STATE OF ILLINOIS

DEPARTMENT OF REGISTRATION AND EDUCATION

SILURIAN PINNACLE REEFS AND RELATED OIL PRODUCTION IN SOUTHERN ILLINOIS

H. M. Bristol

ILLINOIS PETROLEUM 102

ILLINOIS STATE GEOLOGICAL SURVEY

1974

URBANA, IL 61801

STATE OF ILLINOIS

DEPARTMENT OF REGISTRATION AND EDUCATION

BOARD OF NATURAL RESOURCES AND CONSERVATION

Hon. Ronald E. Stackler, J.D., Chairman

Laurence L. Sloss, Ph.D., Geology

H. S. Gutowsky, Ph.D., Chemistry

Robert H. Anderson, B.S., Engineering

Charles E. Olmsted, Ph.D., Forestry

Thomas Park, Ph.D., Biology

Dean William L. Everitt, E.E., Ph.D., D.Eng.,
University of Illinois

Elbert H. Hadley, Ph.D.,
Southern Illinois University

STATE GEOLOGICAL SURVEY

Jack A. Simon, M.S., Acting Chief

SILURIAN PINNACLE REEFS AND RELATED OIL PRODUCTION IN SOUTHERN ILLINOIS

H. M. BRISTOL

CONTENTS

TABLES

TEXT ILLUSTRATIONS

Figures 6 through 84 are pool study illustrations.

POOL STUDIES

(Table of contents continued)

SILURIAN PINNACLE REEFS AND RELATED OIL PRODUCTION IN SOUTHERN ILLINOIS

H. M. BRISTOL

ABSTRACT

Exploration for oil associated with Silurian reefs in Illinois began in 1946 when Marine field, an oil reservoir in Madison County, was identified by Lowenstam and DuBois as a Silurian reef. Since then, 28 Silurian pinnacle reefs have been discovered in Illinois. Oil or gas pools are associated with nearly all of these reefs—either in the reefs themselves or in domes of younger strata above the reefs.

By the end of 1972, approximately 83,652,118 barrels of oil had been produced from Silurian reefs and from reef-related structures in Illinois. Of this total, about 39,354,623 barrels came from the reefs and/or superjacent Devonian strata. The remainder came mainly from younger rocks of Mississippian and Pennsylvanian age.

This report includes structure maps showing the top of the Hunton Megagroup (Silurian-Devonian carbonates) for that part of southwestern Illinois in which known productive reefs occur and discussions of Marine and 26 Silurian pinnacle reefs and their related structures. Each of these discussions contains a Hunton structure map, a typical pool electric log, historical data, and oil production data; most of them include a structure map of a shallower Mississippian or Pennsylvanian unit. This information should be helpful in the search for oil.

INTRODUCTION

Oil from Silurian reefs has been sought after since 1946, when Lowenstam and DuBois (1946) ascertained that Marine field in Madison County produces oil from a Silurian reef. Since then, 28 Niagaran (Silurian) pinnacle reefs have been found in southern Illinois (fig. 1). Marine is included in the present discussion, although it is not now classified as a pinnacle reef but rather as a reef atoll.* Nearly all of the known pinnacle reefs have oil or gas associated with them.

This report presents some geological and statistical data about Marine and 26 Silurian pinnacle reefs in southern Illinois that should be helpful in the search for oil.

*It may be that Marine is a coalescence of small pinnacle reefs (personal communications, W. F. Meents, 1973).

PINNACLE REEFS

A pinnacle reef has been defined by Shouldice (1955) as an isolated biohermal "structure having a height of over 250 feet and a length of less than 2 miles." Since 1955 many geologists, in their studies of the reefs on the flanks of the Michigan Basin, have used the term "pinnacle reefs."

A Silurian pinnacle reef is defined here as an isolated biohermal structure of Silurian age (fig. 2) which is made up of carbonate rocks, has roughly the shape of a dome or a slightly elongated dome, is generally less than 2 miles long, and is constructed mainly of fossil organisms, dominantly algae, corals, and stromatoporoids. In southern Illinois these reefs have a vertical thickness of from 300 to 1,000 feet. Figure 3a is a structure map of a pinnacle reef (scale, 2 inches = 1 mile) showing 20-foot contours; 3b is a vertical cross-section of the reef, exaggerated 50 times.

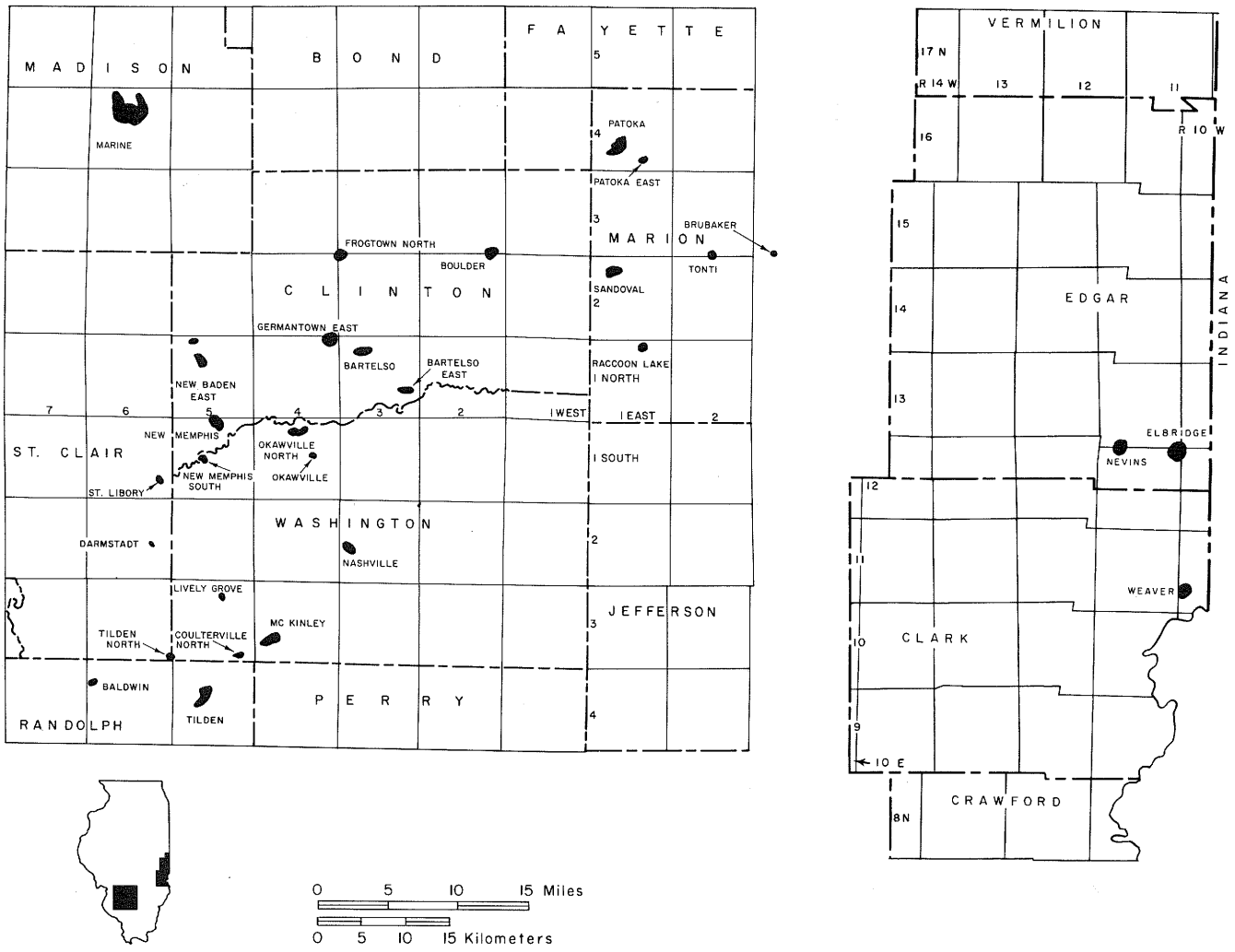


Fig. 1 - Silurian reefs in southern Illinois (modified from Meents, 1973).

Because pinnacle reefs often extended above wave base, their growing tops were subjected to erosion; portions broke off from time to time and rolled down the reef slopes, in some places forming a marginal belt of reef wash. The high-energy environment at the top of a reef tended to winnow out the silt and clay; thus the reef core itself remained a rather pure carbonate. However, many cracks and crevices were later filled with Middle to Upper Devonian sands and clays. The interreef rock is more uniformly silty and less fossiliferous than the pure carbonate of the reef.

Many pinnacle reefs are still capped by Devonian carbonates that have been left draped over the reefs. These draped Devonian carbonates often contain most, if not all, of the oil found in association with the Silurian pinnacle reefs. Some good examples occur at the Patoka, Sandoval, and Weaver fields, where all of the oil is in the Devonian. Flanking beds of Silurian or Devonian age have been known to contain pockets of trapped oil, as at New Memphis and Boulder.

For all of these modes of entrapment associated with a Silurian pinnacle reef, a caprock seems to be required. Impermeable shale of the New Albany Group serves as the major caprock of the Devonian and Silurian reservoirs.

A selected bibliography on reefs is given on pages 97 and 98.

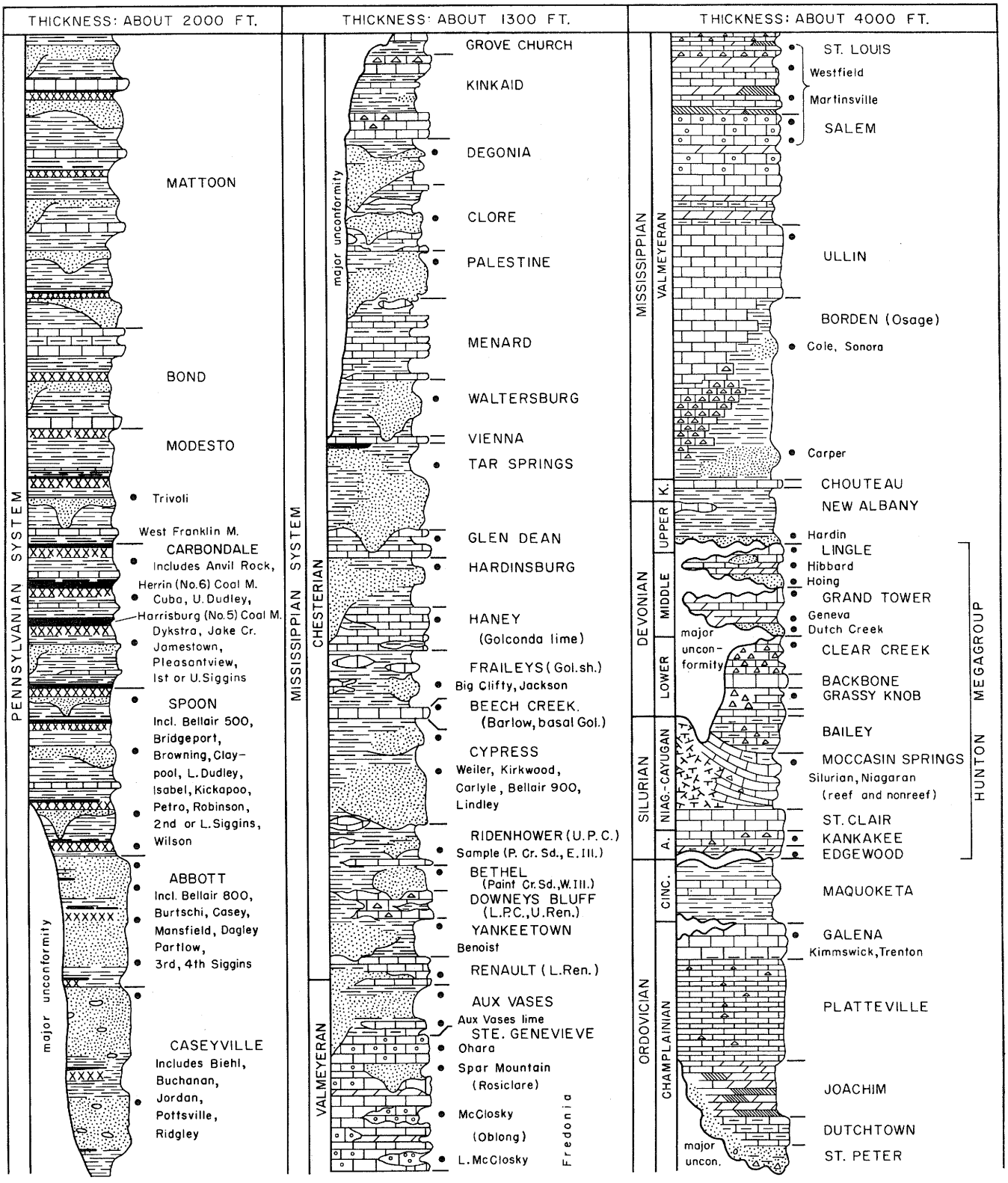


Fig. 2 - Generalized geologic column of southern Illinois. Black dots indicate oil and gas pay zones. Formation names are in capital letters. About 4,000 feet of lower Ordovician and upper Cambrian rocks under the St. Peter are not shown. Series abbreviations: K. - Kinderhookian; Niag. - Niagaran; A. - Alexandrian; Cinc. - Cincinnatian. Variable vertical scale. (Originally prepared by David H. Swann; modified from Van Den Berg and Lawry, 1973.)

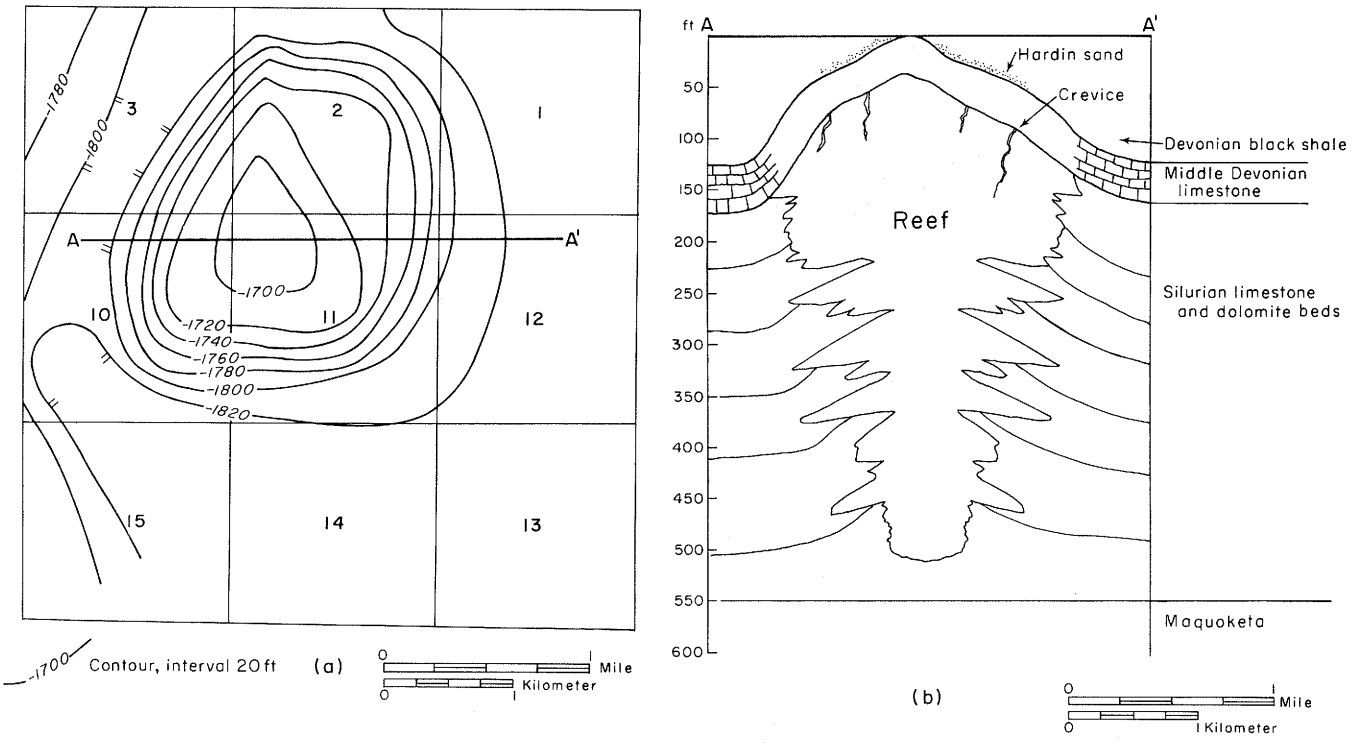


Fig. 3 - Structure map (a) of a typical pinnacle reef contoured on the top of the Hunton and a cross-section (b) of the reef (vertical x50).

Potential Area of Silurian Pinnacle Reef Oil Exploration

Not all of the Silurian pinnacle reefs in Illinois have been found; however, much of Illinois is unsuitable for reef oil exploration because: (1) in large areas of Illinois there are no Niagaran Silurian rocks—since Marine and all of the known Silurian pinnacle reefs in southern Illinois are in the Niagaran Series, new reef discoveries are not expected in areas where Niagaran rocks are absent; (2) in some areas there is less than 200 feet of Niagaran rocks (200 feet is the minimum thought necessary for commercial-oil-bearing reefs); (3) in some areas the Niagaran is exposed at the surface and the oil is thought to have escaped; and (4) in extreme southeastern Illinois, south of the Shawneetown Fault, lies a large area considered unfavorable because of extensive faulting and mineralization (fig. 4).

Despite these exceptions, there remains a very large part of Illinois in which oil-bearing reefs could be found (fig. 4); southern Illinois is especially favorable.

Geologic Structure and Oil Production of Silurian Pinnacle Reef Pools

Structure on the top of the Hunton Megagroup (Devonian-Silurian carbonates) in the area of known pinnacle reefs in southwestern Illinois is shown in figure 5. The areas outlined by boxes include and surround known reefs. These reef areas are treated individually in detail in pool studies (p. 9 - 96); thus most of the holes in these boxed areas have been deleted on the regional structure map (fig. 5).

The pool studies in this report describe oil and/or gas fields and gas storage fields associated with Silurian pinnacle reefs. Included are historical data, land-ownership data at the time of development, a structure map of the top of the Hunton, and, for most fields, a structure map of an overlying Mississippian or Pennsylvanian unit.

Table 1 contains descriptive material and production statistics on 26 reef-associated oil fields in southern Illinois through 1972.*

*Three new reefs, Darmstadt, Nashville, and Brubaker, have not been included in table 1 because they did not produce until after 1972. Of the three, only Nashville is included in the pool studies; sufficient information was not available for the others.

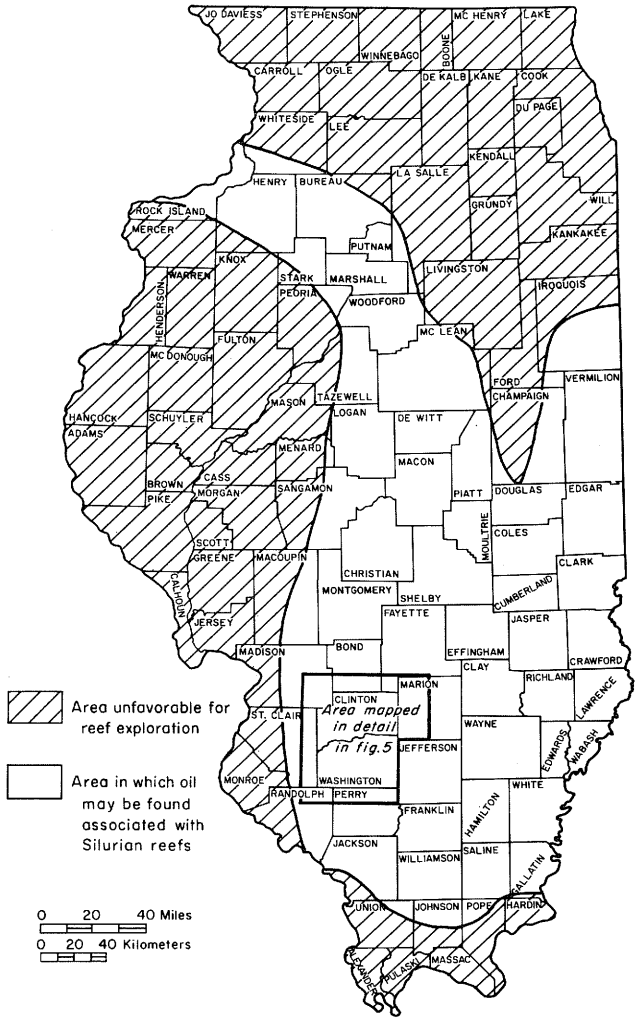


Fig. 4 - Map showing area of potential Silurian-reef-associated oil.

It shows that by the end of 1972 approximately 83,652,118 barrels of oil had been produced from reefs and from domes of younger strata overlying reefs. Of this total, 39,354,623 barrels came from the reefs themselves and from superjacent Devonian strata; the remaining 44,297,495 barrels were produced mainly from overlying younger strata.

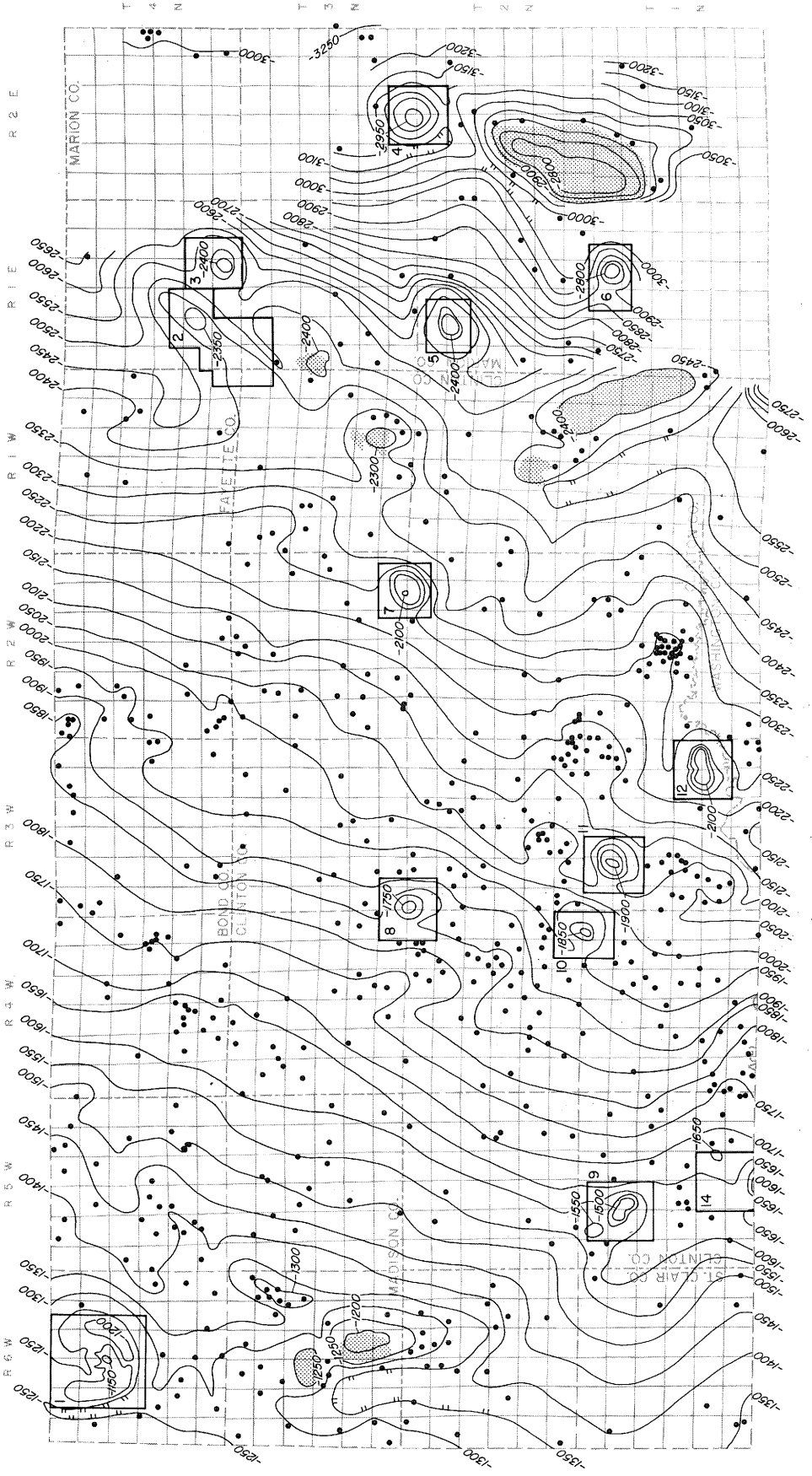
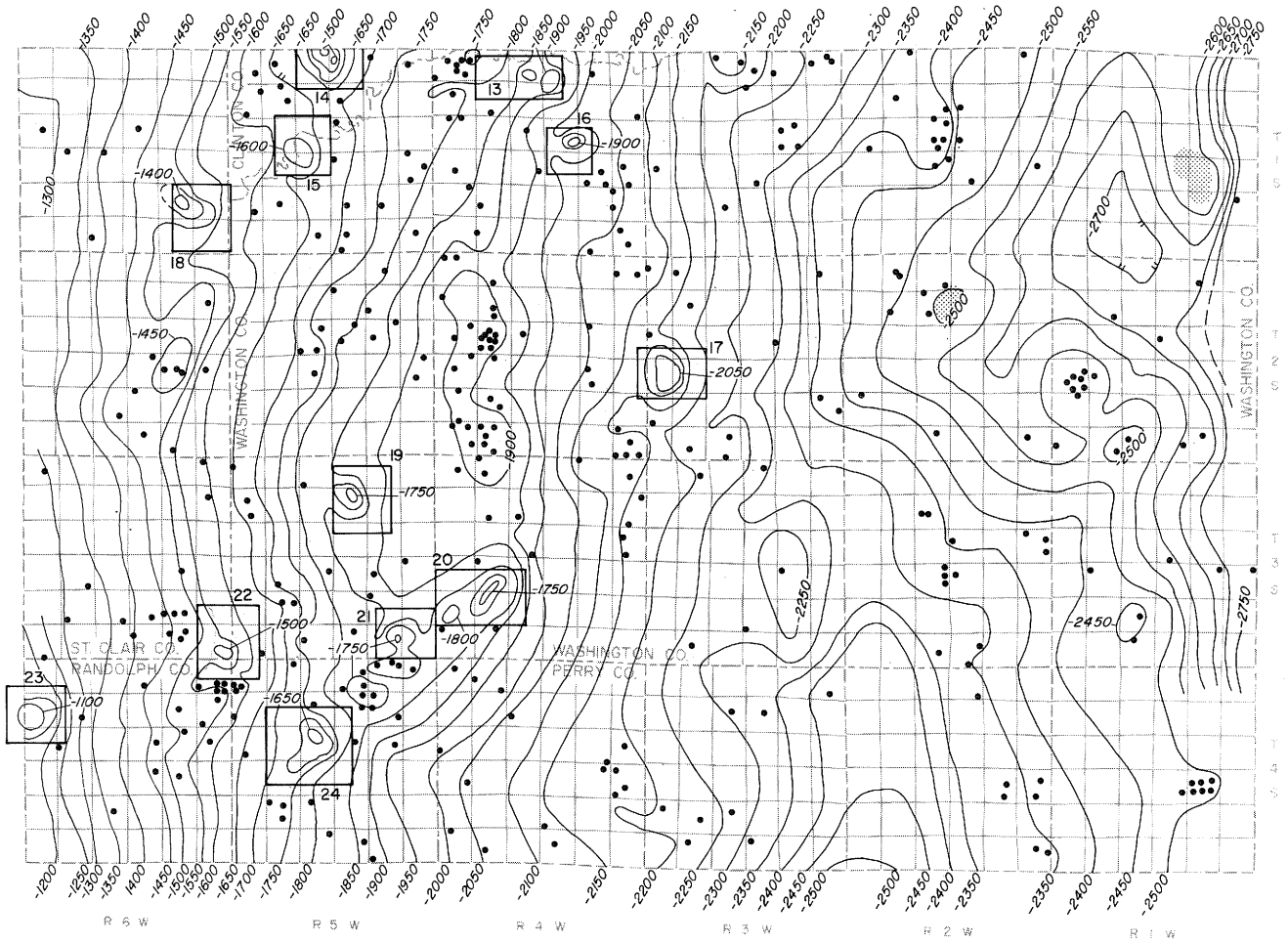

T 4 N
T 3 N
T 2 N
R 2 E
R 1 E
R 1 W
R 2 W
R 3 W
R 4 W
R 5 W
R 6 W
MARION CO.
FAYETTE CO.
BOND CO.
CLINTON CO.
WASHINGTON CO.
ST. CLAIR CO.
-3250
-3200
-3150
-3100
-3050
-3000
-2950
-2900
-2850
-2800
-2750
-2700
-2650
-2600
-2550
-2500
-2450
-2400
-2350
-2300
-2250
-2200
-2150
-2100
-2050
-2000
-1950
-1900
-1850
-1800
-1750
-1700
-1650
-1600
-1550
-1500
-1450
-1400
-1350
-1300
-1250
-1200
1
2
3
4
5
6
7
8
9
10
11
12
14

Figure 5



- Devonian or deeper test
- Area of intensive Devonian or deeper tests
- 10 — Area of pool study (see key)
- Contour interval 50 ft

KEY TO SILURIAN REEF POOL STUDIES

No. on this map	Pool	Pool study no.
1	Marine	10
2	Patoka	19
3	Patoka East	20
4	Tonti	26
5	Sandoval	23
6	Raccoon Lake	21
7	Boulder	4
8	Frogtown North	7
9	New Baden East	14
10	Germantown East	8
11	Bartelso	2
12	Bartelso East	3
13	Okawville North Consol.	18
14	New Memphis	15
15	New Memphis South	16
16	Okawville	17
17	Nashville	12
18	St. Libory	22
19	Lively Grove	9
20	McKinley	11
21	Coulterville North	5
22	Tilden North	25
23	Baldwin	1
24	Tilden	24

Elbridge, Nevins, and Weaver pools are not shown on this map because they are east of the mapped area. See figure 1.

