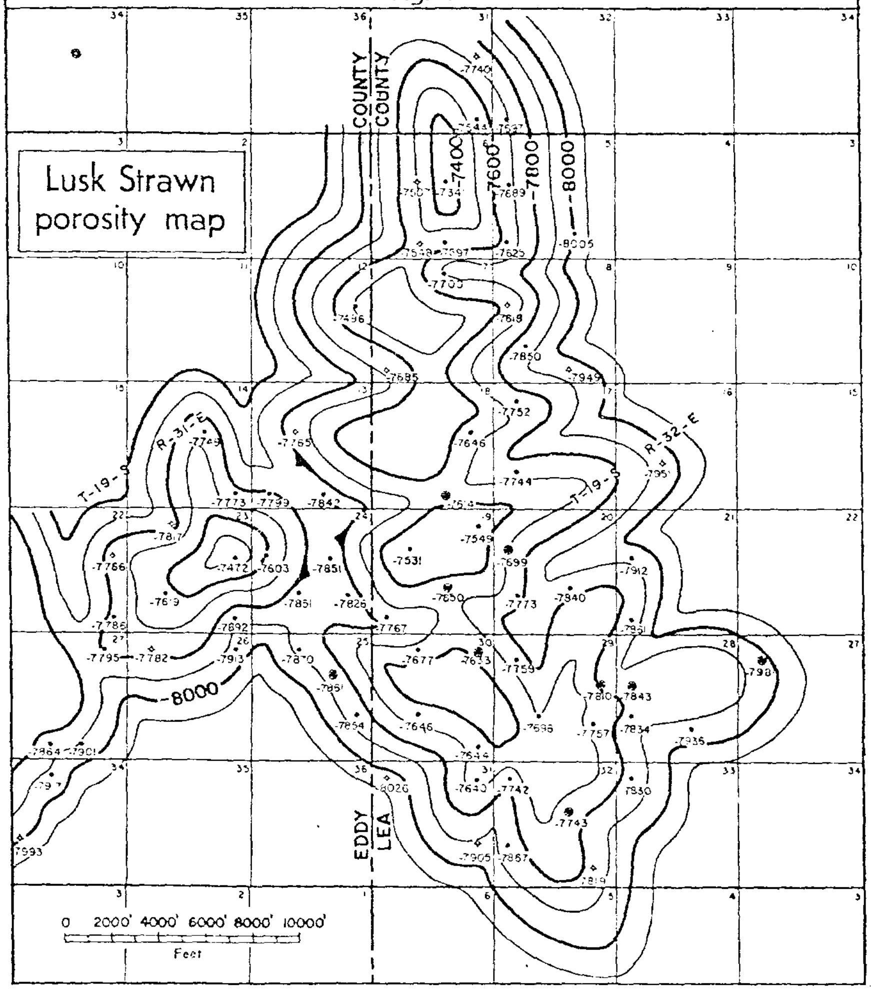
Very little primary porosity has been noted in samples; however, slabbed cores reveal some to be present. This primary porosity is preserved under algae blades. Secondary porosity in the form of vugs and small solution cavities is found in varying quantities throughout the productive area. This secondary porosity is always accompanied by a very effective fracture system. A few local areas have revealed filled fracture systems and a complete lack of porosity where there is an absence of effective fractures.

An example of the importance of the fracture system in this field is the Southern New Mexico Oil Corp. 8 Lusk Deep Unit, 24-19s-31e, Eddy County, which encountered virtually no porous rock. The gamma ray-sonic log indicated a total of only 10 ft of fracture porosity scattered throughout the entire biostrome section.

The fractured zone was perforated and a top allowable well was completed, indicating that fractures in the reservoir are very important in the development of permeability. A map reflecting the top of the Strawn porosity zone reveals the conformable relationship between structure and porosity, Figs. 2, 4.

A conformable relationship between structure and porosity exists (see Fig. 2).

Fig. 4



Microscopic examination of fresh samples is essential in identifying hydrocarbon "show." Only traces of very light oil stain and blue-yellow fluorescence is seen on fresh samples. These virtually disappear when the sample is dried.

An isopach of the gross porosity thickness (refer to Fig. 5) reveals a maximum of 272 ft of gross porosity in Tenneco 1 "E" Jones Federal, 23-19s-31e, Eddy County, where a gross 577 ft of bioherm reef section was encountered. This porosity isopach also reveals gross porosity thicknesses of from 4 to 73 ft across the biostromal portion of the field.

Porosity development has played an important role in defining the productive limits of the field. Outside of the productive limits on the north and west flanks of the feature, the biostrome development is present; but porosity and permeability are lacking.

Porosity and permeability changes have also affected the productive limits on the east, south, and southwest flanks of the field. These changes, probably due to localized porosity and permeability barriers, have caused three distinct oil-water contacts on these flanks. These oil-water contacts are found to be at datums of minus 7,950, 7,915, and 8,000 ft respectively.

These oil-water contacts were determined by drill-stem tests and production tests. Water enroachment limits production from several structurally low wells on the southwest and south flanks of the feature. Pumping equipment is neces-