Fig. 5 - Structure of the top of the Hunton. Boxed areas are treated in detail in pool studies.

TABLE 1 - DATA ON SILURIAN REEFS IN SOUTHERN ILLINOIS

Name of field	Size of field (acres)	Approximate productive acreage of Hunton*	Number of Hunton oil wells	Producing strata	Discovery year	Barrels of Hunton oil produced to 12-31-72	Barrels of non-Hunton oil produced to 12-31-72
Baldwin	80	50	3	Silurian reef	1954	10,399	0
Bartelso	580	400	37	Silurian reef Chesterian	1939 1936	1,000,000†	2,992,967
Bartelso East	280	280	18	Devonian, Silurian reef	1950	887,291	0
Boulder	580	580	22	Devonian, Silurian reef Chesterian	1943 1941	4,500,000†	3,619,630
Coulterville North	40	40	6	Silurian reef	1958	32,355	0
Elbridge	430	20	2	Mississippian, Pennsylvanian	1949	0	1,498,385
Frogtown North	580	580	31	Silurian reef, Devonian, Mississippian	1951	1,915,555†	136,000
Germantown East	540	540	27	Silurian reef	1956	1,893,964	0
Lively Grove	240?	0	0	None	1954	0	0
Marine	2,440	2,440	147	Silurian reef	1943	11,774,775	0
McKinley	250	190	10	Devonian, Silurian reef Chesterian	1948 1940	242,000†	518,726
Nevins	1,320	0	0	Gas storage in Devonian	1950	0	0
New Baden East	290	290	17	Silurian reef	1958	203,277	0
New Memphis	780	780	37	Silurian reef	1951	2,336,219	0
New Memphis South	40	40	2	None	1952	743	0
Okawville	60	60	4	Silurian reef	1951	63,634	0
Okawville North Consol.	210	210	12	Silurian reef, flank Silurian	1955	122,981	0
Patoka	1,140	120	4	Devonian Mississippian Ordovician	1943 1937 1956	280,000†	14,208,751
Patoka East	500	80	4	Devonian Chesterian	1952 1941	400,000†	4,983,787
Raccoon Lake	380	230	16	Devonian, Silurian reef Mississippian	1951 1949	1,700,000†	1,655,685
St. Libory	300?	0	0	Gas in Silurian	1963	0	0
Sandoval	500	280	33	Devonian Chesterian	1938 1908	3,000,000†	3,093,860
Tilden	610	610	29	Silurian reef	1952	4,198,481	0
Tilden North	180	180	14	Silurian reef	1968	551,805	0
Tonti	570	80?	7	Devonian Mississippian	1940 1939	2,000,000†	11,560,704
Weaver	500	500	44	Devonian Mississippian	1949 1949	2,241,144†	29,000
					TOTAL	39,354,623	44,297,495
					GRAND TOTAL	83,652,118	

* Hunton - top of Devonian-Silurian carbonates.

† Where there is production from both Hunton and non-Hunton fields, the production from each has been estimated as closely as possible.

POOL STUDIES

Information about Silurian pinnacle reefs for these pool studies has been gathered from various sources. Detailed structure maps of fields include the location of wells, and property ownership if that information is available. Lease names, on Survey-originated maps, are those used by the original operators when the wells were first drilled. Subsequent operators and landowners have usually made changes in lease names.

The following abbreviations are used in the pool studies: API - American Petroleum Institute; BO - barrels of oil; BW - barrels of water; BHP - bottom-hole pressure; BOPD - barrels of oil pumped per day; cP - centipoise; D&A - dry and abandoned; DF - derrick floor elevation; DST - drill-stem test; frac. - hydraulic fracturing; KB - Kelly bushing elevation; MCA - mud-cut acid; SWD - salt-water disposal well; TD - total depth.

Pool Study 1

BALDWIN FIELD
Randolph County

EXPLORATION METHOD LEADING TO DISCOVERY Subsurface structural mapping on Herrin (No. 6) Coal Member (Pennsylvanian). (Actually Herrin Coal is missing over the top of the field.)

STATUS OF FIELD Producing, but with very irregular oil runs (1972).

DISCOVERY WELL
- NAME Jet Oil Co. No. 2 Rogers
- LOCATION 7-4S-6W, NE-NE-SW
- COMPLETION DATE September 24, 1953. Data released and reported early in 1954.
- ELEVATION 482 ft
- CASING 5-in. to 1,537 ft
- TREATMENT Acidized with 6,000 gal
- TOTAL DEPTH 1,850 ft, plugged back to 1,723 ft
- INITIAL PRODUCTION 4 BO/1 BW per day. No production reported until 1955.

PRODUCING STRATA Silurian reef

DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton) to 2,225 ft TD in the Jet Oil Co. No. 1 Guiebert, 7-4S-6W

KIND OF TRAP Stratigraphic - a Silurian reef

PRODUCTIVE AREA
- PROVED 50 acres
- PROBABLE 80 acres
- APPROVED SPACING 20 acres
- NUMBER OF WELLS THAT PRODUCED 3
- NUMBER OF DRY HOLES At least 6 dry holes were drilled around the stratigraphic trap.

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK One well tested all oil from top 187 ft of reef.

CHARACTER OF OIL 32.1° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	7.51	11.22	49.56

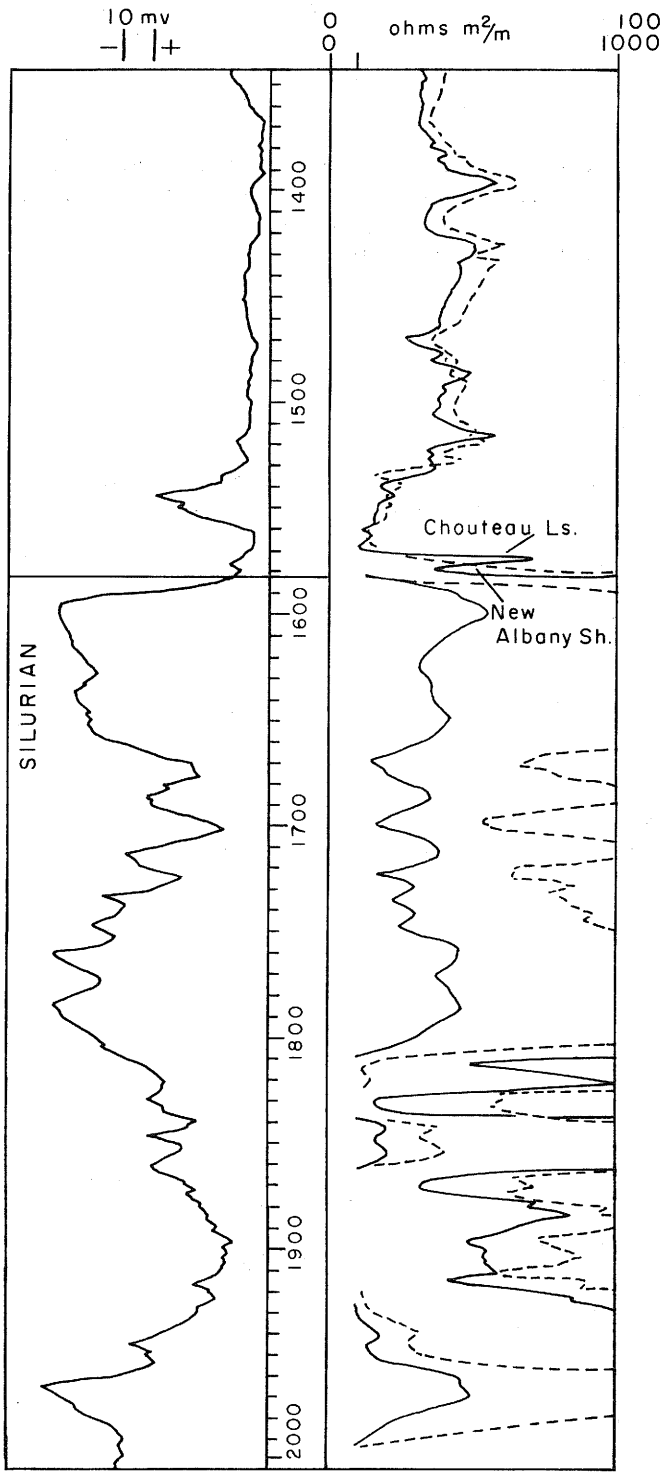
INITIAL FIELD PRESSURE 400 lb BHP (highest observed)

COMPLETION PRACTICES Setting pipe on top of pay and acidizing

MARKET FOR OIL Ashland Oil, Inc.

See figures 6, 7, and 8.

Electric Log
Jet Oil Co. No. 1 W. Patterson
SW-SW-NE 7-4S-6W, Randolph County
El. 476 ft



BALDWIN FIELD

Oil Production, bbl

Year	Annual	Cumulative
1954	——	——
1955	3,499	3,499
1956	1,151	4,650
1957	727	5,377
1958	455	5,832
1959	695	6,527
1960	563	7,090
1961	478	7,568
1962	728	8,296
1963	296	8,592
1964	350	8,942
1965	304	9,246
1966	——	9,246
1967	251	9,497
1968	258	9,755
1969	——	9,755
1970	344	10,099
1971	300	10,399
1972	——	10,399

Fig. 6 - Oil production from the Baldwin field and a portion of a geophysical log from the Baldwin reef.

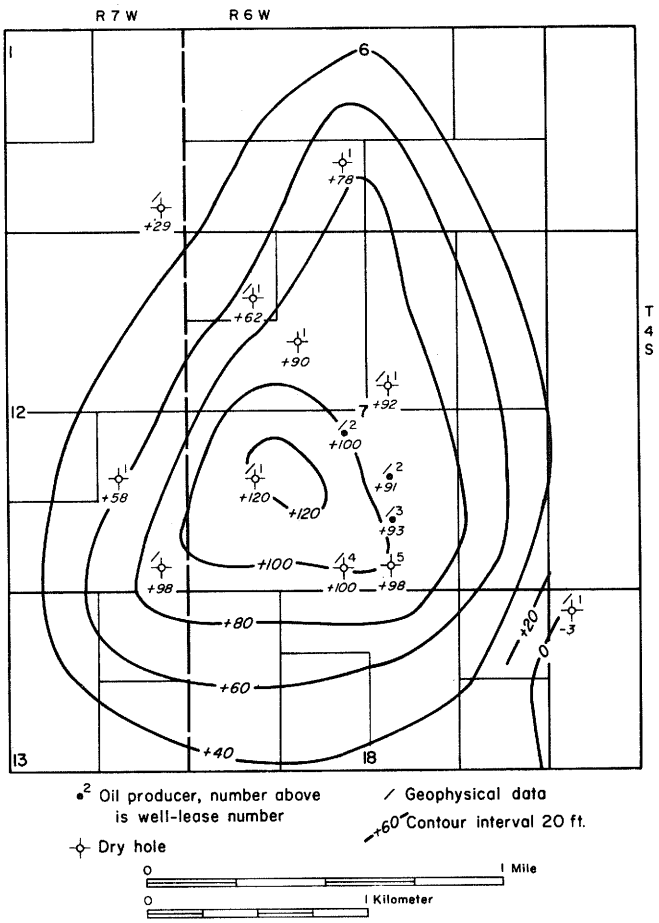


Fig. 7 - Structure map of the Baldwin field drawn on the base of the Beech Creek Limestone (Mississippian).

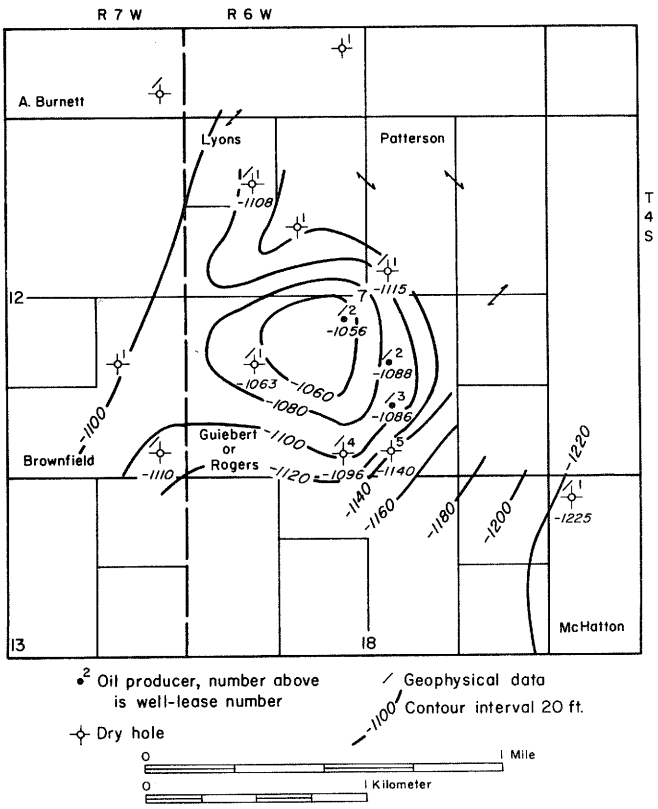


Fig. 8 - Structure map of the Baldwin field drawn on the top of the Silurian.

Pool Study 2

BARTELSO FIELD
Clinton County

EXPLORATION METHOD LEADING TO DISCOVERY Subsurface mapping. Structure originally found on a shallow high on Herrin (No. 6) Coal Member; reef found by drilling deeper on the known shallow high.

STATUS OF FIELD Shallow Cypress (Mississippian) pool now being produced by secondary recovery methods. Silurian apparently depleted.

DISCOVERY WELLS	Field Discovery	Reef Discovery
NAME	Bartelso Oil & Gas No. 1 Trame	Mosebach No. 1 Robben
LOCATION	8-1N-3W, N½-SE-NW	5-1N-3W, SE-SW-SE
COMPLETION DATE	April 20, 1936 in Cypress	December 1939
ELEVATION	488 ft	472 ft
CASING	6 5/8-in. to 1,014 ft	6-in. at 2,413 ft
TOTAL DEPTH	1,037 ft	2,431 ft
TREATMENT	Shot with 20 qt of nitroglycerin	Acidized with 500 gal
INITIAL PRODUCTION	115 BOPD	162 BOPD

PRODUCING STRATA Cypress and Silurian reef

DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton) TD 3,744 ft in 5-1N-3W

KIND OF TRAP Structural - Cypress; stratigraphic - a Silurian reef. West dome has Silurian dolomite wedges interfingering into the reef flank. East dome is an ordinary Silurian reef.

PRODUCTIVE AREA (Reef only)
- PROVED 400 acres
- PROBABLE 480 acres
- APPROVED SPACING 10 acres
- NUMBER OF WELLS THAT PRODUCED 37
- NUMBER OF DRY HOLES 8 drilled around edge of reef

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Reef of rather pure limestone at least 300 ft thick. Edges have some productive dolomite wedges.

CHARACTER OF OIL

1940 41.5° API gravity

1960 40.2° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	2.55	3.32	5.14

INITIAL POOL PRESSURE Not known, but a few of the wells flowed for a short time.

MARKET FOR OIL Marathon Oil Co. and Ashland Oil, Inc.

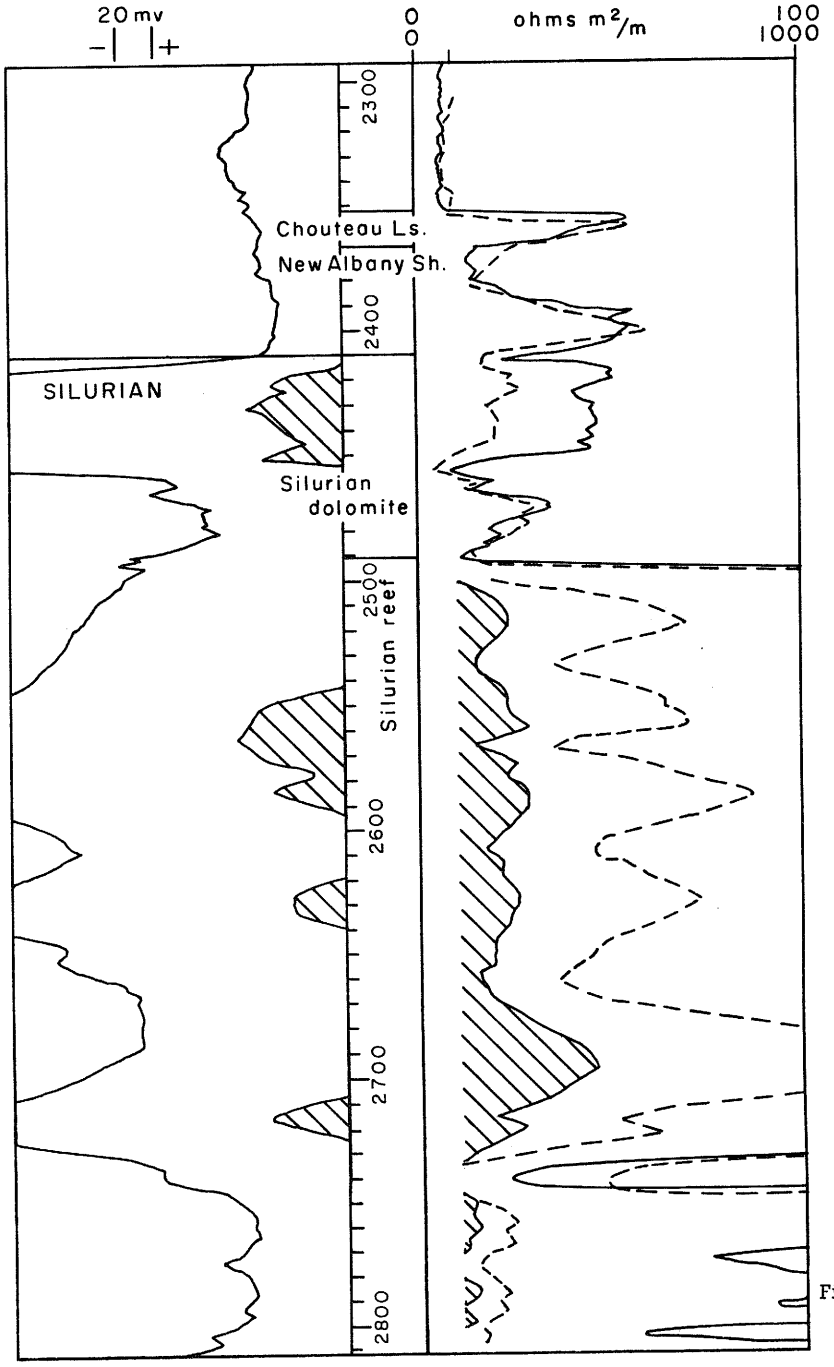
REFERENCES AND NOTES

Carlton, J. L., 1940, The geology of the Bartelso Oil Field, Clinton County, Illinois: M.S. thesis, Univ. Chicago, 58 p.

Payne, J. N., (contrib. by A. H. Bell), 1941, Structure of Herrin (No. 6) Coal bed in Madison County and western Bond, western Clinton, southern Macoupin, southwestern Montgomery, northern St. Clair and northwestern Washington Counties, Illinois: Illinois Geol. Survey Circ. 71, 21 p.

The upper portion of the Hunton rock above reef-type rock was originally called Devonian but is now known to be Silurian.

See figures 9, 10, and 11.



BARTELSO FIELD

Year	Oil production, bbl Annual	Oil production, bbl Cumulative	Silurian production, bbl Annual	Silurian production, bbl Cumulative
1936	40,700	40,700		
1937	51,000	91,700		
1938	161,870	253,570		
1939	110,000	363,570	3,000	3,000
1940	378,000	741,570	211,000	214,000
1941	278,000	1,019,570	129,000	343,000
1942	185,000	1,204,570	80,000	423,000
1943	154,000	1,358,570	75,000	498,000
1944	123,000	1,481,570	68,000	566,000
1945	117,000	1,598,570	67,000	633,000
1946	102,000	1,700,570	60,000	693,000
1947	90,000	1,790,570	60,000	753,000
1948	83,000	1,873,570	53,000	806,000
1949	75,000	1,948,570	50,000	856,000
1950	71,000	2,019,570	45,000	901,000
1951	66,000	2,085,570	42,000	943,000
1952	79,000	2,164,570		
1953	97,000	2,261,570*		
1954	89,000	2,350,570		
1955	468,000	2,818,570†		
1956	356,000	3,174,570		
1957	251,000	3,425,570		
1958	87,000	3,512,570		
1959	76,000	3,588,570		
1960	68,000	3,656,570		
1961	60,946	3,717,516		
1962	52,745	3,770,261		
1963	41,542	3,811,803		
1964	35,896	3,847,699		
1965	29,186	3,876,885		
1966	26,605	3,903,490		
1967	21,382	3,924,872		
1968	22,684	3,947,556		
1969	20,974	3,968,530		
1970	14,837	3,983,367		
1971	6,000	3,989,367		
1972	3,600	3,992,967		

*Pilot flood begun.

†Cypress waterflood.

Fig. 9 - Oil production from the Bartelso field and a portion of a geophysical log from the Bartelso reef.

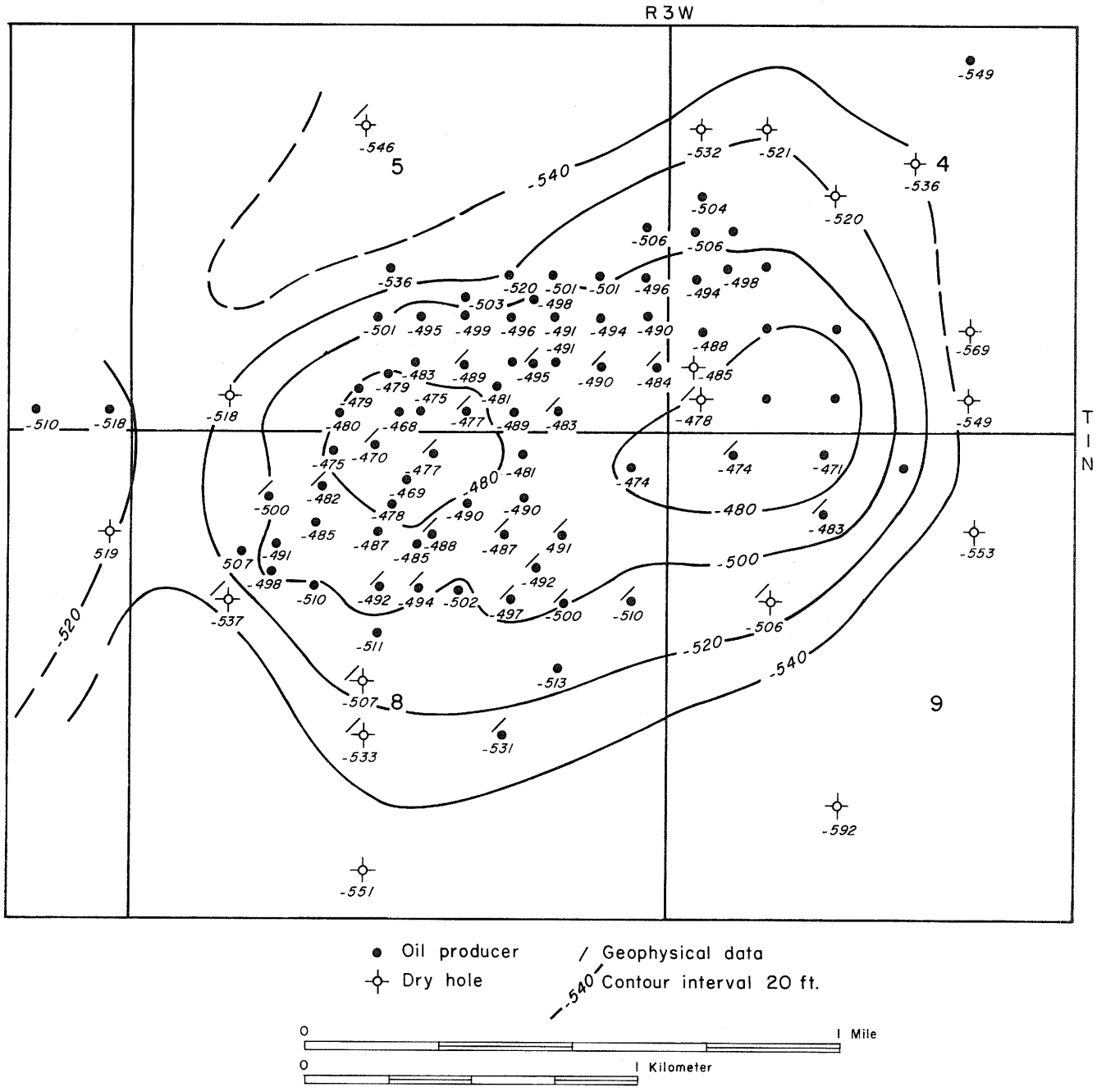


Fig. 10 - Structure map of the Bartelso field drawn on the base of the Beech Creek Limestone (Mississippian).

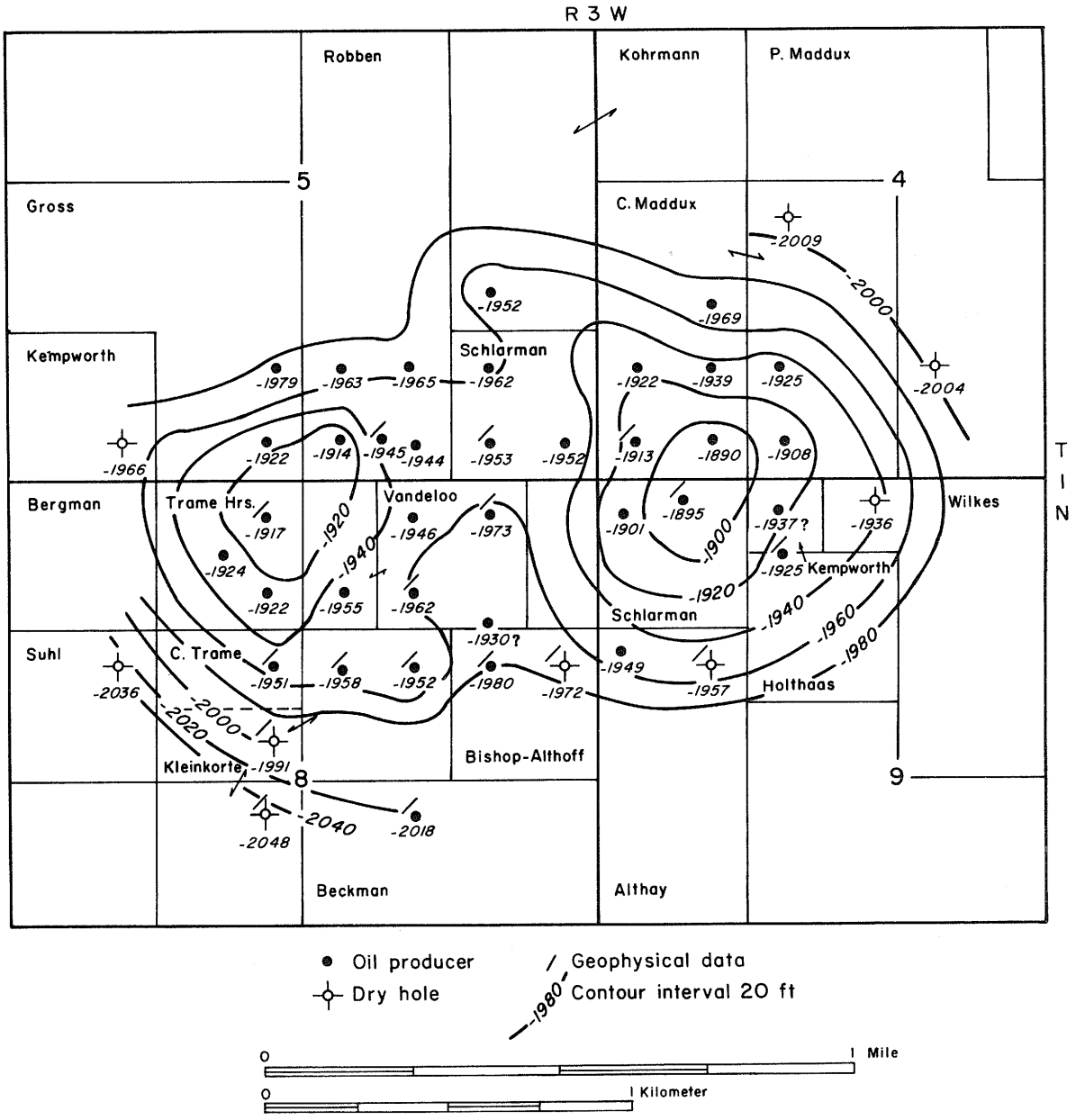


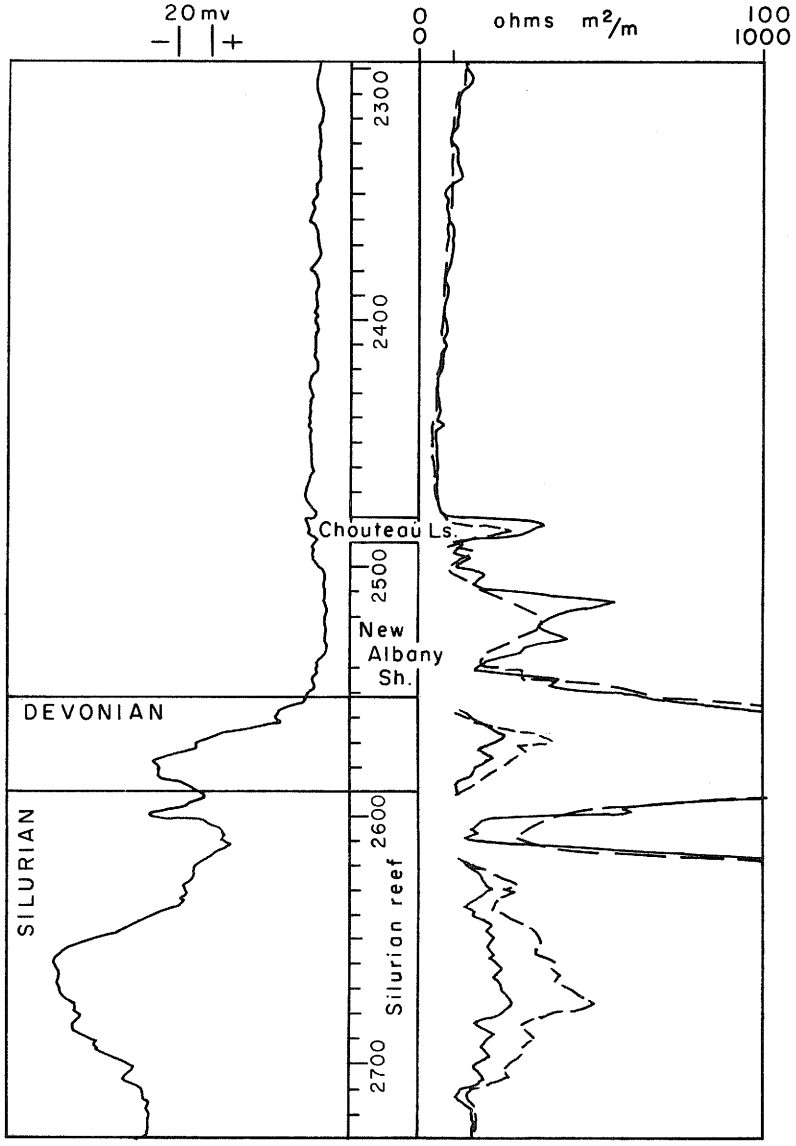
Fig. 11 - Structure map of the Bartelso field drawn on the top of the Silurian.

Pool Study 3

BARTELSO EAST FIELD
Clinton County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Producing

DISCOVERY WELL
NAME Paul Doran (Deep Rock) No. 1 Johnpeter
LOCATION 23-1N-3W, NE-SW-SE
COMPLETION DATE September 5, 1950
ELEVATION 446 ft
CASING $5\frac{1}{2}$-in. to 2,550 ft
TREATMENT 2 acidizing treatments, first with 500 gal, second with 3,000 gal
TOTAL DEPTH 2,564 ft
INITIAL PRODUCTION 99 BOPD



Electric Log
Deep Rock No. 4 Johnpeter
SE-SE-SE 23-1N-3W, Clinton County
El. 445 ft

BARTELSO EAST FIELD
Oil Production, bbl

Year	Annual	Cumulative
1950	3,120	3,120
1951	32,962	36,082
1952	67,239	103,321
1953	26,386	129,707
1954	22,584	152,291
1955	198,591	350,882
1956	91,214	442,096
1957	66,228	508,324
1958	50,986	559,310
1959	43,429	602,739
1960	38,409	641,148
1961	33,262	674,410
1962	30,136	704,546
1963	26,814	731,360
1964	26,993	758,353
1965	23,738	782,091
1966	19,143	801,234
1967	16,690	817,924
1968	17,653	835,577
1969	13,147	848,724
1970	13,223	861,947
1971	12,900	874,847
1972	12,444	887,291

Fig. 12 - Oil production from the Bartelso East field and a portion of a geophysical log from the Bartelso East reef.

PRODUCING STRATA Silurian reef and some oil from Devonian carbonate
DEEPEST STRATIGRAPHIC UNIT PENETRATED Silurian
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA
PROVED 280 acres
PROBABLE 280 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 17
NUMBER OF DRY HOLES 16 wells drilled off edge of reef
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK About 100 ft of oil-bearing limestone reef rock
CHARACTER OF OIL 40.0° API gravity; viscosity 36 cP at 100° F.
INITIAL FIELD PRESSURE Maximum recorded on a DST was 275 lb; some wells flowed.
COMPLETION PRACTICES Pipe set through pay section and perforated, and well then acidized.
MARKET FOR OIL Sohio Petroleum Co. and Ashland Oil, Inc.
NOTES There is approximately 25 ft of Lingle Limestone (Devonian) on top of the reef.

See figures 12, 13, and 14.

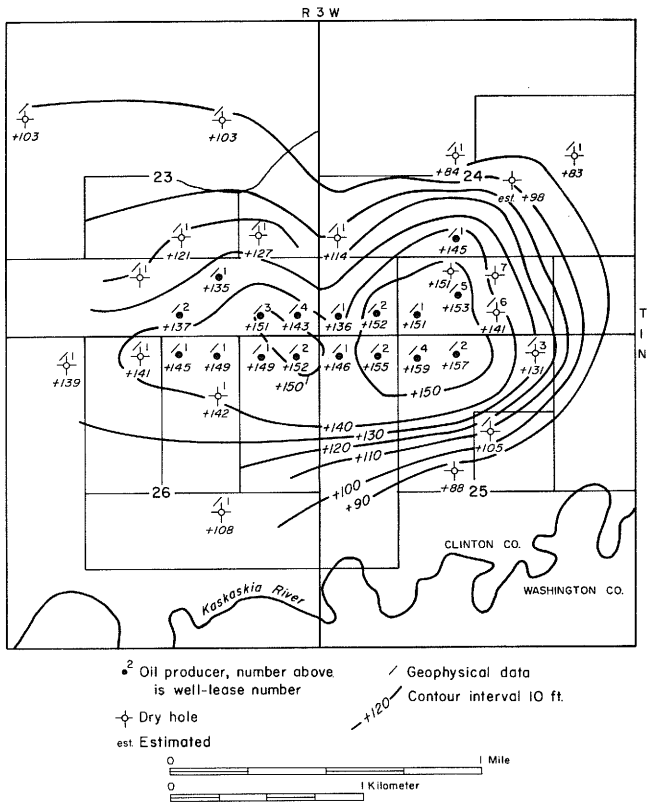


Fig. 13 - Structure map of the Bartelso East field drawn on the top of the West Franklin Limestone Member (Pennsylvanian).

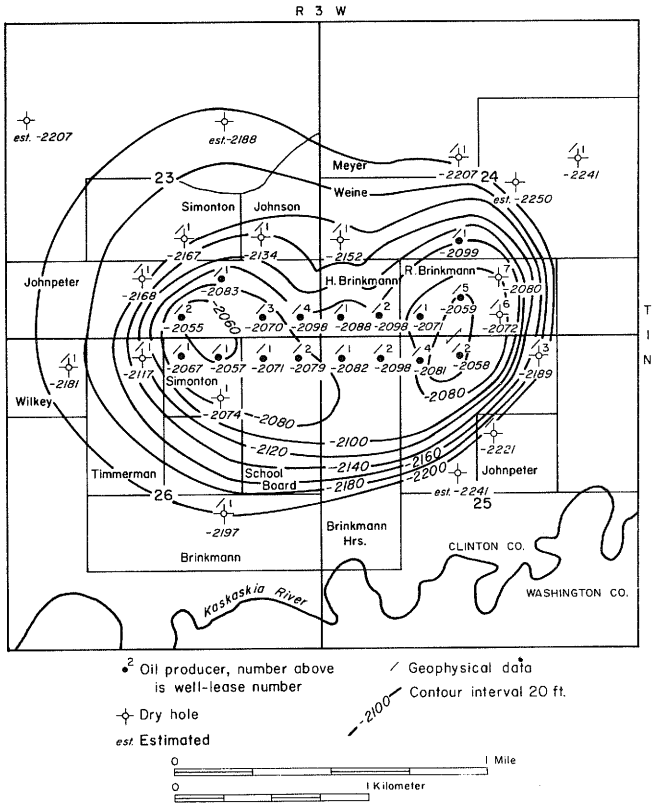


Fig. 14 - Structure map of the Bartelso East field drawn on the top of the Hunton Megagroup.

Pool Study 4

BOULDER FIELD
Clinton County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Abandoned because of flooding by Lake Carlyle

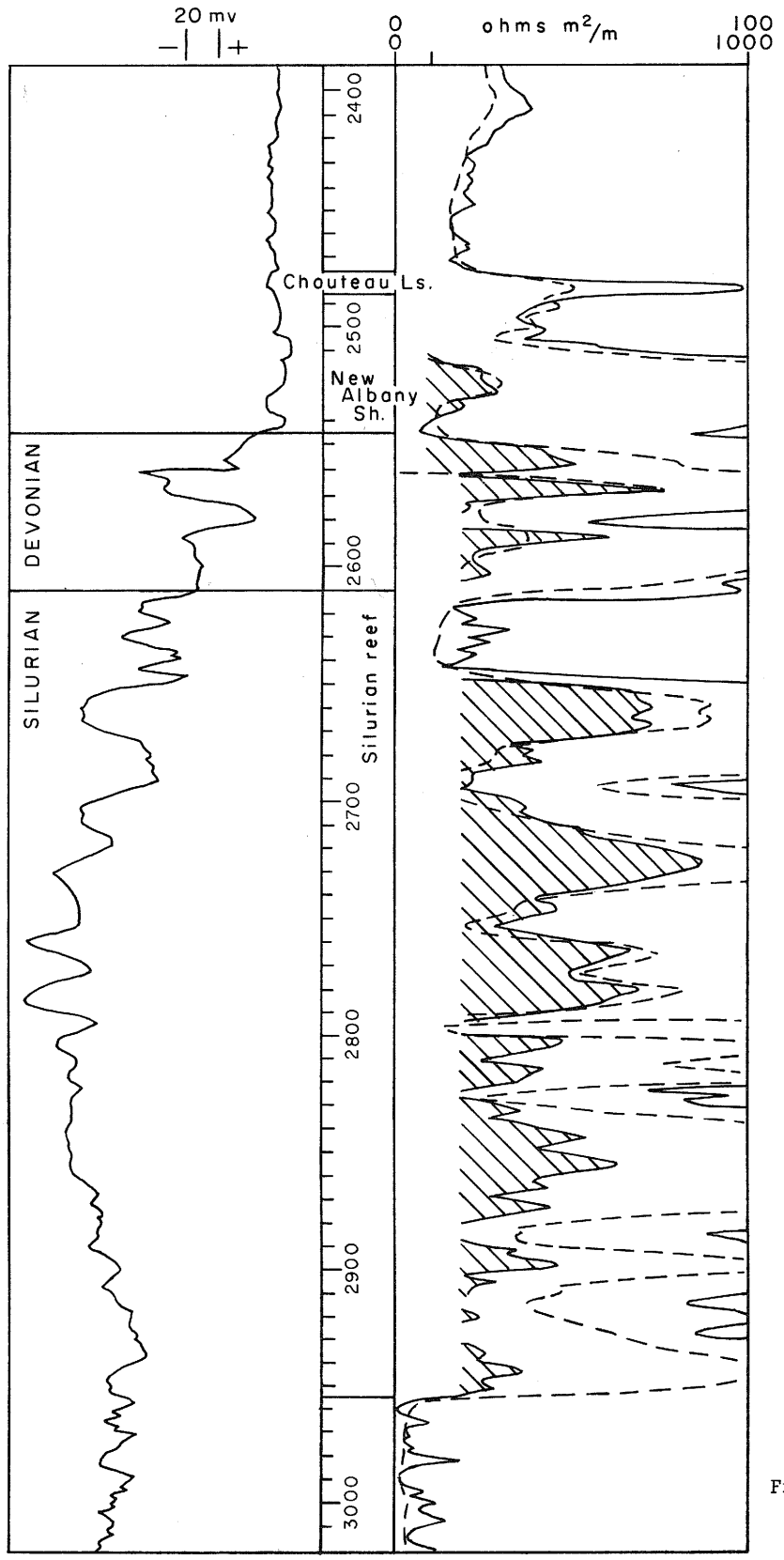
DISCOVERY WELL
NAME Texas No. 1 P. Gray
LOCATION 990 ft N.L., 660 ft W.L., 35-3N-2W, NW-SE
COMPLETION DATE September 1941
ELEVATION 428 ft
CASING 7-in. to 2,682 ft
TREATMENT Pipe set through pay and perforated
TOTAL DEPTH 2,684 ft
INITIAL PRODUCTION 17,500,000 cu ft of gas per day. Flowed oil, then went to dry gas.

PRODUCING STRATA Yankeetown ("Benoist") (Mississippian); Devonian; Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena, 35-3N-2W Texas No. 1 Defend-Gray Community
KIND OF TRAP Stratigraphic - Devonian draped over a Silurian reef, and the Silurian reef itself. "Benoist" sand is draped over the reef at a depth of about 1,150 ft.
PRODUCTIVE AREA (Reef only)
PROVED 580 acres
PROBABLE 580 acres
APPROVED SPACING 10 acres sand, 20 acres limestone
NUMBER OF WELLS THAT PRODUCED 22
NUMBER OF DRY HOLES 10 plus 2 SWD wells
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Geneva Member (Devonian) - dolomite 7 to 20 ft thick. Silurian - unknown.
CHARACTER OF OIL "Benoist" - 37° API gravity; viscosity 5.99 cP at 77° F.
Silurian reef - 27.3° API gravity; viscosity 24.29 cP at 77° F.
INITIAL FIELD PRESSURE Reef - 1,000 psi
COMPLETION PRACTICES Devonian-Silurian wells were either open-hole or perforated casing completions. Most holes were acidized at one time or another.
MARKET FOR OIL Field abandoned
REFERENCES AND NOTES

Stevenson, D. L., 1968, Boulder field, Clinton County, Illinois, in Geology and petroleum production of the Illinois Basin: a symposium: Evansville, Indiana: Illinois and Indiana-Kentucky Geological Societies, p. 71-76.

This field was plugged when it was making about 1,400 BOPD because it was in the area of the Carlyle Reservoir.

See figures 15, 16, and 17.



Electric Log
Texas No. 1 Defend-Gray Comm.
Cen. SE-SW 35-3N-2W
Clinton County
El. 434 ft

BOULDER FIELD
Oil Production, bbl

Year	Annual	Cumulative
1941	——	——
1942	374,701	374,701
1943	626,597	1,001,298
1944	535,062	1,536,360
1945	504,982	2,041,342
1946	484,224	2,525,566
1947	429,373	2,954,939
1948	373,454	3,328,393
1949	343,706	3,672,099
1950	308,215	3,980,314
1951	281,575	4,261,889
1952	255,978	4,517,867
1953	242,665	4,760,532
1954	434,659	5,195,191
1955	444,373	5,639,564
1956	365,502	6,005,066
1957	311,298	6,316,364
1958	266,670	6,583,034
1959	215,348	6,798,382
1960	189,558	6,987,940
1961	202,167	7,190,107
1962	141,061	7,331,168
1963	404,663	7,735,831
1964	383,799	8,119,630

Fig. 15 - Oil production from the Boulder field and a portion of a geophysical log from the Boulder reef.

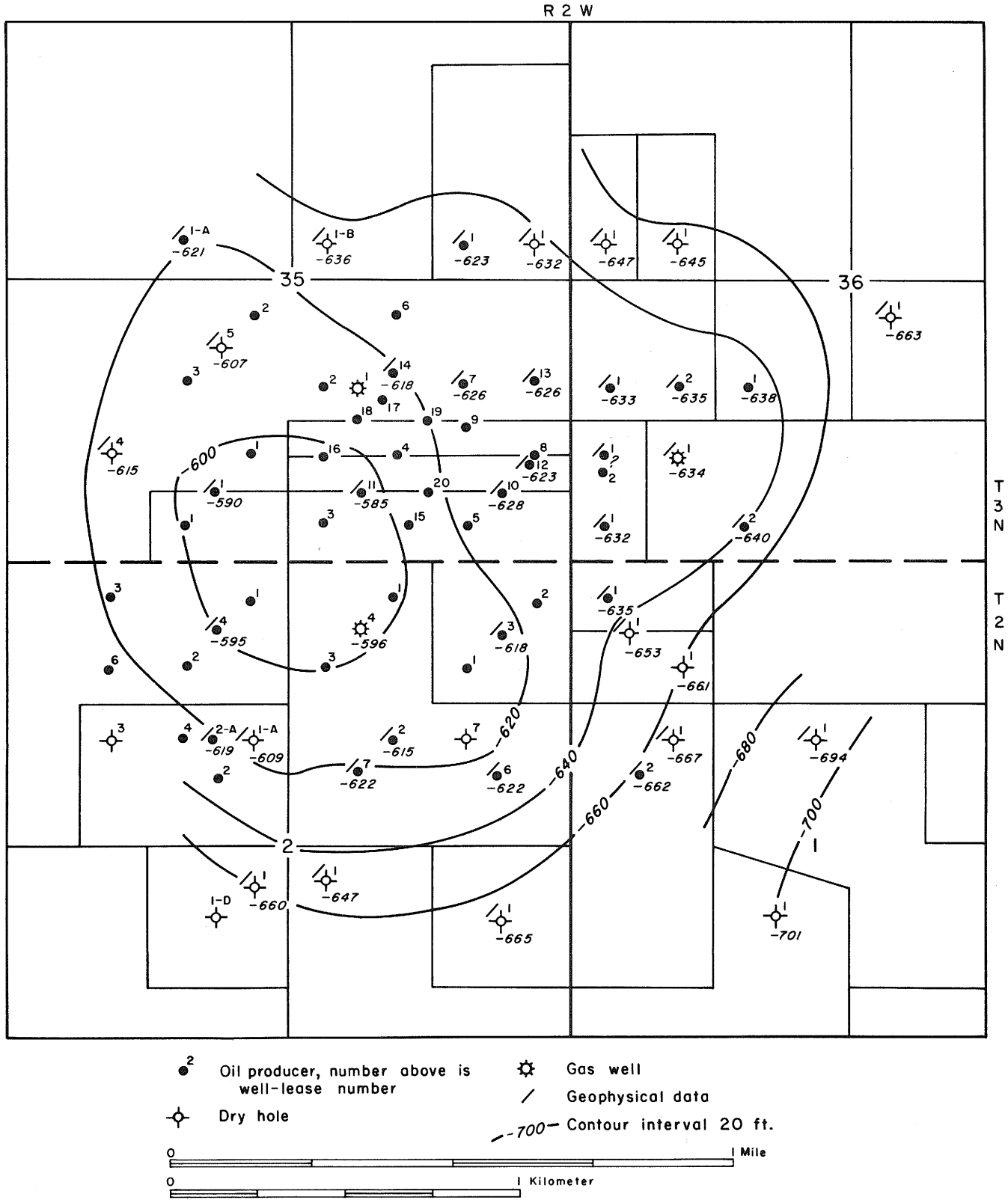


Fig. 16 - Structure map of the Boulder field drawn on the base of the Beech Creek Limestone (Mississippian).

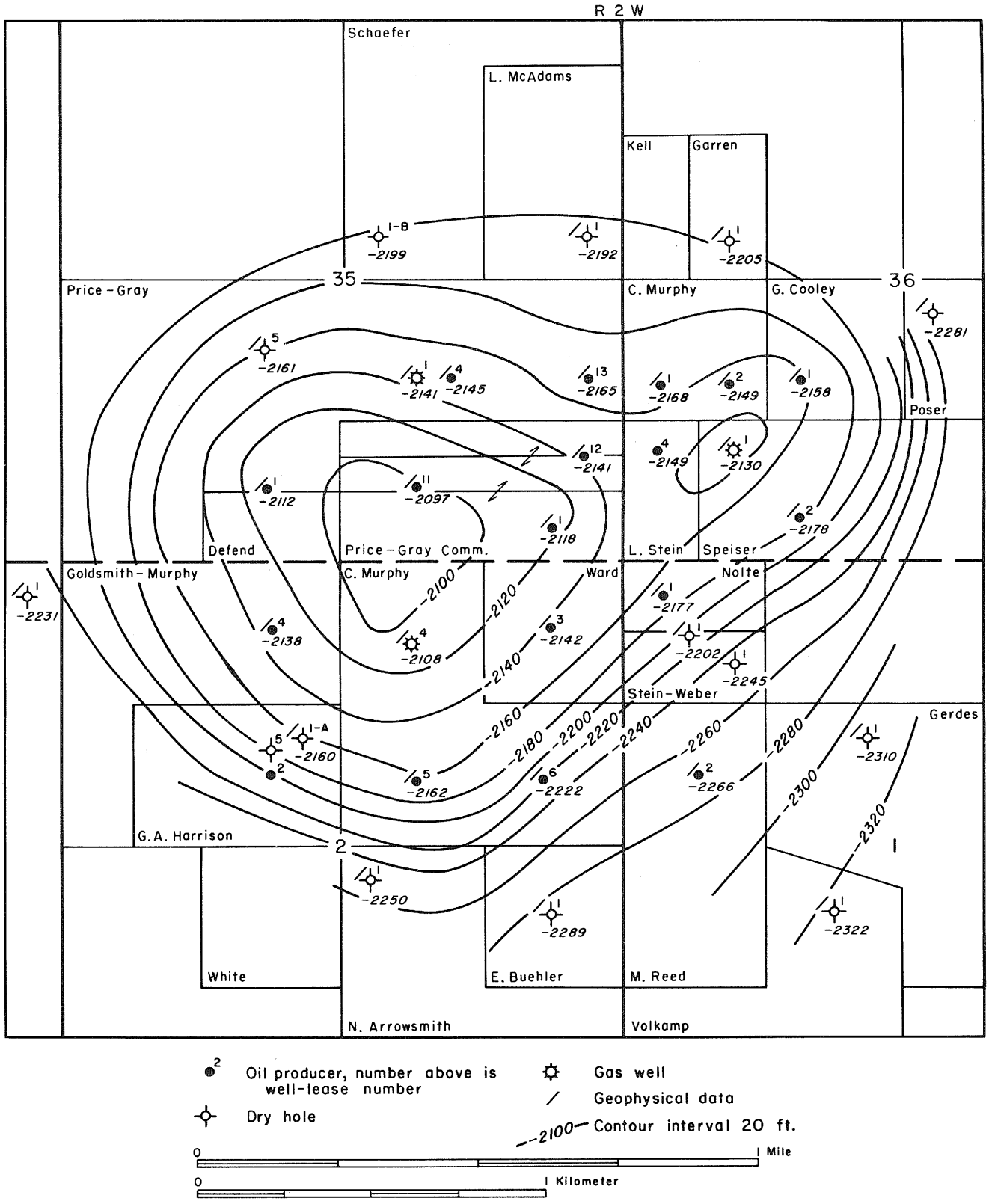


Fig. 17 - Structure map of the Boulder field drawn on the top of the Hunton Megagroup.

Pool Study 5

COULTERVILLE NORTH
Washington County

EXPLORATION METHOD LEADING TO DISCOVERY Unknown
STATUS OF FIELD Producing

DISCOVERY WELL
NAME R. H. Robben No. 1 Menafee
LOCATION 36-3S-5W, NW-NW-SW
COMPLETION DATE June 1958
ELEVATION 506 ft
CASING 10-in. to 58 ft, 5-in. to 2,288 ft
TREATMENT Small application of MCA
TOTAL DEPTH 2,412 ft
INITIAL PRODUCTION 48 BO/358 BW per day

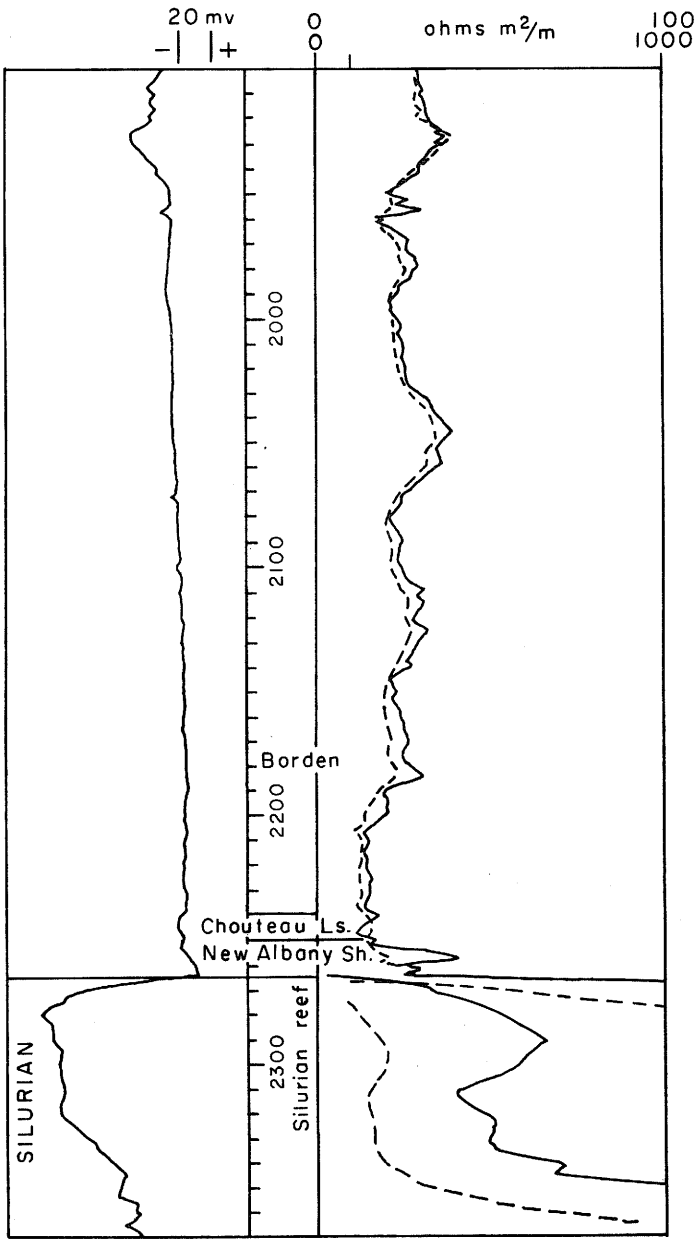
PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), 36-3S-5W slightly off reef, Weinert No. 1 Bonnat
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA
PROVED 40 acres
PROBABLE 50 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 6 (including an abandoned well later converted and now a producer)
NUMBER OF DRY HOLES 7
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Oil has been reported as far as 90 ft into reef.
CHARACTER OF OIL
41.7° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	2.2	3.18	4.31

INITIAL FIELD PRESSURE Highest DST pressure measured was 900 lb
COMPLETION PRACTICES Some wells were acidized in open hole after pipe was set at top of porosity; in other wells pipe was set through pay and perforated and wells were then acidized.
MARKET FOR OIL Ashland Oil, Inc.
NOTE Chouteau Limestone (Mississippian) absent in some wells (see fig. 18).

See figures 18, 19, and 20.

Electric Log
Robben No. 1 Hannah-Bonnat Comm.
NE-NE-SE 35-3S-5W, Washington County
El. 516 ft



COULTERVILLE NORTH FIELD

Oil Production, bbl

Year	Annual	Cumulative
1958	4,199	4,199
1959	11,473	15,672
1960	3,679	19,351
1961	2,670	22,021
1962	2,019	24,040
1963	1,279	25,319
1964	1,041	26,360
1965	204	26,564
1966	0	26,564
1967	447	27,011
1968	1,005	28,016
1969	391	28,407
1970	1,434	29,841
1971	0	29,841
1972	2,514	32,355

Fig. 18 - Oil production from the Coulterville North field and a portion of a geophysical log from the Coulterville North reef.

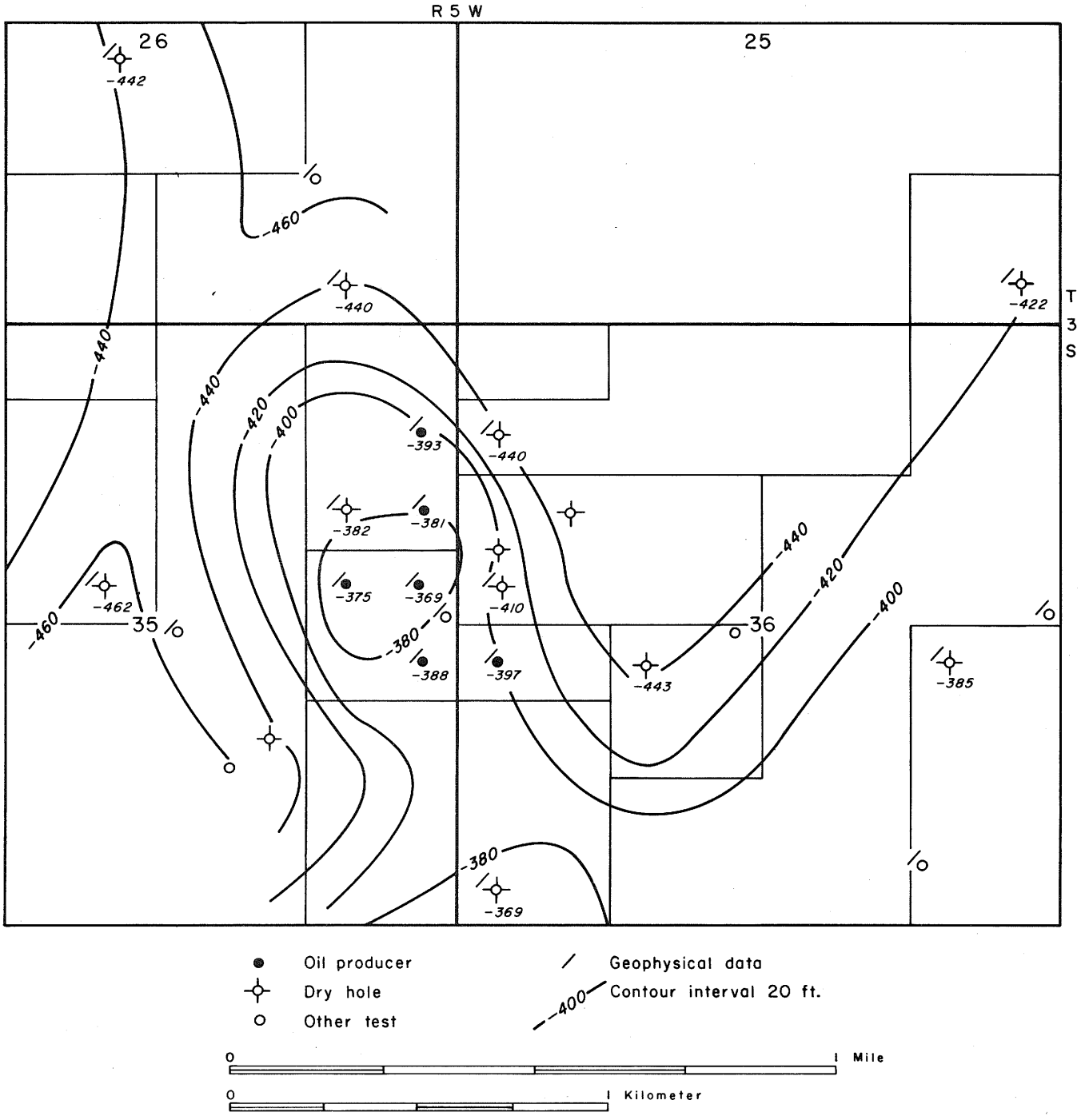


Fig. 19 - Structure map of the Coulterville North field drawn on the base of the Beech Creek Limestone (Mississippian).

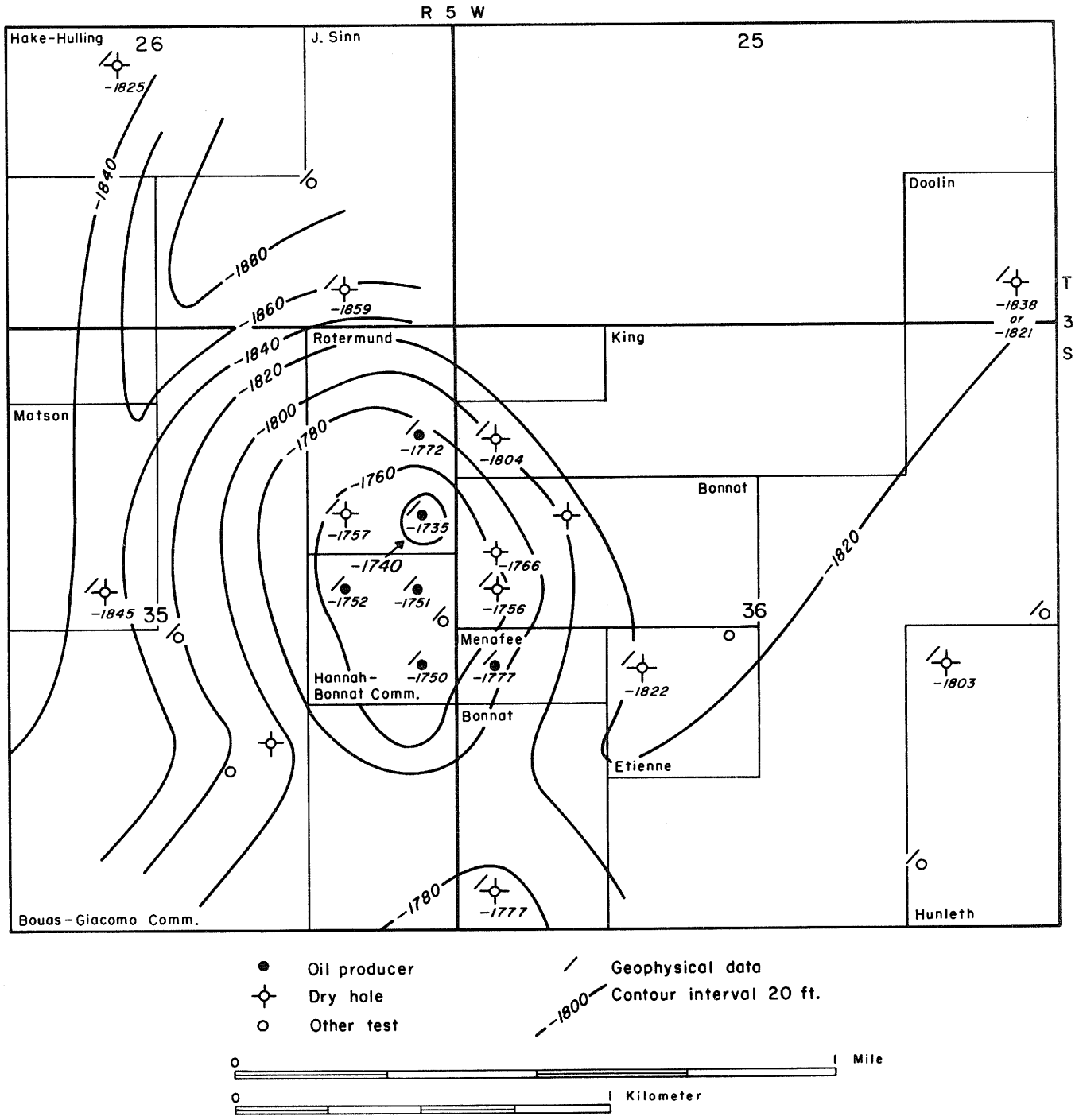


Fig. 20 - Structure map of the Coulterville North field drawn on the top of the Silurian.

Pool Study 6

ELBRIDGE FIELD
Edgar County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Gas injection into Geneva Dolomite Member (Devonian); oil production from "McClosky" (Mississippian)

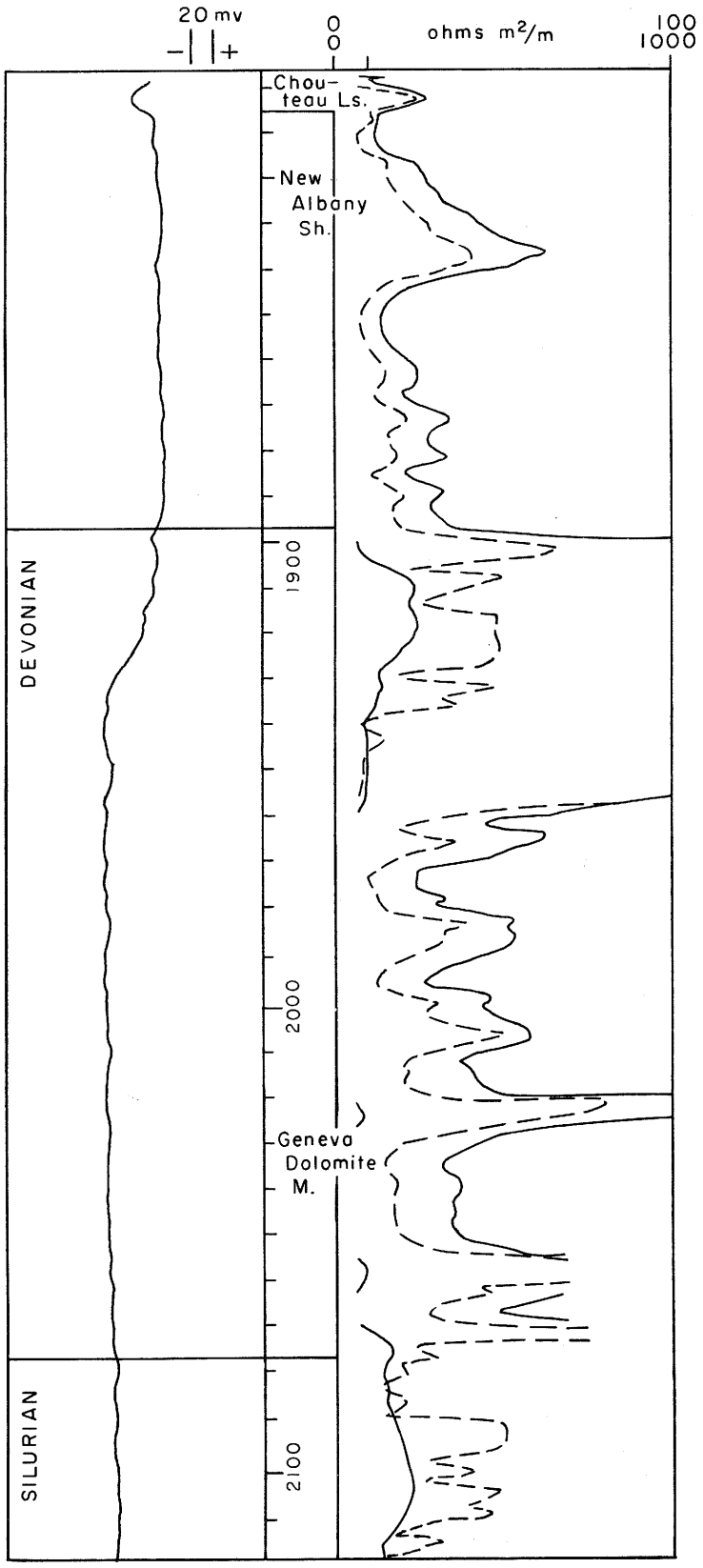
DISCOVERY WELL
NAME National Associated and Continental Oil Co. No. 1 H. S. Cockcroft
LOCATION 1-12N-11W, NW-NW-SW
COMPLETION DATE September 1949
ELEVATION 687 ft
CASING 10 ¾-in. to 135 ft, 5 ½- in. to 2,091 ft
TREATMENT Pipe set through pay and perforated
INITIAL PRODUCTION 50 BO/50 BW per day from "McClosky" after testing Devonian

PRODUCING FORMATION Pennsylvanian sand and "McClosky"; gas storage in Geneva Dolomite
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton); 2-12N-11W, Continental No. 1 Maddock
KIND OF TRAP Stratigraphic - Devonian and shallow beds draped over a Silurian reef. All production comes from "McClosky" and Pennsylvanian sand in a structural trap.
PRODUCTIVE AREA (Devonian only)
PROVED 0 acres
PROBABLE 0 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 2 wells were reported testing a small unmeasured amount of Devonian oil
NUMBER OF DRY HOLES 15 wells drilled into Devonian (37 "McClosky" and/or Pennsylvanian wells)
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Several hundred feet of reef rock present; Geneva Dolomite (Devonian) about 20 ft thick.
CHARACTER OF OIL None tested
INITIAL FIELD PRESSURE Not known
COMPLETION PRACTICES In first well pipe set through Geneva and perforated. Well acidized with 3,000 gal. D&A.
MARKET FOR OIL Marathon Oil Co.
REFERENCES AND NOTES

Buschbach, T. C., and D. C. Bond, 1967, Underground storage of natural gas in Illinois: Illinois Petroleum 86, 54 p.
Illinois Commerce Commission Hearings Docket on Gas Storage No. 48623.

Practically no oil came from Devonian strata, and none came from the Silurian reef.

See figures 21, 22, and 23.



Electric Log
Continental Oil No. B-11 Maddock
SE-NE-SE 2-12N-11W, Edgar County
El. 660.5 ft KB

ELBRIDGE FIELD

Oil Production, bbl

Year	Annual	Cumulative
1949	89,830	89,830
1950	464,174	554,004
1951	267,129	821,133
1952	158,999	980,132
1953	108,550	1,088,682
1954	75,745	1,164,427
1955	61,193	1,225,620
1956	50,497	1,276,117
1957	40,050	1,316,167
1958	34,248	1,350,415
1959	29,587	1,380,002
1960	23,342	1,403,344
1961	17,000	1,420,344
1962	16,085	1,436,429
1963	14,755	1,451,184
1964	12,751	1,463,935
1965	10,160	1,474,095
1966	7,068	1,481,163
1967	5,726	1,486,889
1968	4,277	1,491,166
1969	5,246	1,496,412
1970	1,973	1,498,385
1971	0	1,498,385
1972	0	1,498,385

Fig. 21 - Oil production from the Elbridge field and a portion of a geophysical log from the Elbridge reef.

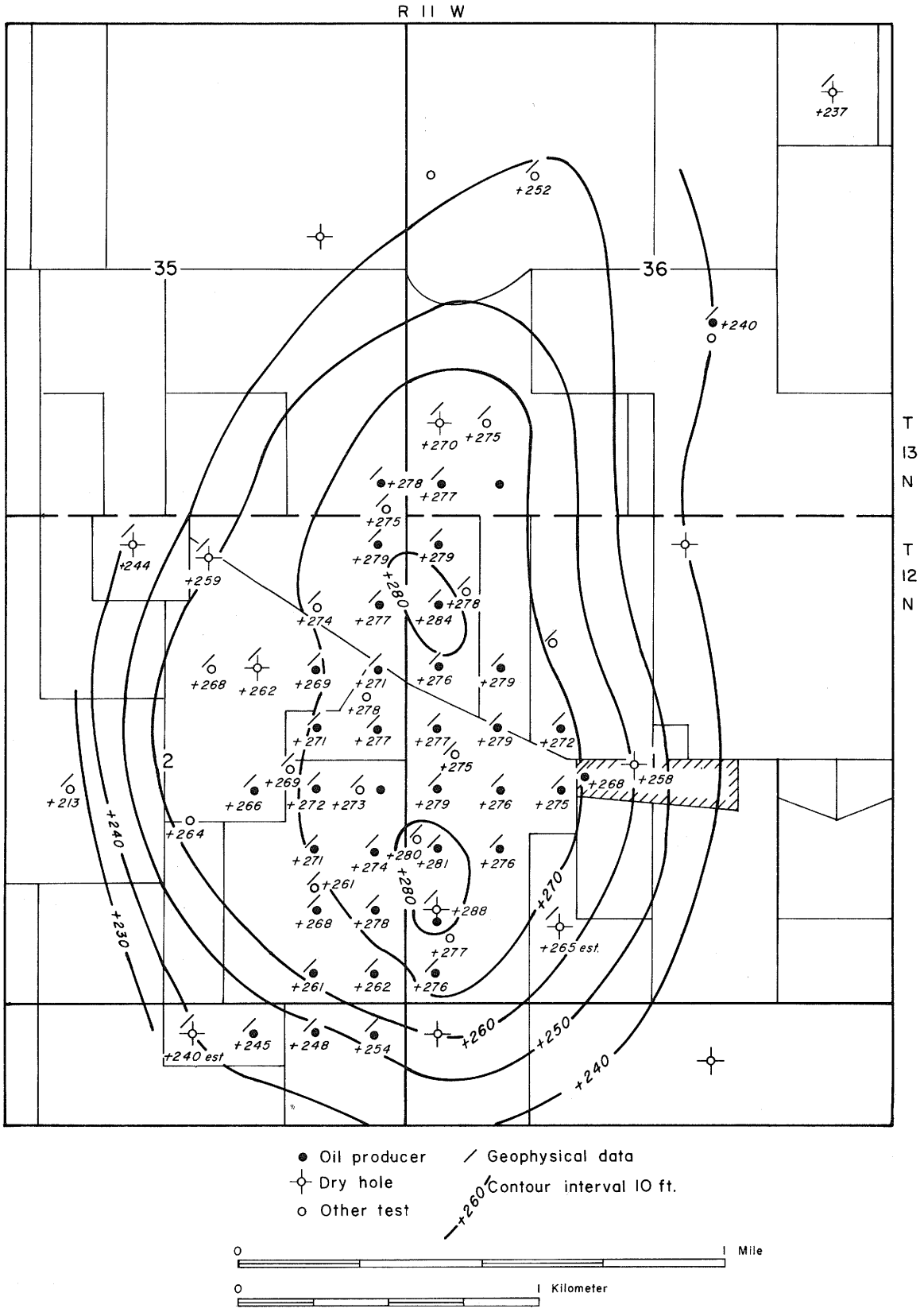


Fig. 22 - Structure map of the Elbridge field drawn on the base of Harrisburg (No. 5) Coal Member (Pennsylvanian).

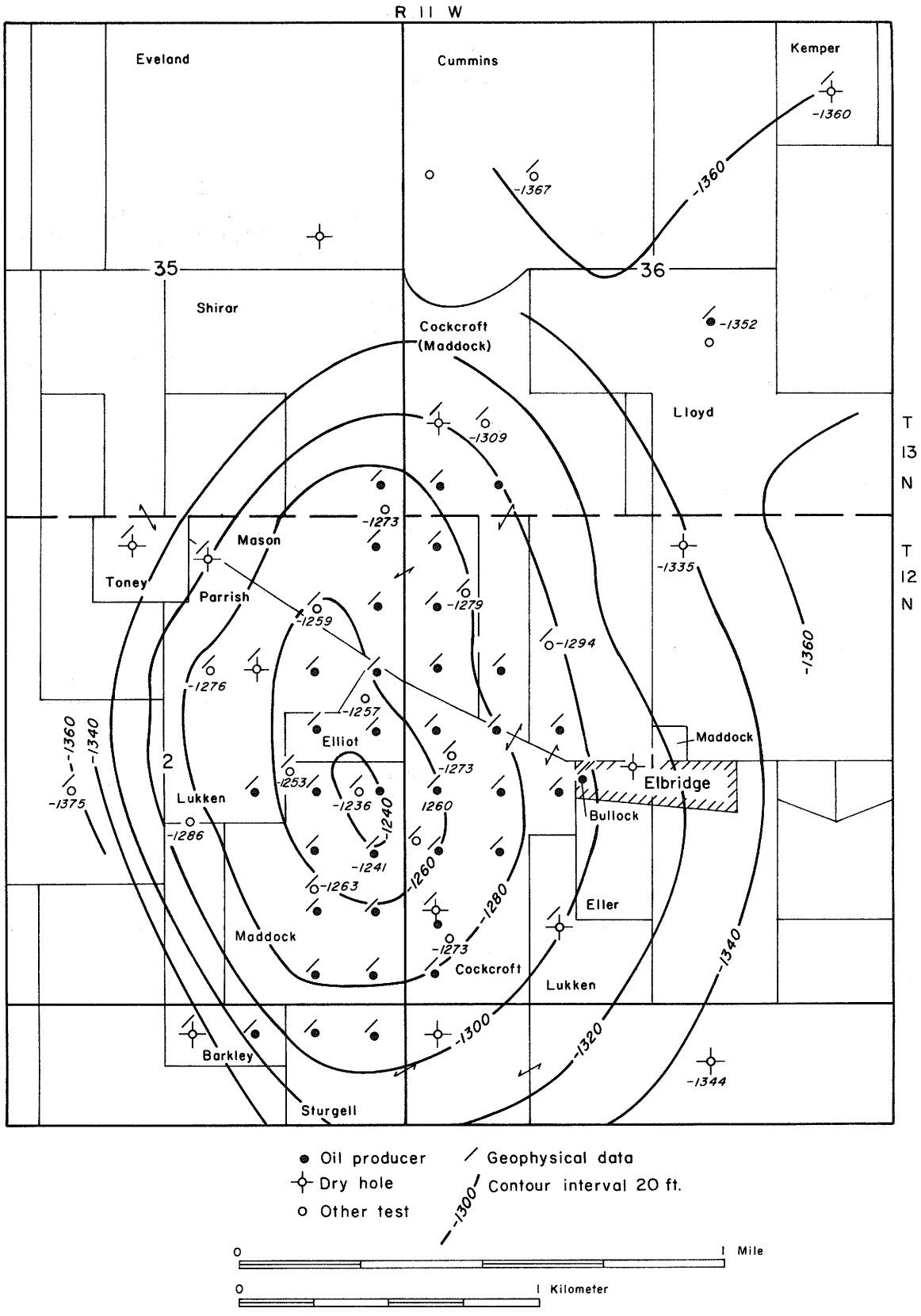


Fig. 23 - Structure map of the Elbridge field drawn on the top of the Hunton Megagroup.

Pool Study 7

FROGTOWN NORTH FIELD
Clinton County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Producing

DISCOVERY WELL	Mississippian	Reef
NAME	Gulf No. 1 F. Warnecke	Goldschmidt No. 1 Jaske Com.
LOCATION	6-2N-3W, NE-NE-NW	100 ft N.L., 330 ft E.L., NE-SE, 1-2N-4W
COMPLETION DATE	March 6, 1951	April 17, 1951
ELEVATION	448 ft	457 ft
CASING	5-in. to 2,217 ft	10-in. to 105 ft, $5\frac{1}{2}$-in. to 2,251 ft
TREATMENT	Not known	None
INITIAL PRODUCTION	165 BOPD from St. Louis Limestone (Mississippian); tested Silurian, 64 BO and 2 Mcf of gas on choke, then plugged back to St. Louis.	Flowed 440 BO/50 BW per day

PRODUCING STRATA St. Louis (Mississippian), Devonian, and Silurian
DEEPEST STRATIGRAPHIC UNIT PENETRATED Silurian
KIND OF TRAP Structural for St. Louis; stratigraphic for Devonian and Silurian
PRODUCTIVE AREA (Reef only)
PROVED 580 acres
PROBABLE 580 acres
APPROVED SPACING 20 acres
NUMBER OF PRODUCING WELLS 31
NUMBER OF DRY HOLES 11 dry holes drilled on the edge or slightly off the reef.
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Approximately 15 ft of Lingle Limestone (Devonian) over reef.
CHARACTER OF OIL
35.2° API gravity

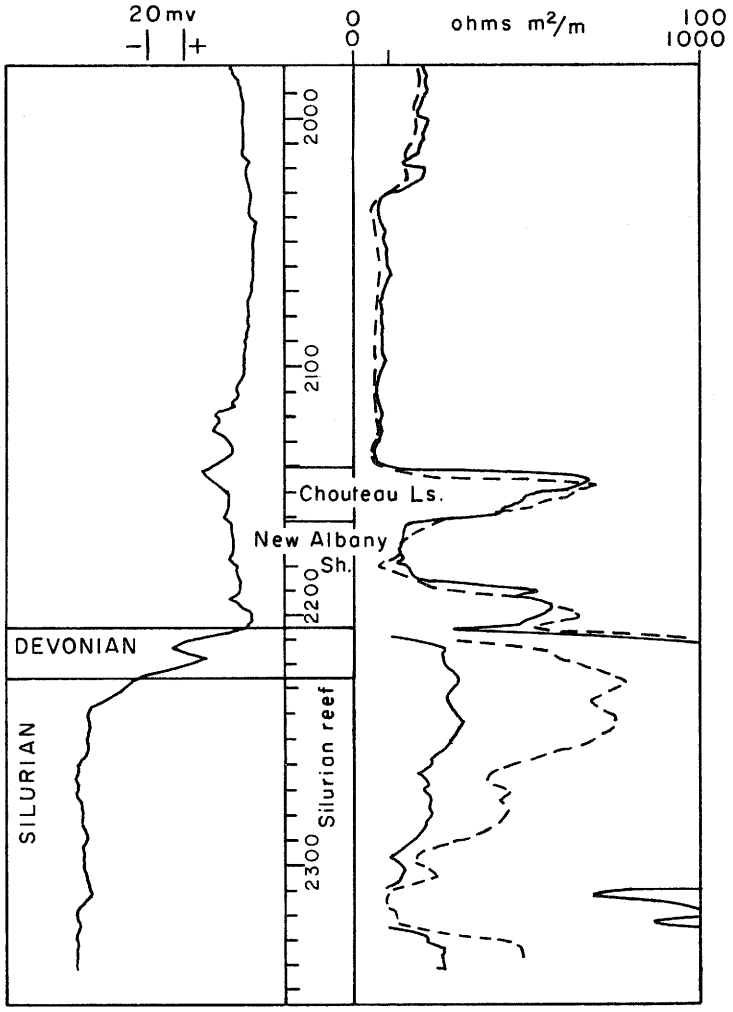
Temperature (F)	77°	50°
Viscosity (cP)	9.56	24.07

INITIAL FIELD PRESSURE 1,002 lb on a DST, Gulf No. 1 Warnecke
COMPLETION PRACTICES Some were completed natural and some were acidized.
MARKET FOR OIL Sohio Petroleum Co.

NOTES Shallow markers conform to reef structure. Herrin (No. 6) Coal Member has about 25 to 30 ft of closure. A few wells in the northeast corner produced out of a Devonian sand in the Lingle Formation.

See figures 24, 25, and 26.

Electric Log
Gulf No. 2 F. Warnecke
SW cor. NW-NE 6-2N-3W, Clinton County
El. 457 ft



FROGTOWN NORTH FIELD
Oil Production, bbl

Year	Annual	Cumulative
1951	308,239	308,239
1952	398,242	706,481
1953	216,279	922,760
1954	206,111	1,128,871
1955	210,361	1,339,232
1956	143,220	1,482,452
1957	80,791	1,563,243
1958	75,371	1,638,614
1959	63,047	1,701,661
1960	53,145	1,754,806
1961	44,673	1,799,479
1962	32,553	1,832,032
1963	27,015	1,859,047
1964	24,928	1,883,975
1965	20,994	1,904,969
1966	16,541	1,921,510
1967	27,862	1,949,372
1968	26,776	1,976,148
1969	18,938	1,995,086
1970	20,869	2,015,955
1971	19,800	2,035,755
1972	15,800	2,051,555

Fig. 24 - Oil production from the Frogtown North field and a portion of a geophysical log from the Frogtown North reef.

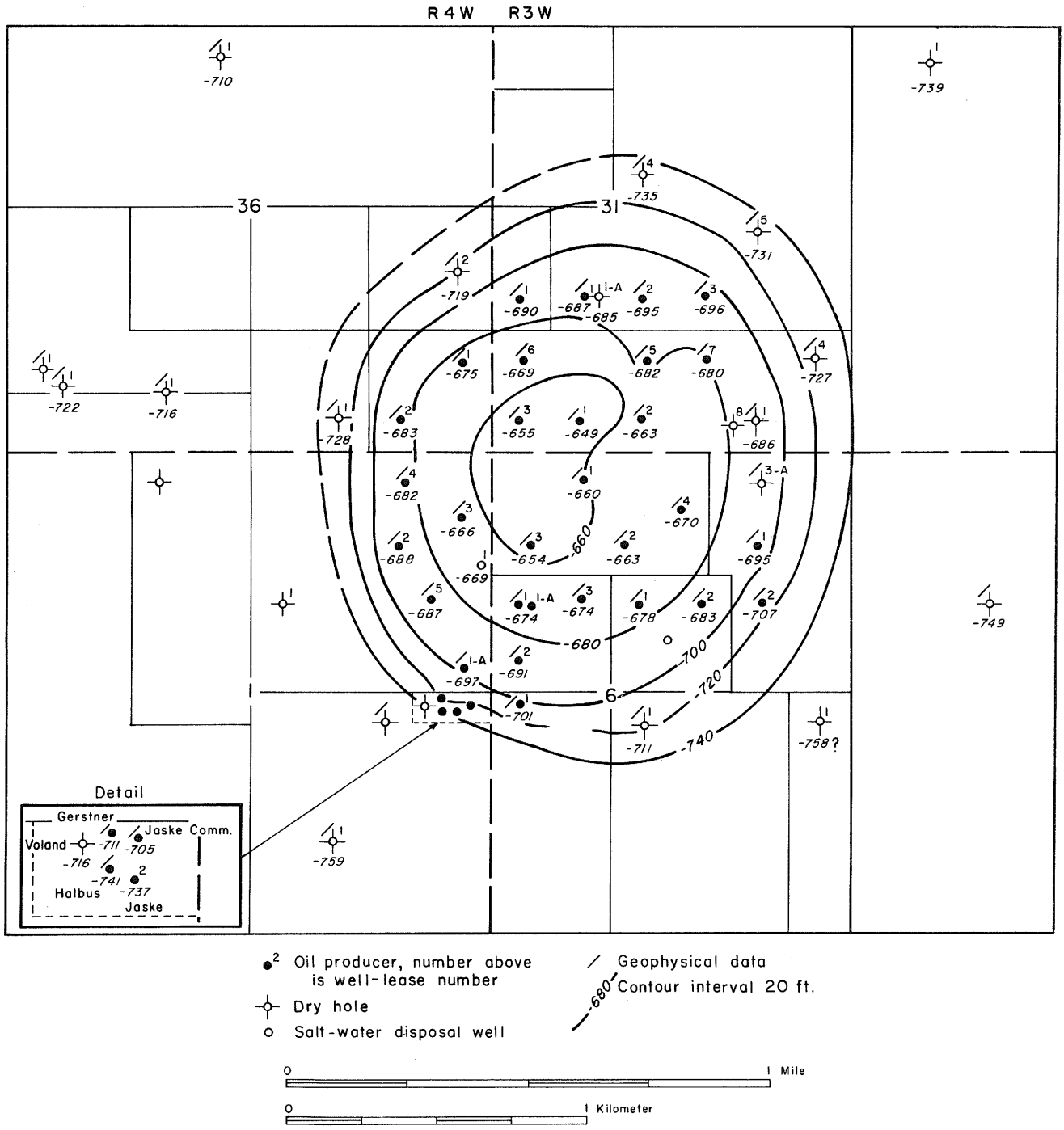


Fig. 25 - Structure map of the Frogtown North field drawn on the top of the Ste. Genevieve Limestone (Mississippian).

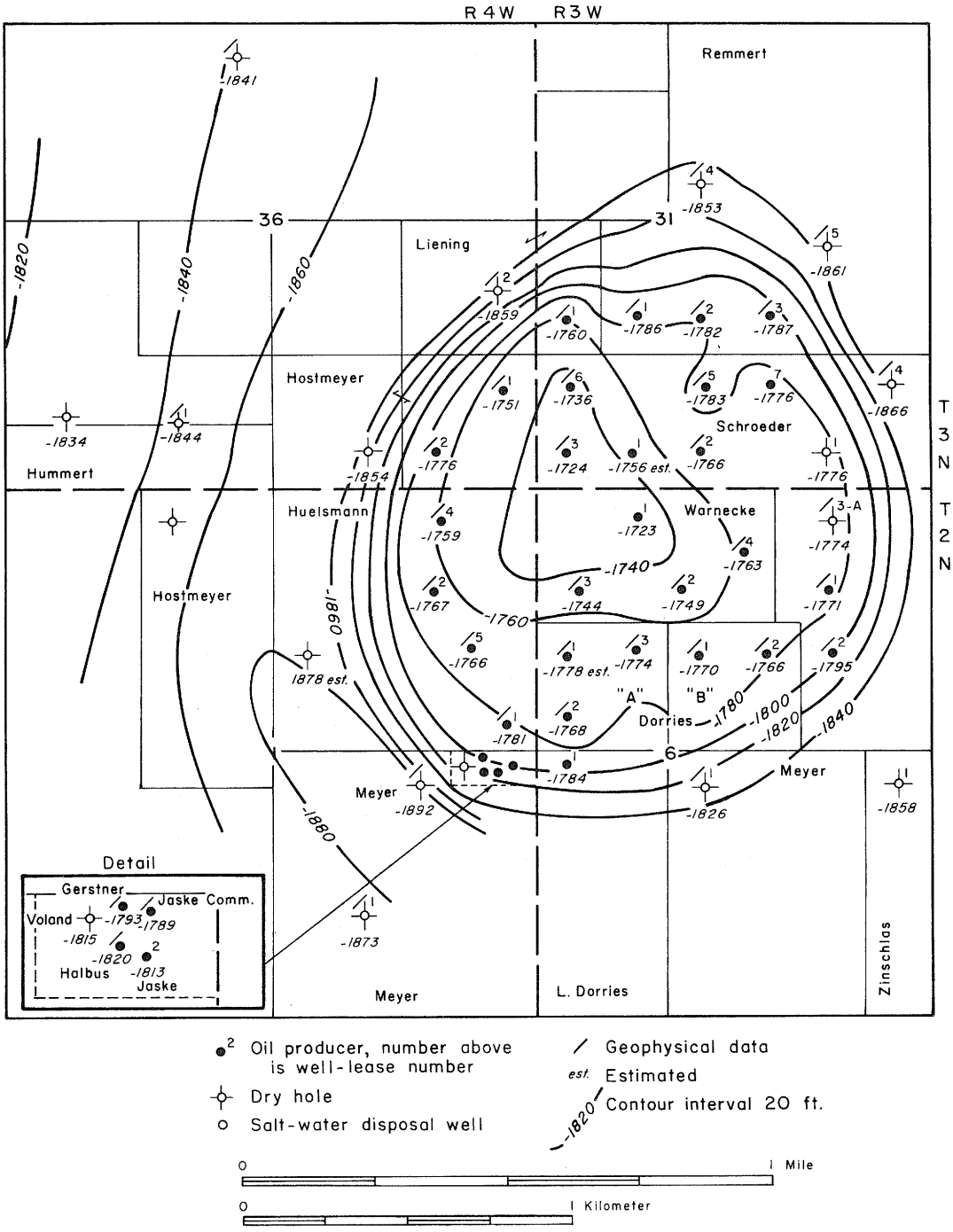


Fig. 26 - Structure map of the Frogtown North field drawn on the top of the Hunton Megagroup.

Pool Study 8

GERMANTOWN EAST FIELD
Clinton County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Producing

DISCOVERY WELL
- NAME National Associated No. 1 M. Holtgrave
- LOCATION 1-1N-4W, SW-SE-NW
- COMPLETION DATE July 1956
- ELEVATION 444 ft
- CASING 8-in. to 161 ft, 5-in. to 2,503 ft
- TREATMENT Pipe set, perforated at 2,423-2,442 ft, well acidized with 500 gal MCA
- TOTAL DEPTH 2,505 ft
- INITIAL PRODUCTION 177 BO/107 BW per day

PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), 1-1N-4W, National Associated No. 1 Becker to 3,308 ft
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA
- PROVED 540 acres
- PROBABLE 540 acres
- APPROVED SPACING 20 acres
- NUMBER OF WELLS THAT PRODUCED 27
- NUMBER OF DRY HOLES 8 dry holes drilled on edge of or slightly off reef

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK One well tested all oil from top 185 ft of reef rock.
CHARACTER OF OIL

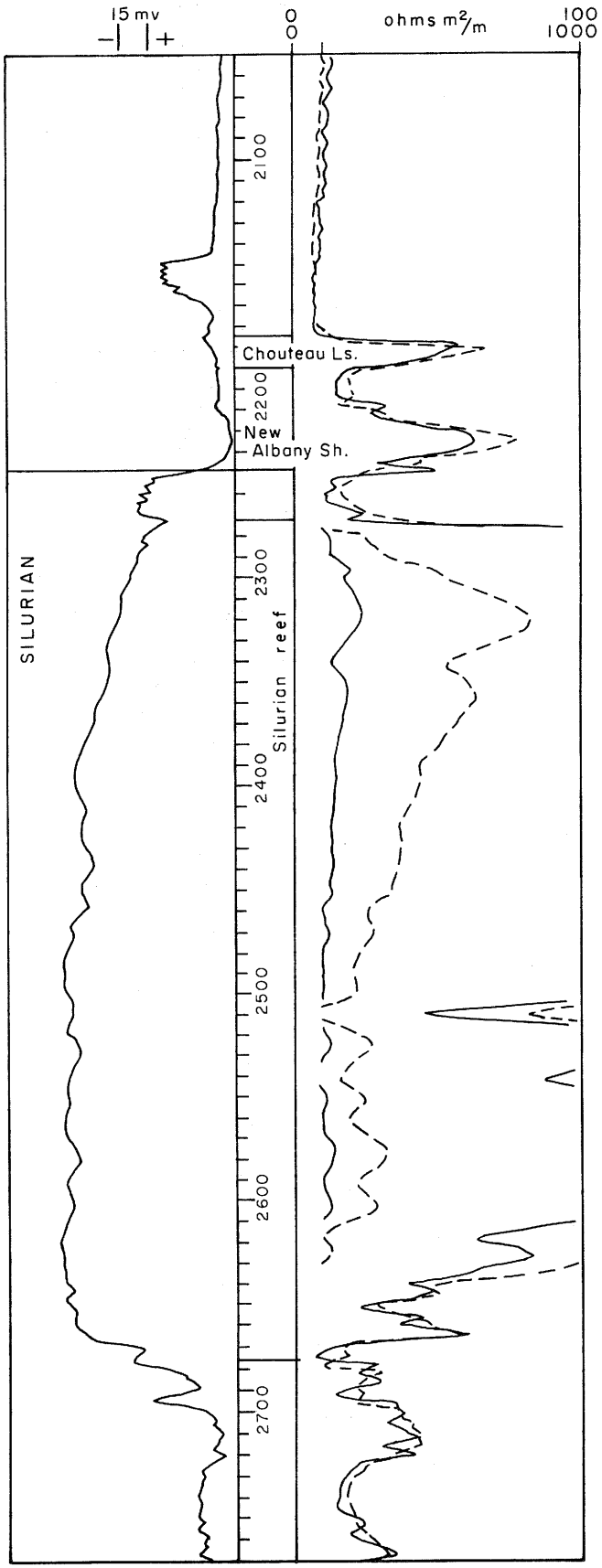
39.4° API gravity

Temperature (F)	77°	50°
Viscosity (cP)	4.87	6.16

INITIAL FIELD PRESSURE Highest recorded was 800 lb on a DST. Some wells flowed.
COMPLETION PRACTICES Perforated pipe set through pay and well then acidized.
MARKET FOR OIL Sohio Petroleum Co.

NOTES Devonian limestone formations are only on the east side of the reef and not over the top.

See figures 27, 28, and 29.



Electric Log
National Associated No. 1 Becker
SE-NW-NW 1-1N-4W, Clinton County
El. 426 ft

GERMANTOWN EAST FIELD
Oil Production, bbl

Year	Annual	Cumulative
1956	328,826	328,826
1957	362,852	691,678
1958	284,254	975,932
1959	169,865	1,145,797
1960	141,606	1,287,403
1961	106,488	1,393,891
1962	77,493	1,471,384
1963	71,426	1,542,810
1964	65,674	1,608,484
1965	56,577	1,665,061
1966	50,447	1,715,508
1967	40,977	1,756,485
1968	37,057	1,793,542
1969	31,954	1,825,496
1970	26,868	1,852,364
1971	22,100	1,874,464
1972	19,500	1,893,964

Fig. 27 - Oil production from the Germantown East field and a portion of a geophysical log from the Germantown East reef.

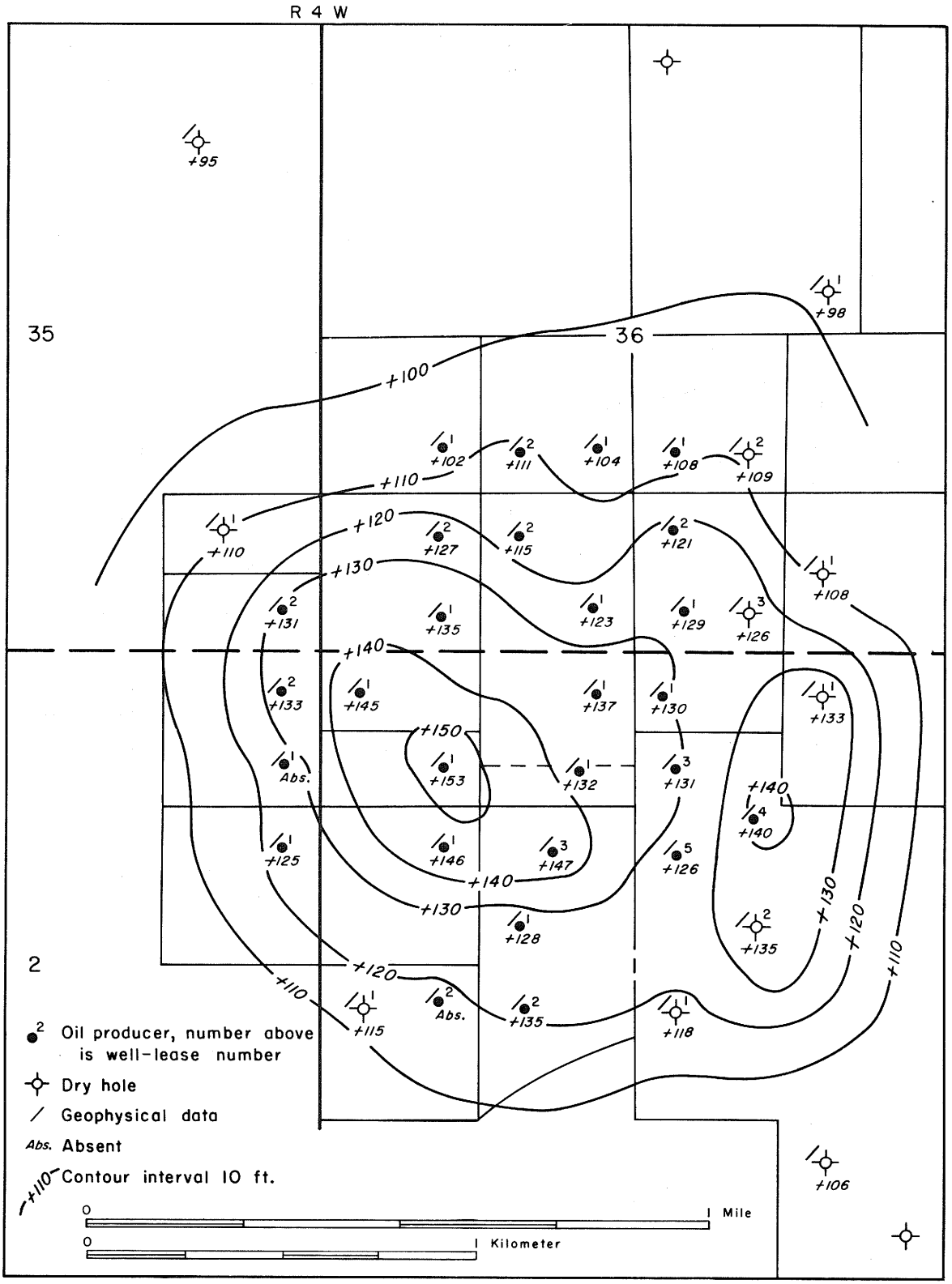


Fig. 28 - Structure map of the Germantown East field drawn on the top of the West Franklin Limestone Member (Pennsylvanian).

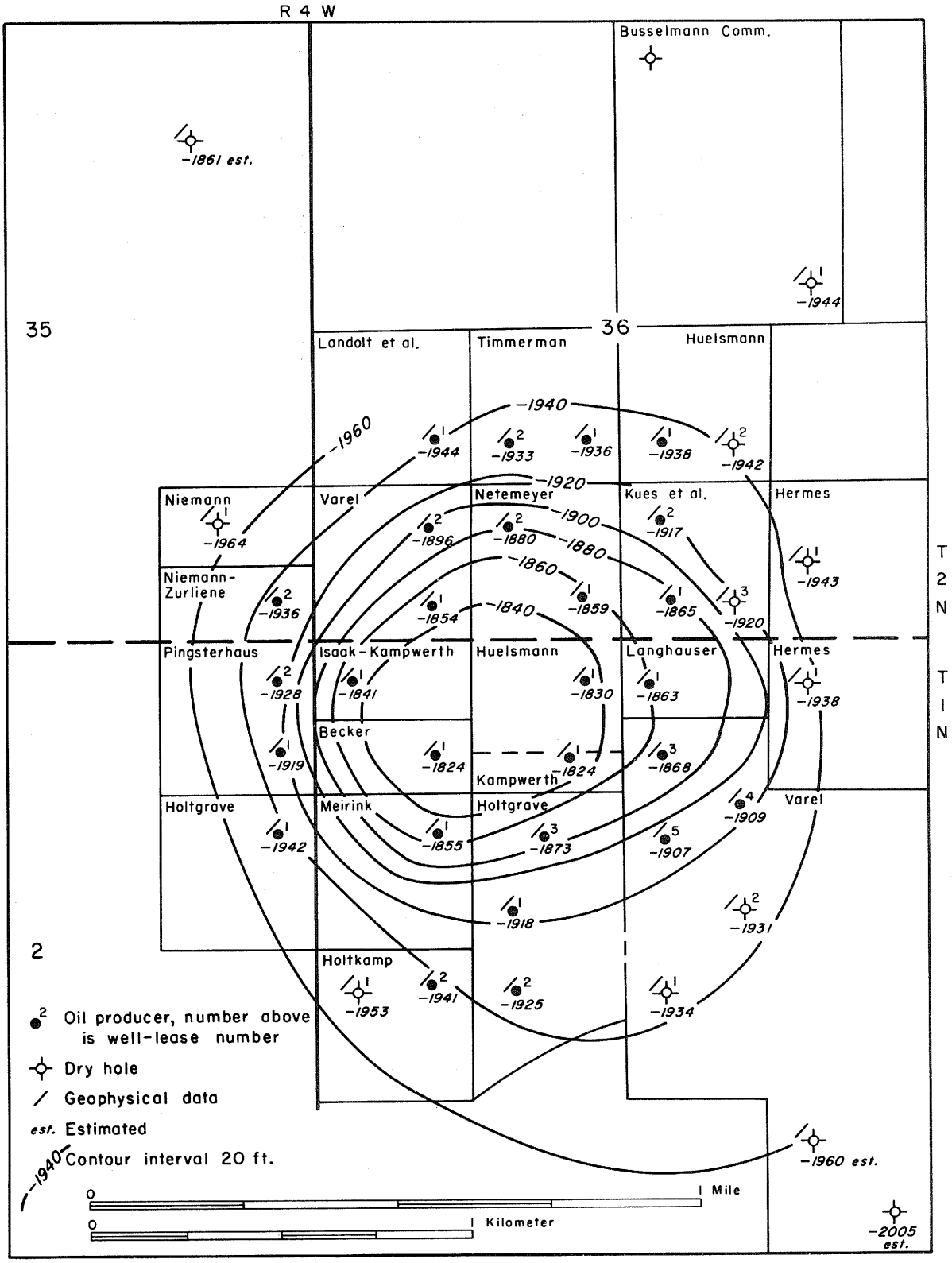


Fig. 29 - Structure map of the Germantown East field drawn on the top of the Silurian.

Pool Study 9

LIVELY GROVE FIELD
Washington County

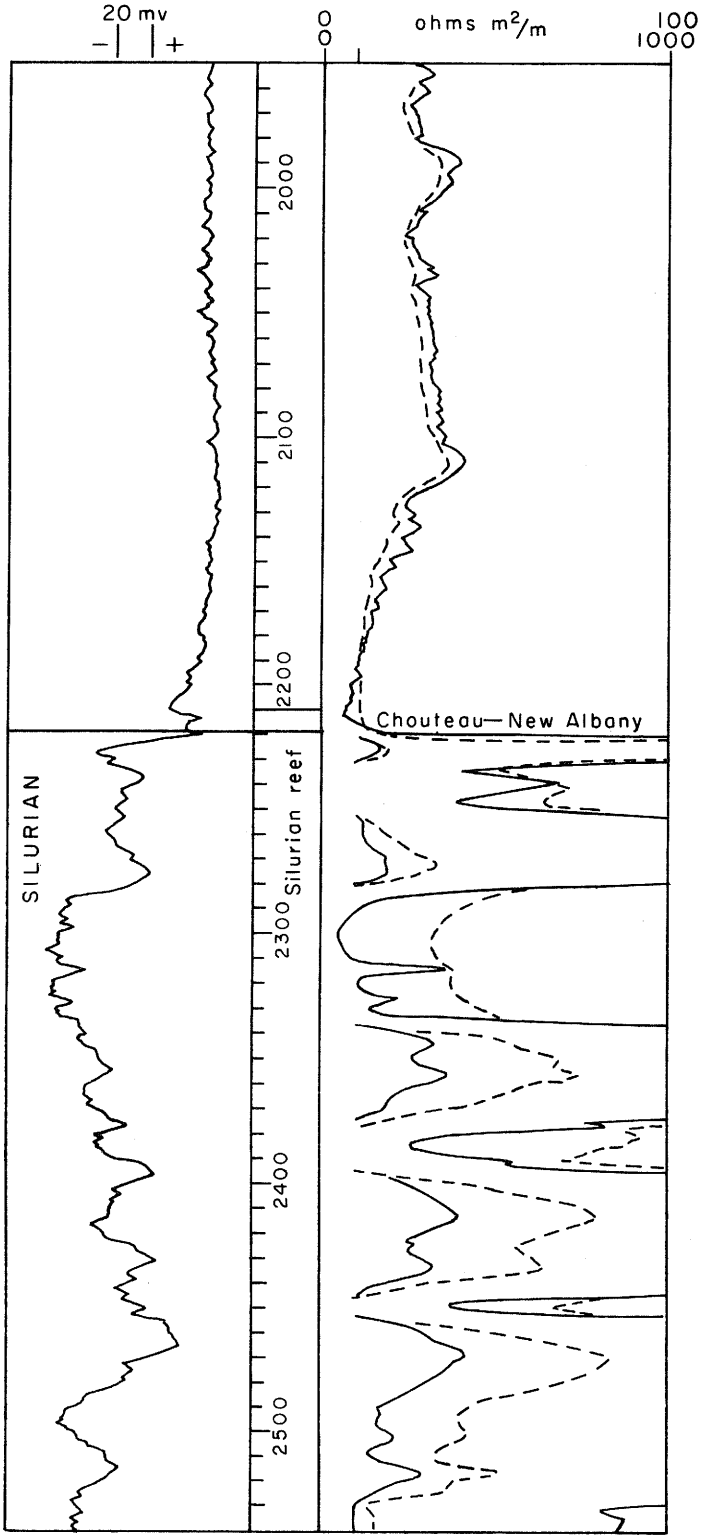
EXPLORATION METHOD LEADING TO DISCOVERY
Seismographing
STATUS OF FIELD Never produced

DISCOVERY WELL
NAME Carter No. 1 Weber
LOCATION 10-3S-5W, NW-NW-NE
COMPLETION DATE April 1954
ELEVATION 483 ft
CASING 10-in. to 124 ft
TREATMENT D&A, therefore not treated
TOTAL DEPTH 2,537 ft
INITIAL PRODUCTION D&A; none; show of light high-gravity oil.

PRODUCING STRATA None
DEEPEST STRATIGRAPHIC UNIT PENETRATED
Silurian
KIND OF TRAP None
PRODUCTIVE AREA
PROVED 0
PROBABLE 0 (reef covers at least 240 acres)
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 0
NUMBER OF DRY HOLES 11 (9 reef and 2 shallow tests)
THICKNESS AND CHARACTER OF RESERVOIR ROCK
Several hundred feet of reef rock.
CHARACTER OF OIL None
INITIAL FIELD PRESSURE 242 lb BHP noted on a DST
COMPLETION PRACTICES ———
MARKET FOR OIL None

NOTES It is thought that this reef was decapped and that the oil escaped from the trap.

See figures 30, 31, and 32.



Electric Log
Carter Oil Co. No. 1 Weber
NW-NW-NE 10-3S-5W
El. 483 ft

Fig. 30 - A portion of a geophysical log from the Lively Grove reef.

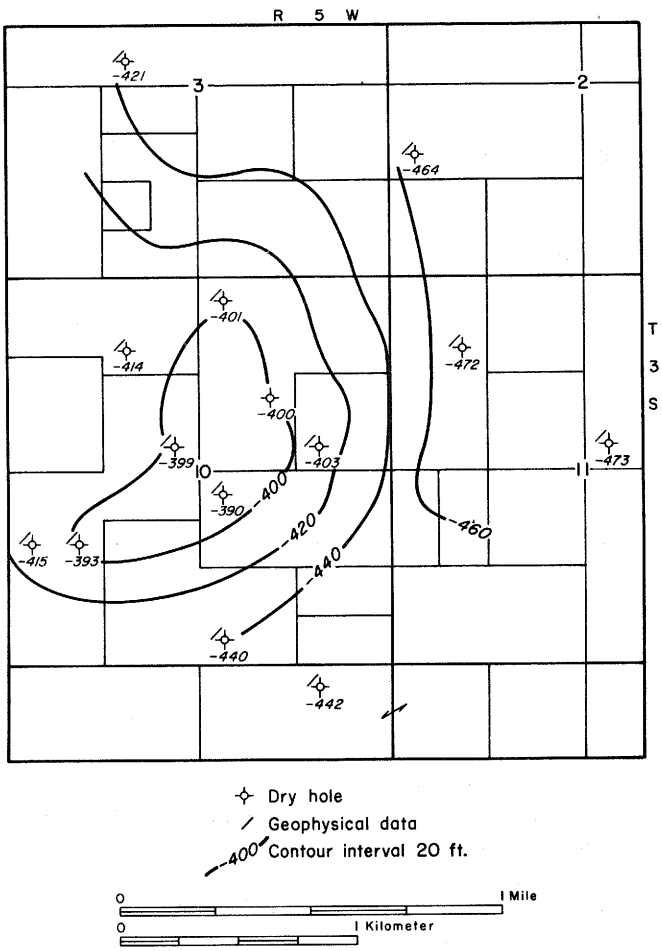


Fig. 31 - Structure map of the Lively Grove reef drawn on the base of the Beech Creek Limestone (Mississippian).

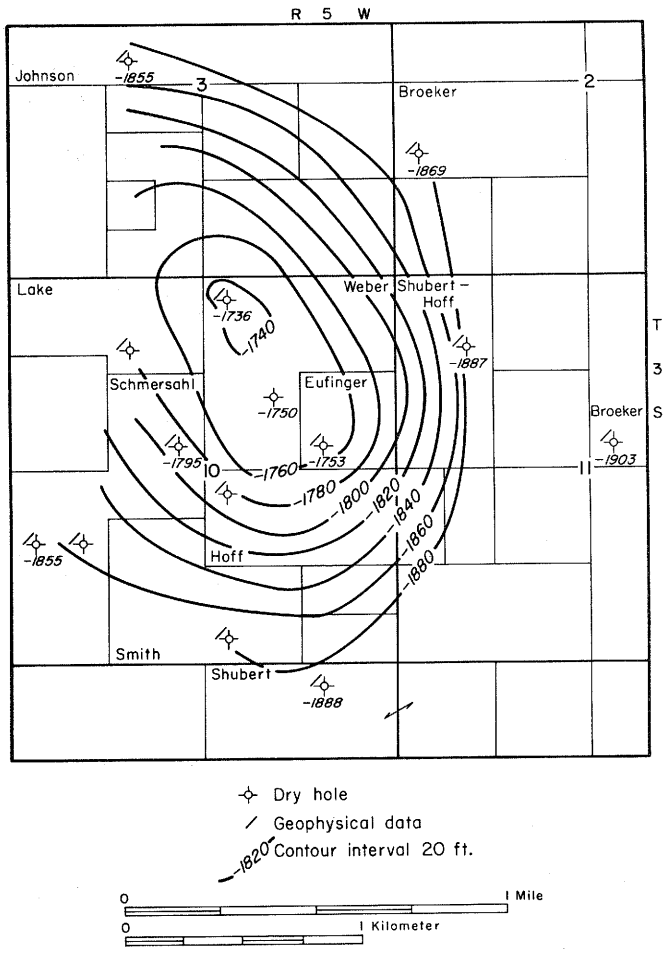


Fig. 32 - Structure map of the Lively Grove reef drawn on the top of the Silurian.

Pool Study 10

MARINE FIELD
Madison County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Producing

DISCOVERY WELL
NAME Rock Hill Oil (Eason & Co.) No. 1 L. Mayer
LOCATION 15-4N-6W, SE-NW-SW
COMPLETION DATE June 1943
ELEVATION 535 ft
CASING 7-in. to 1,736 ft
TREATMENT Acidized with 6,000 gal
TOTAL DEPTH 2,590 ft
INITIAL PRODUCTION 4 BO/1 BW per day

PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton) - Three Trenton wells have been drilled in the field. See figure 33.
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCING AREA
PROVED 2,440 acres
PROBABLE 2,440 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 147
NUMBER OF DRY HOLES Approximately 18 wells around the flanks
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK 430 to 570 ft of reef, of which about 150 ft was oil bearing; -1,300 ft was often considered the oil-water contact.
CHARACTER OF OIL 35.2° API gravity; viscosity - 626 cP at 100° F.
INITIAL FIELD PRESSURE Highest observed BHP was 400 lb. Some of the wells flowed.
COMPLETION PRACTICES In nearly all wells, pipe was set at top of pay and well was either produced naturally or acidized. Most holes were deepened several times and acidized after each deepening.
MARKET FOR OIL Ashland Oil, Inc.; Sohio Petroleum Co.; Marathon Oil Co.; Sinclair Oil Co.

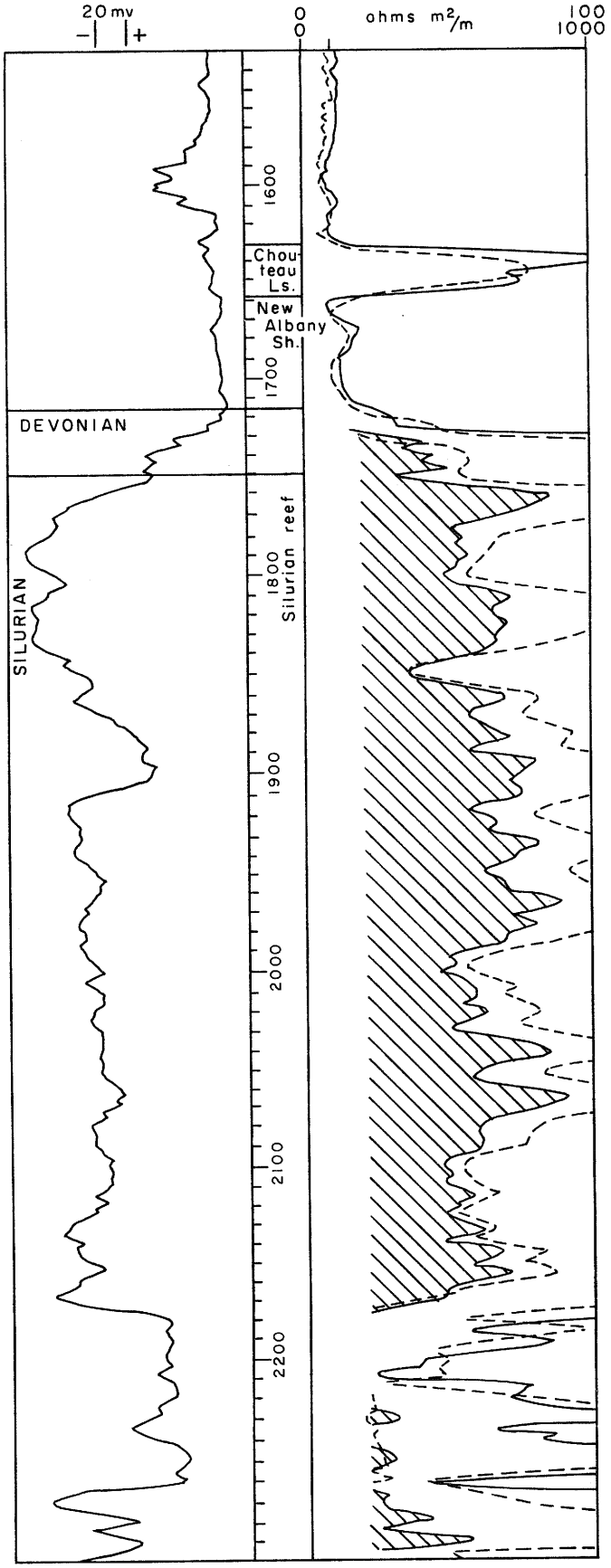
REFERENCES AND NOTES

Lowenstam, H. A., 1948, Marine pool, Madison County, Illinois, Silurian reef producer, in J. V. Howell, ed., Structure of typical American oil fields, v. 3: Am. Assoc. Petroleum Geologists, p. 153-188; Illinois Geol. Survey Rept. Inv. 131, 40 p.

Lowenstam, H. A., 1950, Niagaran reefs of the Great Lakes area: Jour. Geol., v. 58, no. 4, p. 430-487.

Lowenstam, H. A., and E. P. DuBois, 1946, Marine pool, Madison County, a new type of oil reservoir in Illinois: Illinois Geol. Survey Rept. Inv. 114, 30 p.

See figures 33 and 34.



Electric Log
Rock Hill (Eason) No. 1 L. Mayer
SE-NW-SW 15-4N-6W, Madison County
El. 535 ft

MARINE FIELD

Oil Production, bbl

Year	Annual	Cumulative
1943	17,851	17,851
1944	479,725	497,576
1945	828,378	1,325,954
1946	1,201,783	2,527,737
1947	1,074,097	3,601,834
1948	1,081,220	4,683,054
1949	980,415	5,663,469
1950	876,361	6,539,830
1951	787,714	7,327,544
1952	670,183	7,997,727
1953	519,510	8,517,237
1954	404,923	8,922,160
1955	348,800	9,270,960
1956	297,298	9,568,258
1957	232,976	9,801,234
1958	237,183	10,038,417
1959	223,704	10,262,121
1960	227,917	10,490,038
1961	210,185	10,700,223
1962	192,329	10,892,552
1963	166,460	11,059,012
1964	146,113	11,205,125
1965	117,687	11,322,812
1966	103,121	11,425,933
1967	78,391	11,504,324
1968	61,245	11,565,569
1969	60,883	11,626,452
1970	60,123	11,686,575
1971	47,700	11,734,275
1972	40,500	11,774,775

Fig. 33 - Oil production from the Marine field and a portion of a geophysical log from the Marine reef.

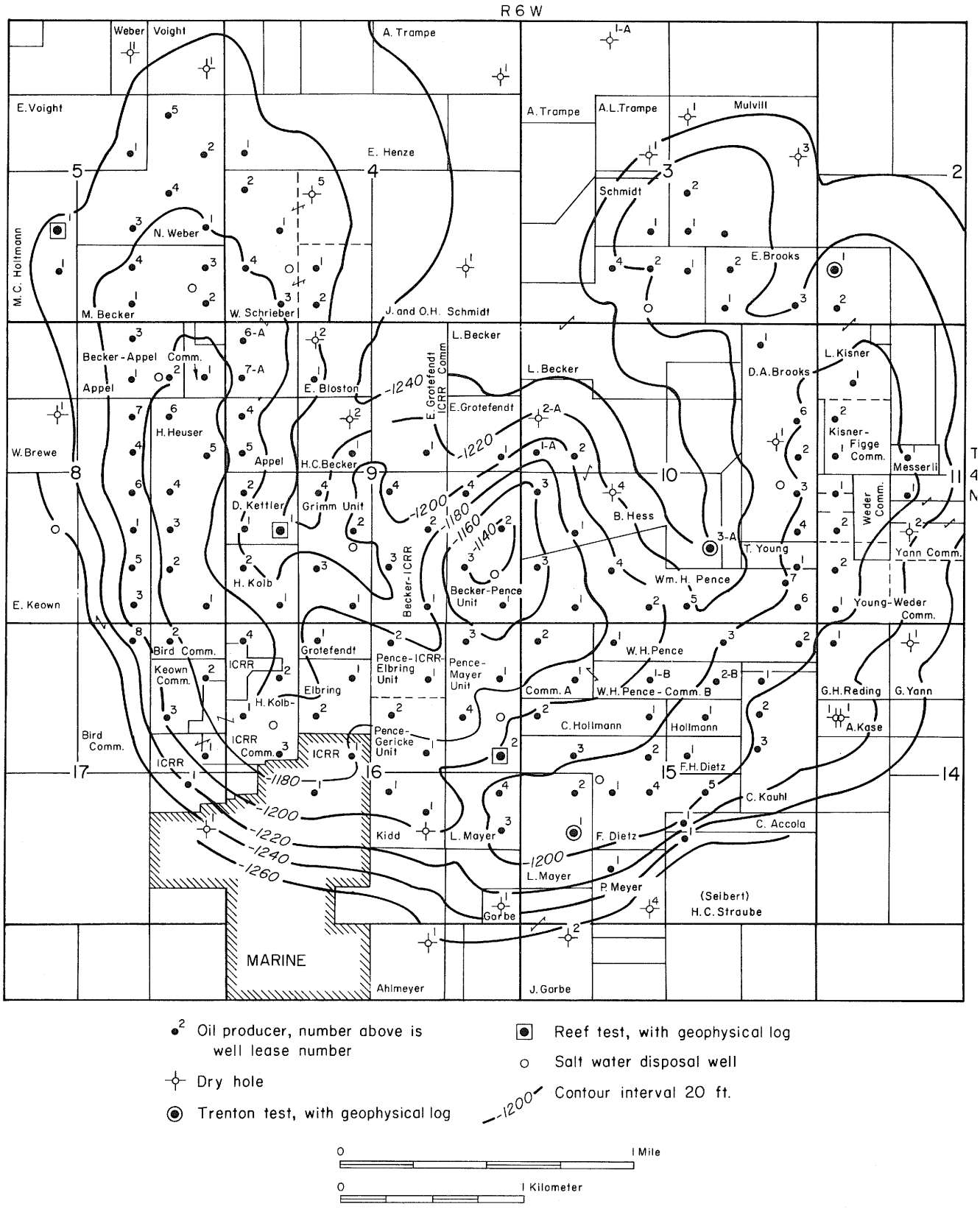


Fig. 34 - Structure map of the Marine field drawn on the top of the Silurian.

Pool Study 11

McKINLEY FIELD
Washington County

EXPLORATION METHOD LEADING TO DISCOVERY The deepening of a shallow pool found by seismic technique

STATUS OF FIELD Producing

DISCOVERY WELL	Field	Reef
NAME	DeKalb et al. No. 3 Hunleth	McBride No. 1 A. V. Hunleth
LOCATION	29-3S-4W, SW-NE-NW	29-3S-4W, SE-NE-NW
COMPLETION DATE	December 1940	July 1948
ELEVATION	534 ft	542 ft
CASING	5-in. to 1,108 ft	No record of casing, but through pay
TREATMENT	Perf. casing 1,028-1,034 ft	Perf. casing after plugging back to 2,325 ft
TOTAL DEPTH	1,186 ft	3,985 ft
INITIAL PRODUCTION	165 BO/65 BW per day from Yankeetown ("Benoist") Sandstone	225 BO/70 BW

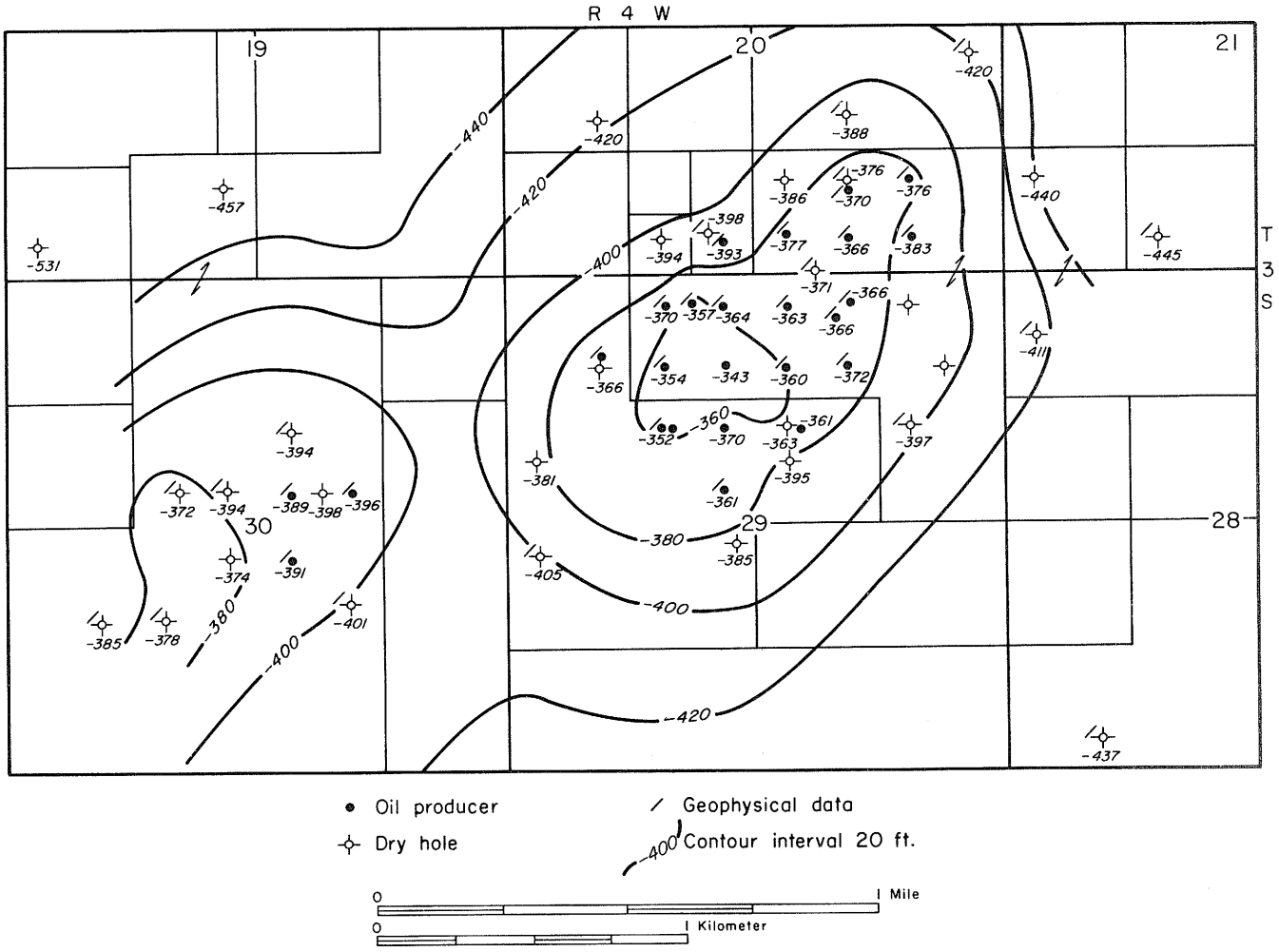


Fig. 35 - Structure map of the McKinley field drawn on the base of the Beech Creek Limestone (Mississippian).

Pool Study 11, continued

PRODUCING STRATA "Benoist" (Mississippian); Silurian reef

DEEPEST STRATIGRAPHIC UNIT PENETRATED St. Peter Sandstone (Ordovician), 29-3S-4W, McBride No. 1 Hunleth, TD 3,985 ft

KIND OF TRAP Structural - "Benoist"; stratigraphic - a Silurian reef.

PRODUCTIVE AREA (Reef only)

PROVED 190 acres

PROBABLE 190 acres

APPROVED SPACING 20 acres

NUMBER OF WELLS THAT PRODUCED 10 wells

NUMBER OF DRY WELLS 8 wells on fringe of reef

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Reef appears to be at least 400 ft thick.

CHARACTER OF OIL

39.4° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	2.55	3.41	5.12

INITIAL FIELD PRODUCTION Maximum recorded was 800 bbl on a DST.

COMPLETION PRACTICES Many wells completed naturally or with small amounts of MCA

MARKET FOR OIL Ashland Oil, Inc.

REFERENCES AND NOTES

Bandy, J. C., Jr., 1950, The geology of the McKinley Pool, Washington County, Illinois: Univ. Illinois A.M. thesis.

No Chouteau or black shale of the New Albany Group noted.

See figures 35, 36, and 37.

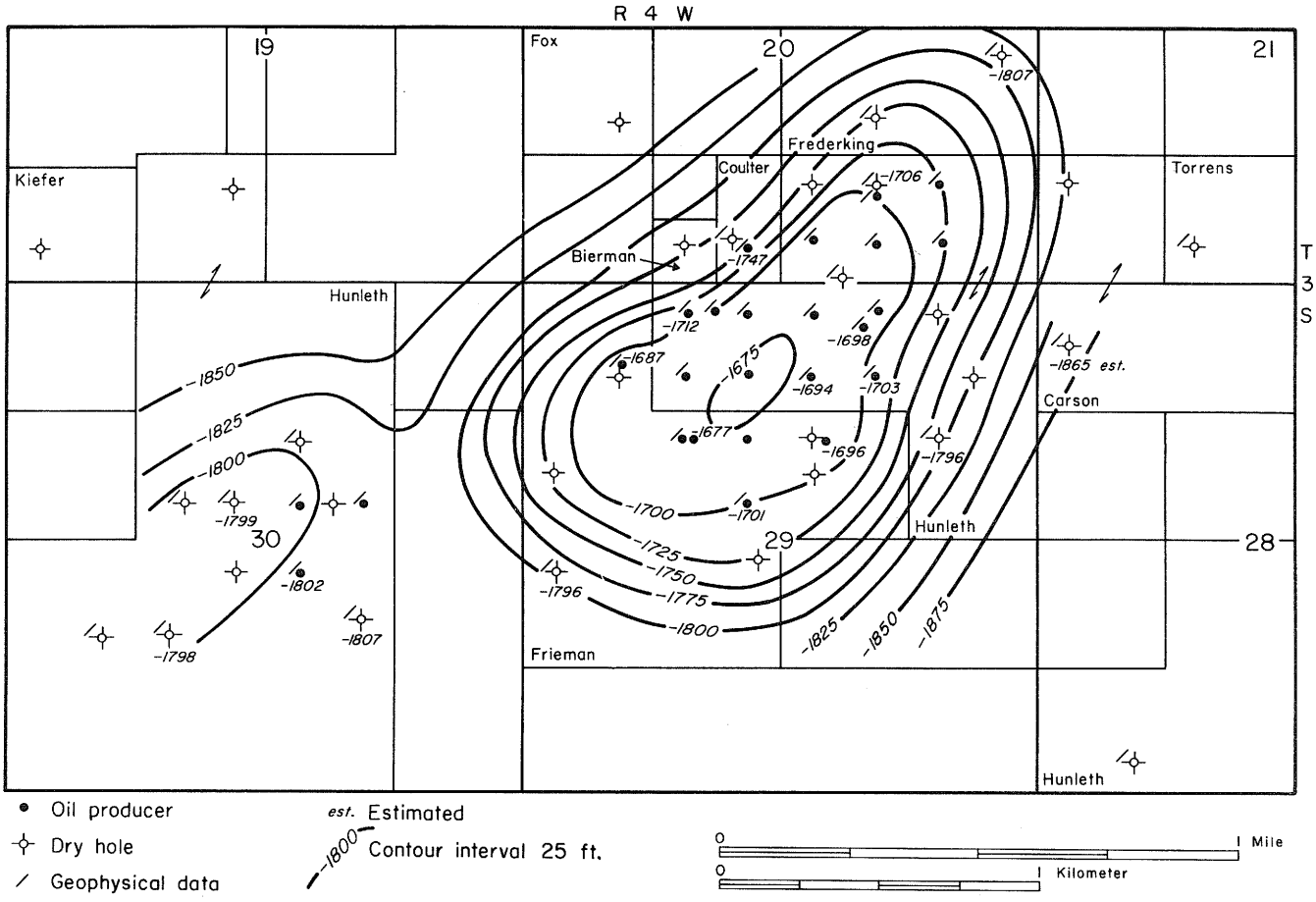
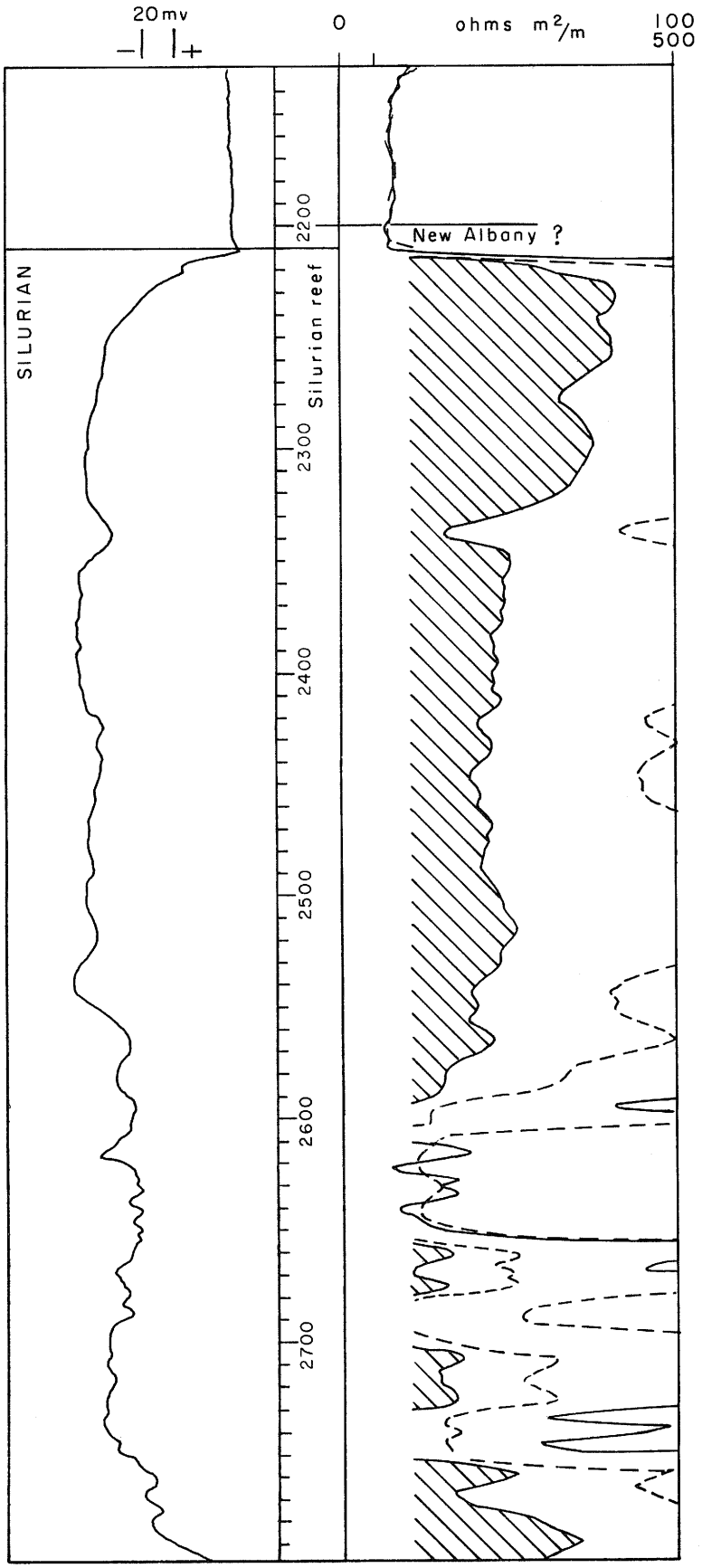


Fig. 36 - Structure map of the McKinley field drawn on the top of the Silurian.



Electric Log
McBride No. 1 Hunleth
SE-NE-NW 29-3S-4W, Washington County
El. 542 ft

McKINLEY FIELD

Oil Production, bbl

Year	Annual	Cumulative
1940	3,717	3,717
1941	86,792	90,509
1942	45,356	135,865
1943	31,028	166,893
1944	13,131	180,024
1945	7,201	187,225
1946	5,530	192,755
1947	3,907	196,662
1948	85,032	281,694
1949	52,902	334,596
1950	28,250	362,846
1951	16,819	379,665
1952	13,090	392,755
1953	9,648	402,403
1954	9,725	412,128
1955	8,034	420,162
1956	6,881	427,043
1957	81,084	508,127
1958	89,427	597,554
1959	49,029	646,583
1960	32,919	679,502
1961	19,040	698,542
1962	13,204	711,746
1963	10,916	722,662
1964	7,895	730,557
1965	7,108	737,665
1966	4,821	742,486
1967	3,656	746,142
1968	3,213	749,355
1969	2,971	752,326
1970	3,000	755,326
1971	3,100	758,426
1972	2,300	760,726

Fig. 37 - Oil production from the McKinley field and a portion of a geophysical log from the McKinley reef.

Pool Study 12

NASHVILLE FIELD
Washington County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Producing

DISCOVERY WELL
NAME Perry Fulk No. 1 A. Harre
LOCATION 17-2S-3W, cen. SW-SW
COMPLETION DATE April 3, 1973
ELEVATION 536 ft KB
CASING 8 5/8-in. to 87 ft; 4 1/2-in. to 2,800 ft
TREATMENT Pipe set, perforated at 2,664-2,668 ft and 2,716-2,726 ft; then acidized
TOTAL DEPTH 3,776 ft
INITIAL PRODUCTION 25 BO, no water, per day. In July 1973 converted to SWD well.

PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton)
KIND OF TRAP Stratigraphic - Silurian reef
PRODUCTIVE AREA
PROVED Approximately 600 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 24 reef and 2 off reef
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Limestone - reef
CHARACTER OF OIL 41.3° API gravity. Viscosity - 36 cP at 100° F.
COMPLETION PRACTICES Pipe set through and perforated; well then acidized.
MARKET FOR OIL Sohio Petroleum Co. and Ashland Oil, Inc.

See figures 38 and 39.

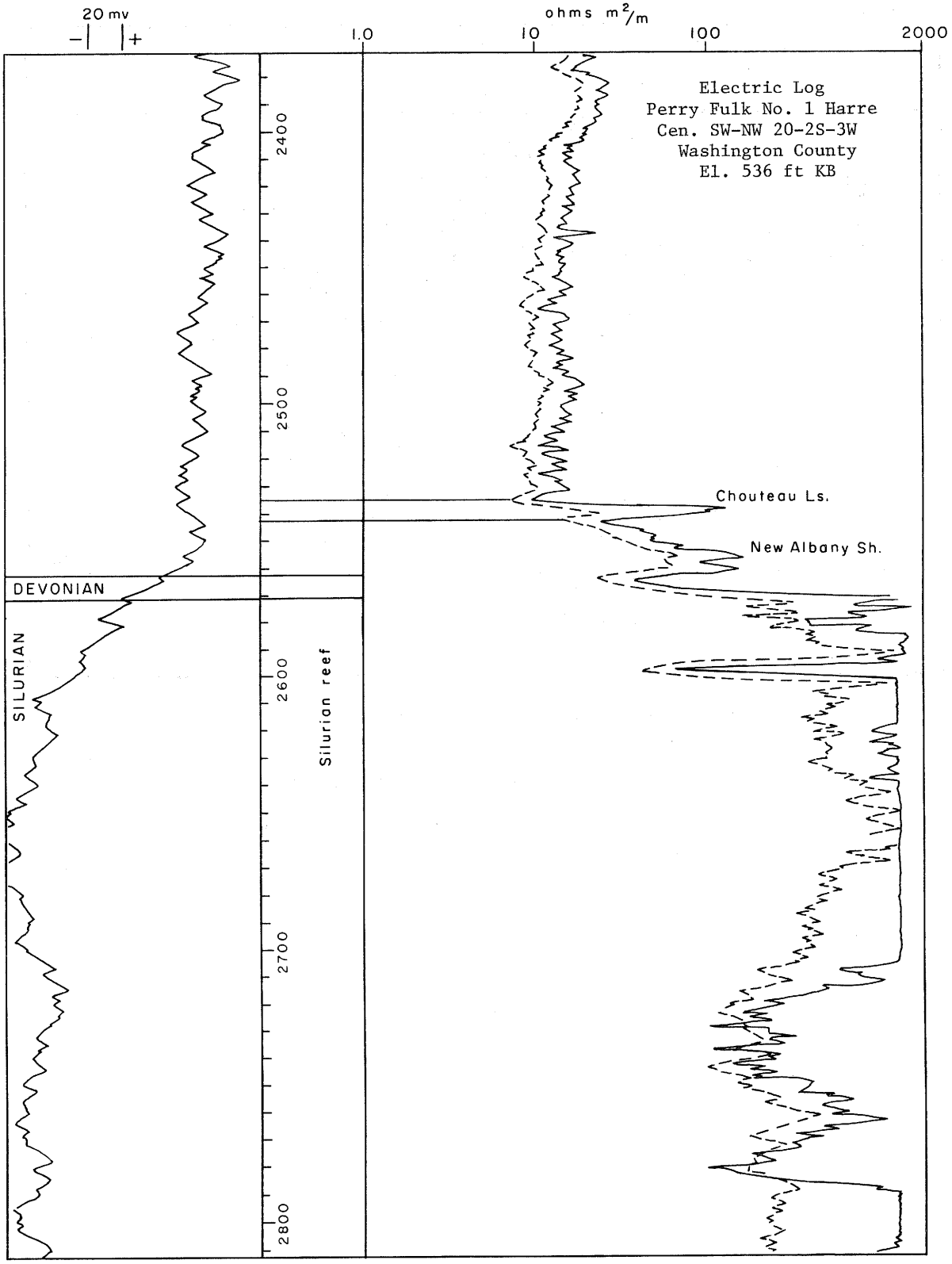


Fig. 38 - A portion of a geophysical log from the Nashville reef.

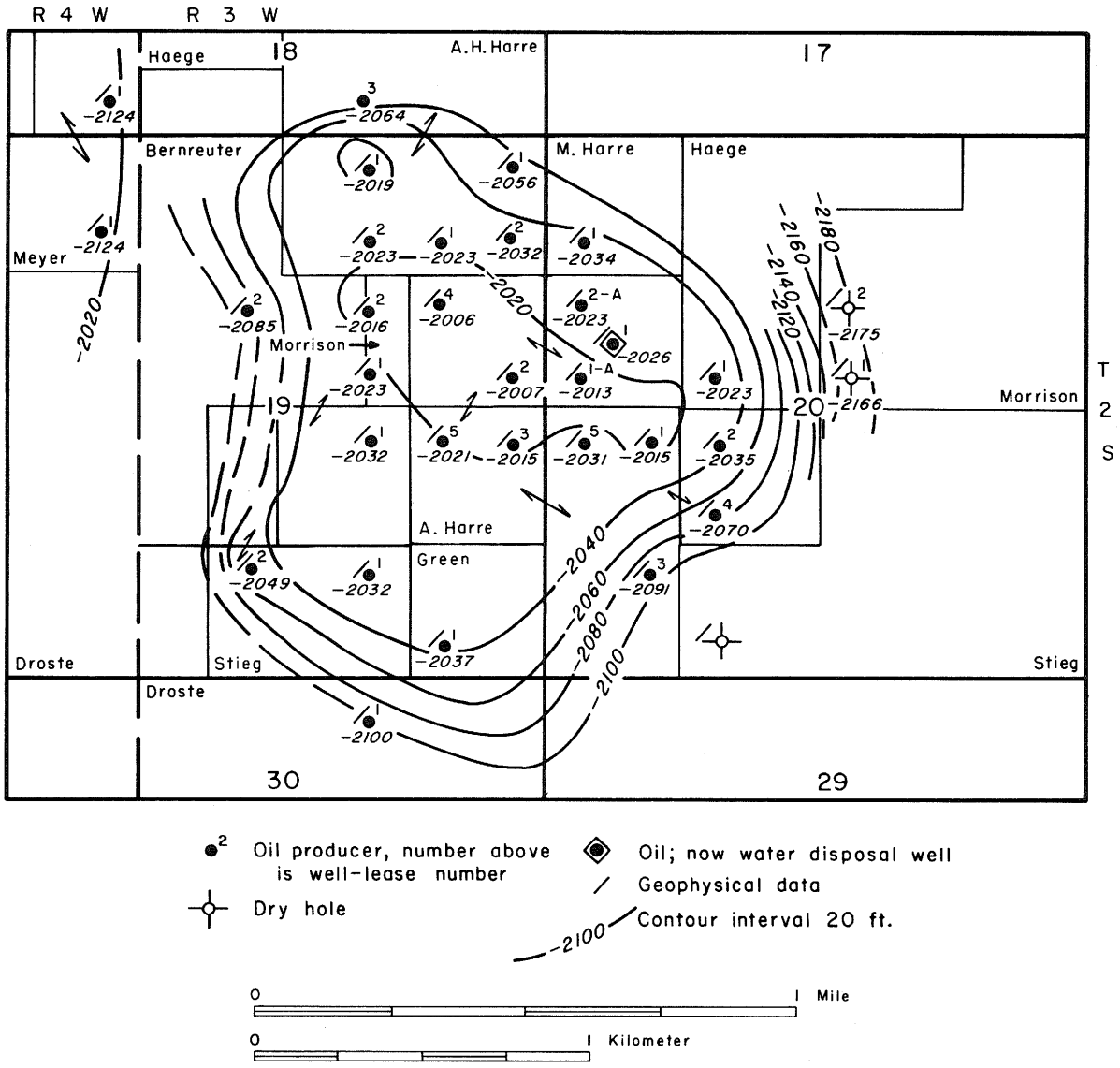


Fig. 39 - Structure map of the Nashville field drawn on the top of the Hunton Megagroup.

Pool Study 13

NEVINS FIELD
Edgar County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing on a known coal high
STATUS OF FIELD Gas storage field - never produced any oil.

DISCOVERY WELL
NAME National Associated and Continental Oil No. 1 J. D. Martin
LOCATION 5-12N-11W, NW-NW-NE
COMPLETION DATE April 1950
ELEVATION 635 ft
CASING Not known
TREATMENT Not known
TOTAL DEPTH 2,037 ft
INITIAL PRODUCTION D&A

PRODUCING STRATA None - gas stored in Geneva Dolomite Member (Devonian) draped over a Silurian reef. Project started in 1961.
DEEPEST STRATIGRAPHIC UNIT PENETRATED Silurian
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA
PROVED 1,320 acres within -1,400-ft closure contour on top of the Hunton
PROBABLE Same as above—closure of 86 ft
APPROVED SPACING —
NUMBER OF HUNTON WELLS 19

REFERENCES AND NOTES
Illinois Commerce Commission Hearings Docket on Gas Storage No. 48793.

Buschbach, T. C., and D. C. Bond, 1967, Underground storage of natural gas in Illinois—1967: Illinois Geol. Survey Illinois Petroleum 86, p. 39, 41, and 42.

See figures 40, 41, and 42.

Electric Log
Midwestern Gas Transmission Co. No. 6 Martin-Nevins
NW-SW-NE 5-12N-11W, Edgar County
El. 637 ft

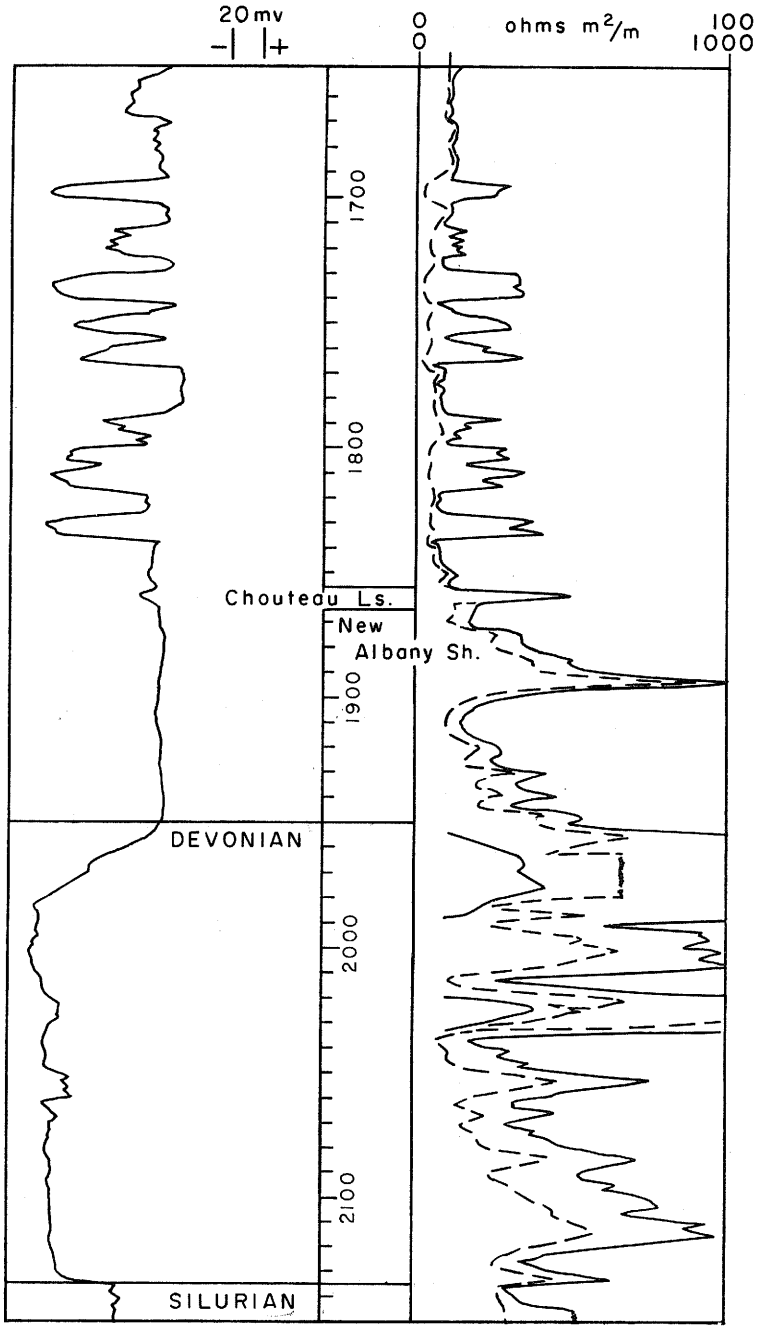


Fig. 40 - A portion of a geophysical log from the Nevins gas storage field.

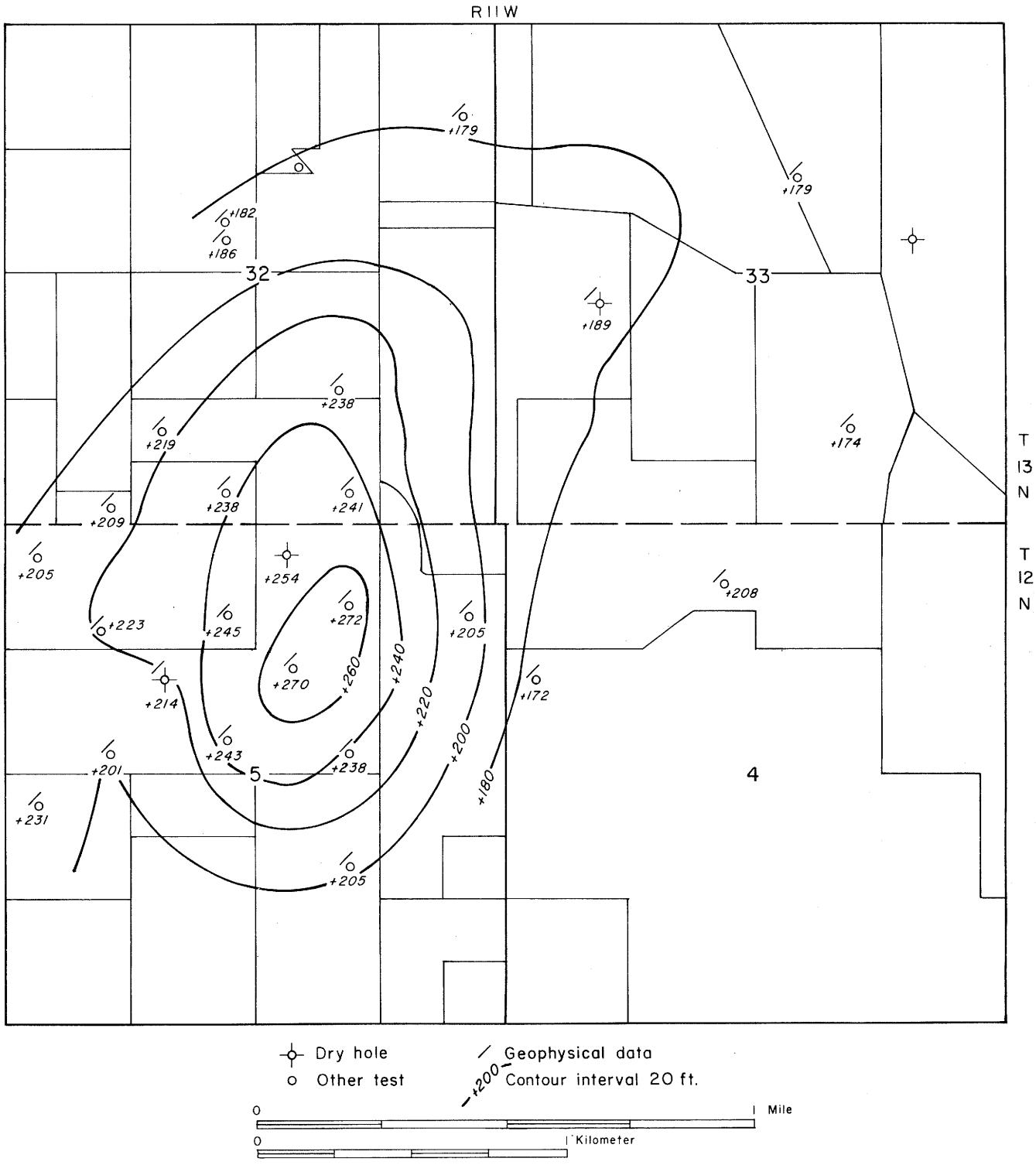


Fig. 41 - Structure map of the Nevins gas storage field drawn on the top of the Ste. Genevieve Limestone (Mississippian).

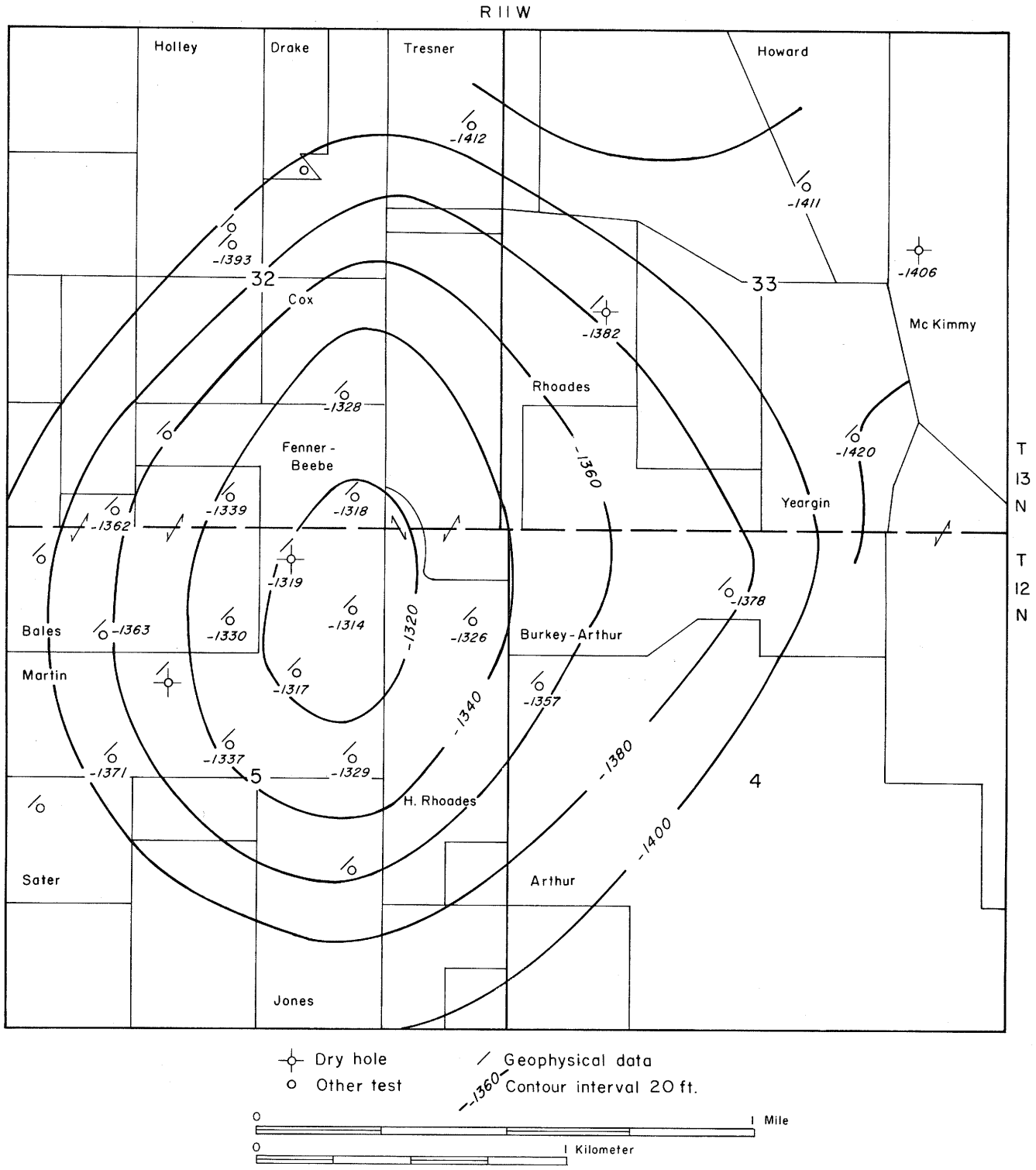


Fig. 42 - Structure map of the Nevins gas storage field drawn on the top of the Middle Devonian carbonate.

Pool Study 14

NEW BADEN EAST FIELD
Clinton County

EXPLORATION METHOD LEADING TO DISCOVERY Subsurface study based on existing dry holes and coal data. The surface expression of the creeks indicated west and south flanks of reef.

STATUS OF FIELD Producing

DISCOVERY WELL
- NAME Brand No. 1 Wieberg
- LOCATION 9-1N-5W, SW-SE-SW
- COMPLETION DATE October 1958
- ELEVATION 427 ft
- CASING 8-in. to 41 ft, 4-in. to 1,930 ft
- TREATMENT Acidized with 500 gal
- TOTAL DEPTH 2,028 ft
- INITIAL PRODUCTION 48 BO, some water, in 24 hr

PRODUCING STRATA Silurian reef

DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), 5-1N-5W, Lester No. 1 Harpstrite Comm.

KIND OF TRAP Stratigraphic - a Silurian reef

PRODUCTIVE AREA
- PROVED 270 acres
- PROBABLE 290 acres
- APPROVED SPACING 20 acres
- NUMBER OF WELLS THAT PRODUCED 17
- NUMBER OF DRY HOLES 8 (2 in field, 6 off edge of field)

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK 161 ft of reef limestone penetrated, of which about 50 to 60 ft was oil bearing.

CHARACTER OF OIL

39.4° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	4.32	6.17	12.28

INITIAL FIELD PRESSURE 655 lb on a DST; some wells flowed.

COMPLETION PRACTICES In some wells, pipe set through pay section and perforated, followed by acid treatment; in others, pipe set on top of pay, hole drilled deeper and acidized.

MARKET FOR OIL Sohio Petroleum Co.

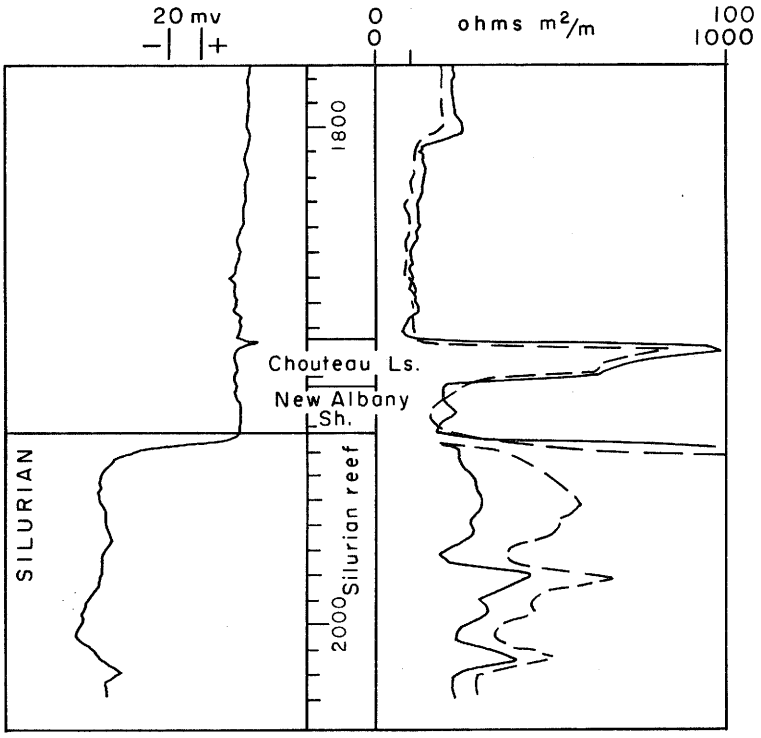
REFERENCES AND NOTES

Bristol, H. M., 1968, New Baden East field, Clinton County, Illinois, in Geology and petroleum production of the Illinois Basin: a symposium: Evansville, Indiana: Illinois and Indiana-Kentucky Geological Societies, p. 167-171.

Very high water/oil ratio.

See figures 43, 44, and 45.

Electric Log
Brand Oil Co. No. 1 Wieberg
SW-SE-SW 9-1N-5W, Clinton County
El. 428 ft



NEW BADEN EAST FIELD

Oil Production, bbl

Year	Annual	Cumulative
1958	567	567
1959	19,557	20,124
1960	26,775	46,899
1961	23,491	70,390
1962	22,016	92,406
1963	15,007	107,413
1964	11,509	118,922
1965	8,415	127,337
1966	8,032	135,369
1967	9,342	144,711
1968	11,288	155,999
1969	9,351	165,350
1970	11,627	176,977
1971	14,000	190,977
1972	12,300	203,277

Fig. 43 - Oil production from the New Baden East field and a portion of a geophysical log from the New Baden East reef.

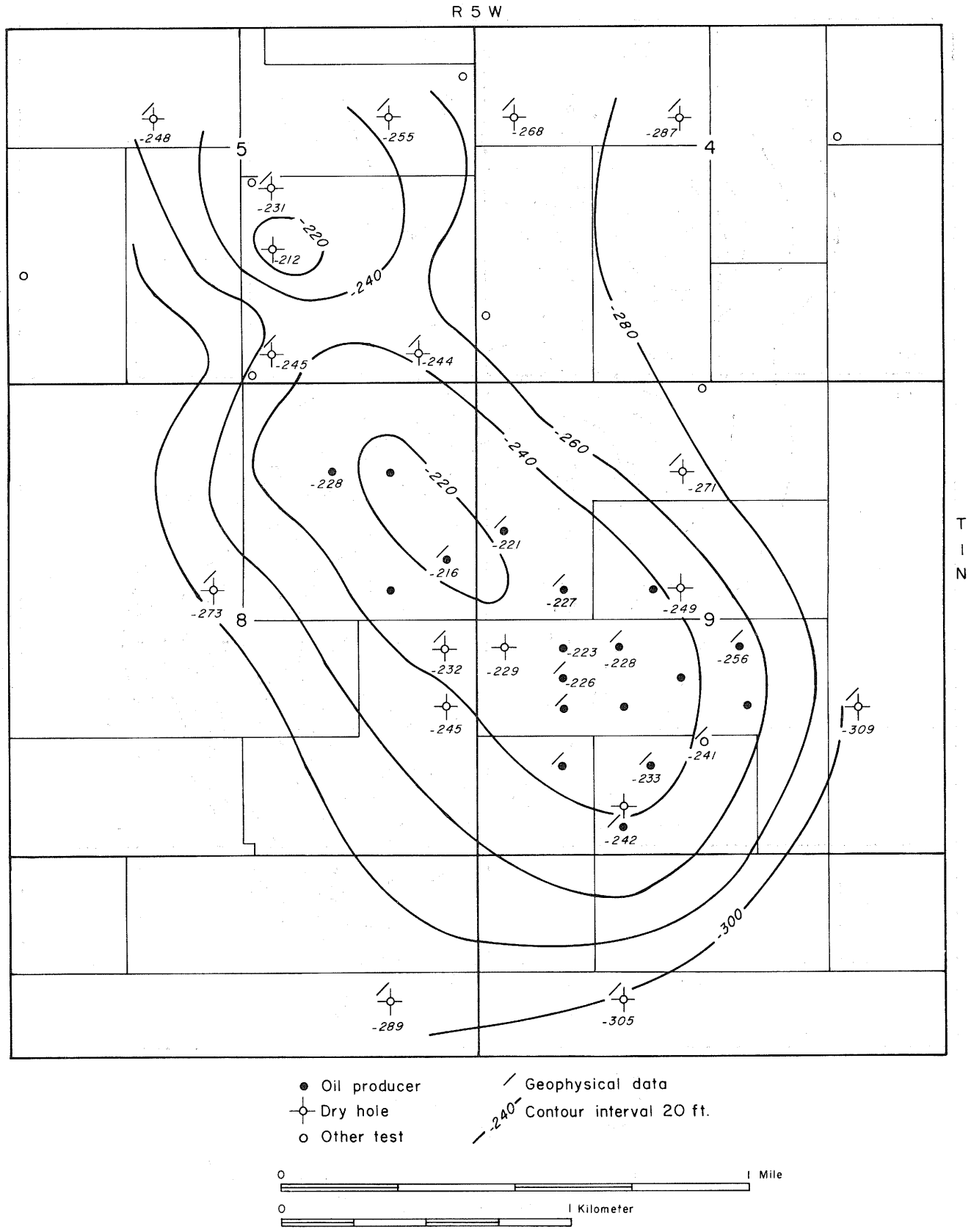


Fig. 44 - Structure map of the New Baden East field drawn on the base of the Beech Creek Limestone (Mississippian).

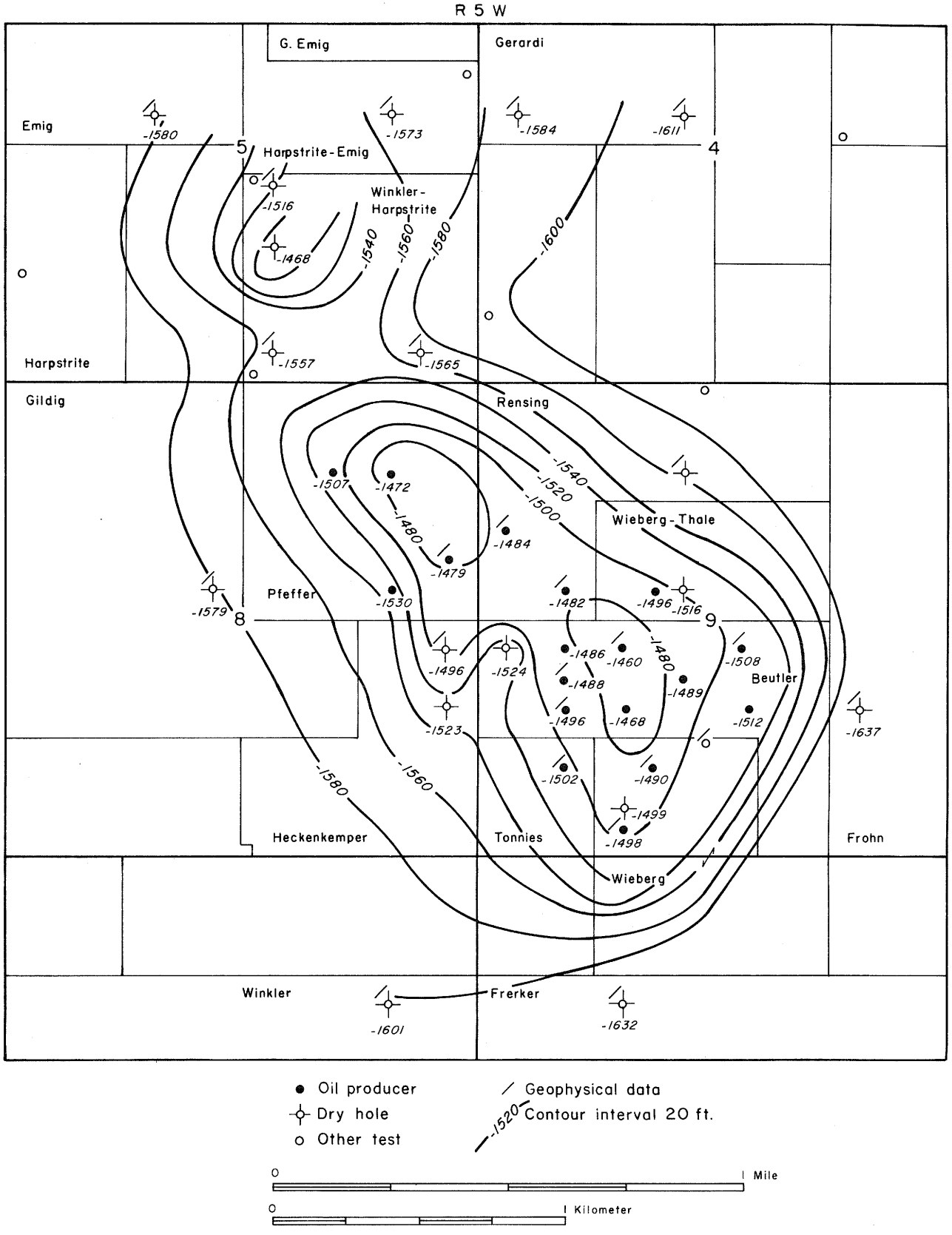


Fig. 45 - Structure map of the New Baden East field drawn on the top of the Hunton Megagroup.

Pool Study 15

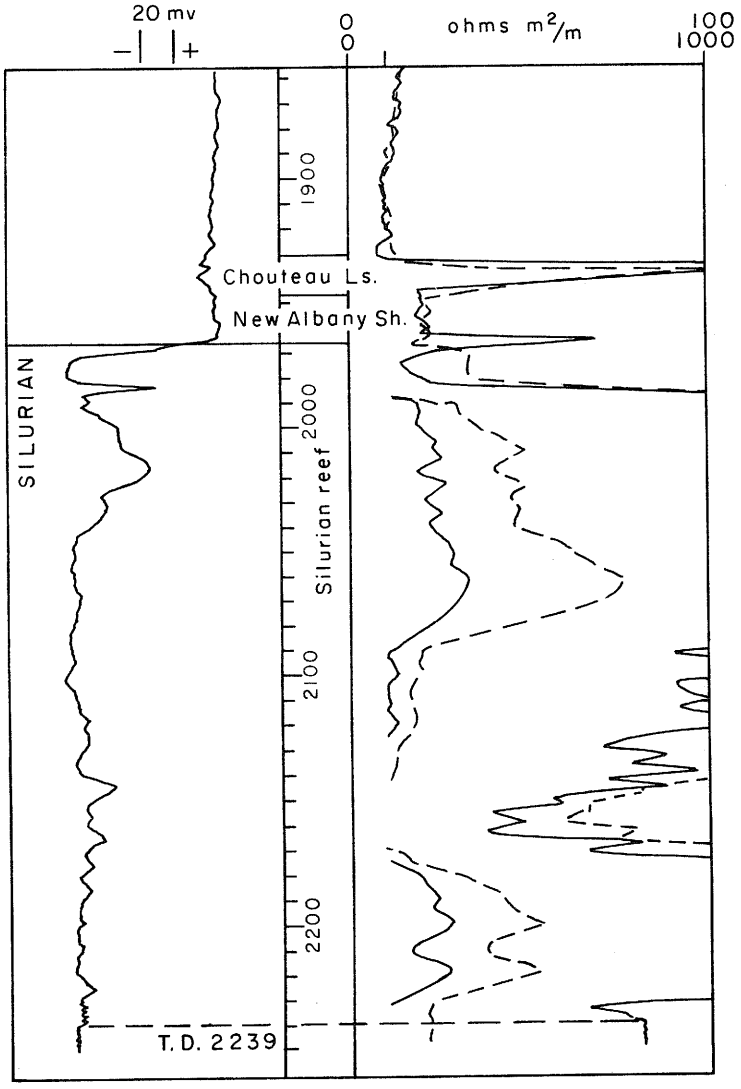
NEW MEMPHIS FIELD
Clinton County

EXPLORATION METHOD LEADING TO DISCOVERY A subsurface study of the area substantiated a gravity and seismic high.

STATUS OF FIELD Producing

DISCOVERY WELL

NAME Gulf No. 1 Elmer Oelze
LOCATION 3-1S-5W, NW-NE-SW
COMPLETION DATE December 7, 1951
ELEVATION 401 ft
CASING 8 1/2-in. to 120 ft; 5 1/2-in. to 2,076 ft; set with 50 sacks of cement
TREATMENT Perforated at 1,942-2,075 ft, well acidized with 5,600 gal
TOTAL DEPTH 2,077 ft
INITIAL PRODUCTION 8.7 BOPD. Well showed better on swab, as much as 27 BOPD.



Electric Log
Gulf No. 7 Oelze
NW-NW-SE 3-1S-5W, Clinton County
El. 402 ft

NEW MEMPHIS FIELD
Oil Production, bbl

Year	Annual	Cumulative
1952	18,214	18,214
1953	18,760	36,974
1954	238,487	275,461
1955	442,579	718,040
1956	286,742	1,004,782
1957	151,340	1,156,122
1958	143,368	1,299,490
1959	124,137	1,423,627
1960	109,918	1,533,545
1961	102,443	1,635,988
1962	96,049	1,732,037
1963	83,491	1,815,528
1964	75,848	1,891,376
1965	68,811	1,960,187
1966	58,879	2,019,066
1967	54,599	2,073,665
1968	52,449	2,126,114
1969	51,758	2,177,872
1970	54,147	2,232,019
1971	55,500	2,287,519
1972	48,700	2,336,219

Fig. 46 - Oil production from the New Memphis field and a portion of a geophysical log from the New Memphis reef.

NEW MEMPHIS FIELD continued

PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), 4-1S-5W, Friederich No. 1 Broeckling (nearly off reef)
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA
PROVED 740 acres
PROBABLE 780 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 37
NUMBER OF DRY HOLES 15 around flank of

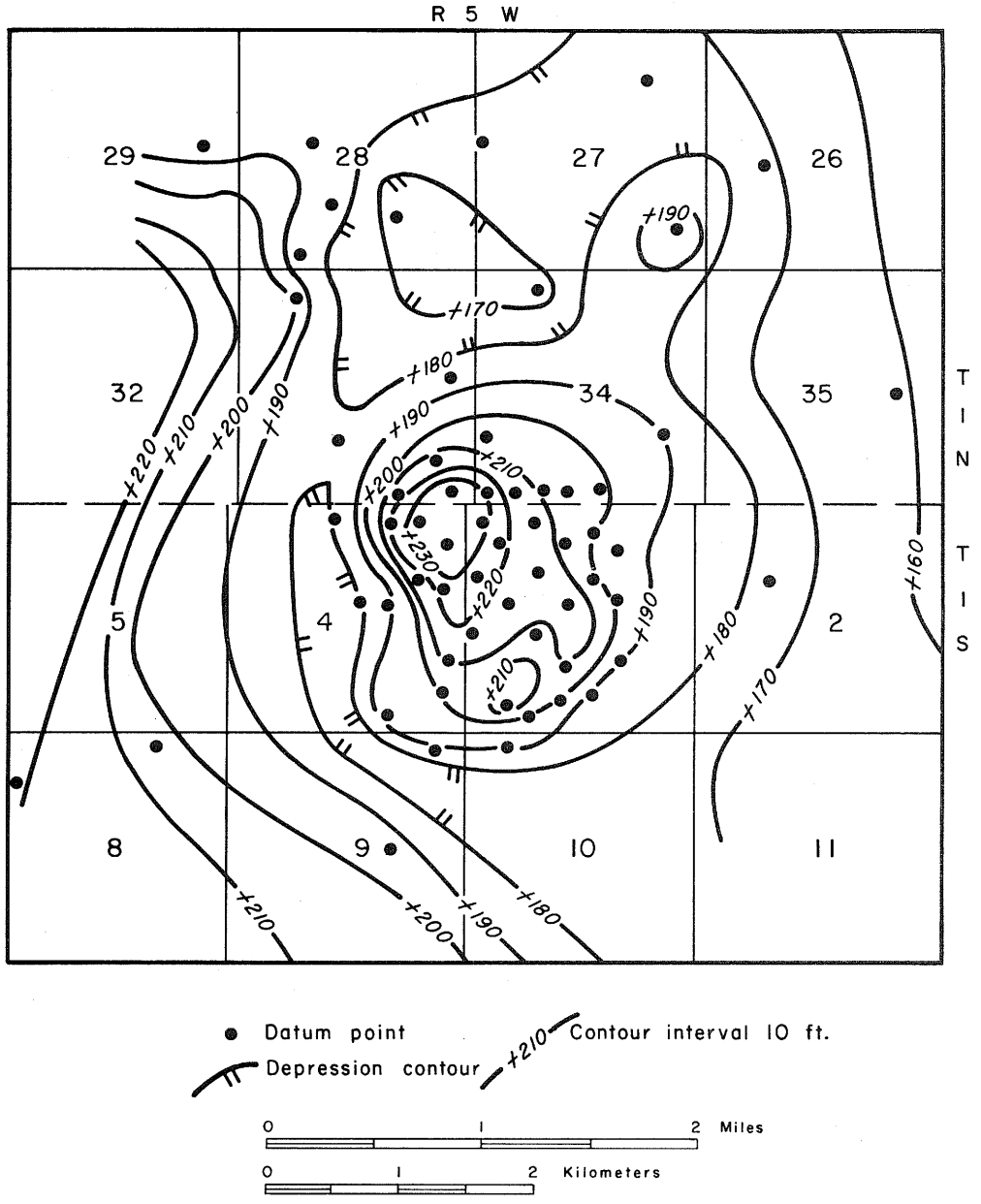


Fig. 47 - Structure map of the New Memphis field drawn on the top of the West Franklin Limestone Member (Pennsylvanian).

NEW MEMPHIS FIELD continued

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK 275 ft of reef rock having vuggy porosity was penetrated. Some Silurian dolomite wedges produce oil on the flanks.

CHARACTER OF OIL

40.6° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	3.49	4.72	15.05

INITIAL FIELD PRESSURE 940 lb BHP. Some wells flowed as they were swabbed.

COMPLETION PRACTICES In some wells pipe set through pay section and perforated; well then acidized. In other wells, pipe set above pay, well drilled deeper and then acidized.

MARKET FOR OIL Sohio Petroleum Co.

REFERENCES AND NOTES

Van Horn, C. L., 1956, Effects of a Silurian reef on Mississippian and Pennsylvanian sediments: Univ. Illinois M.S. thesis.

See figures 46, 47, 48, and 49.

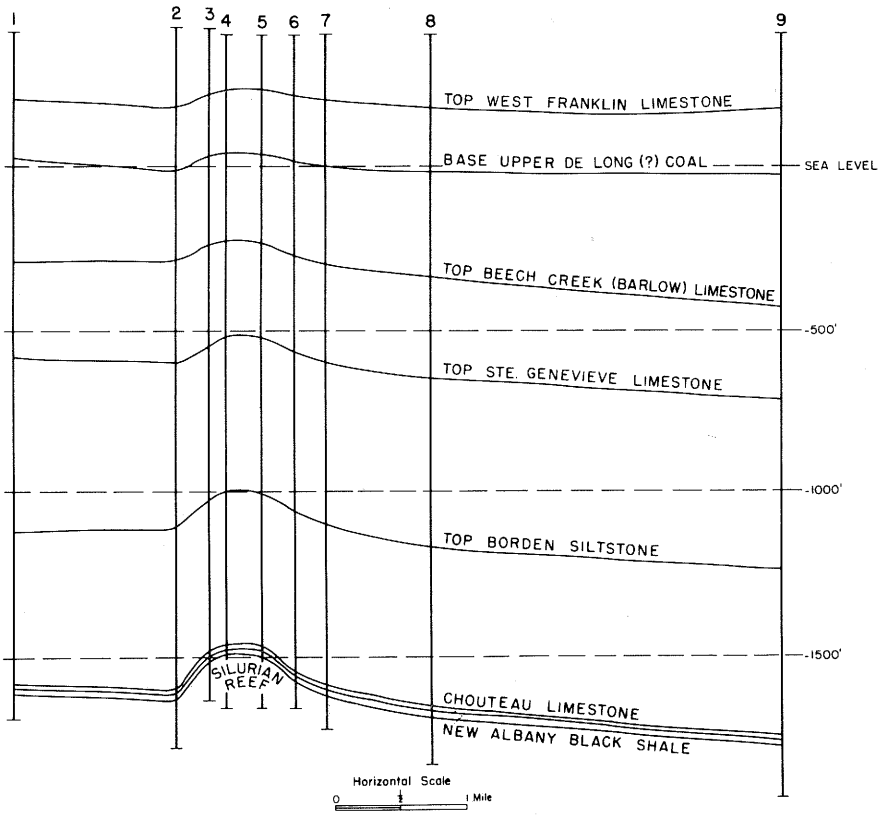


Fig. 48 - East-west cross section of New Memphis field, adapted from Van Horn (1956).

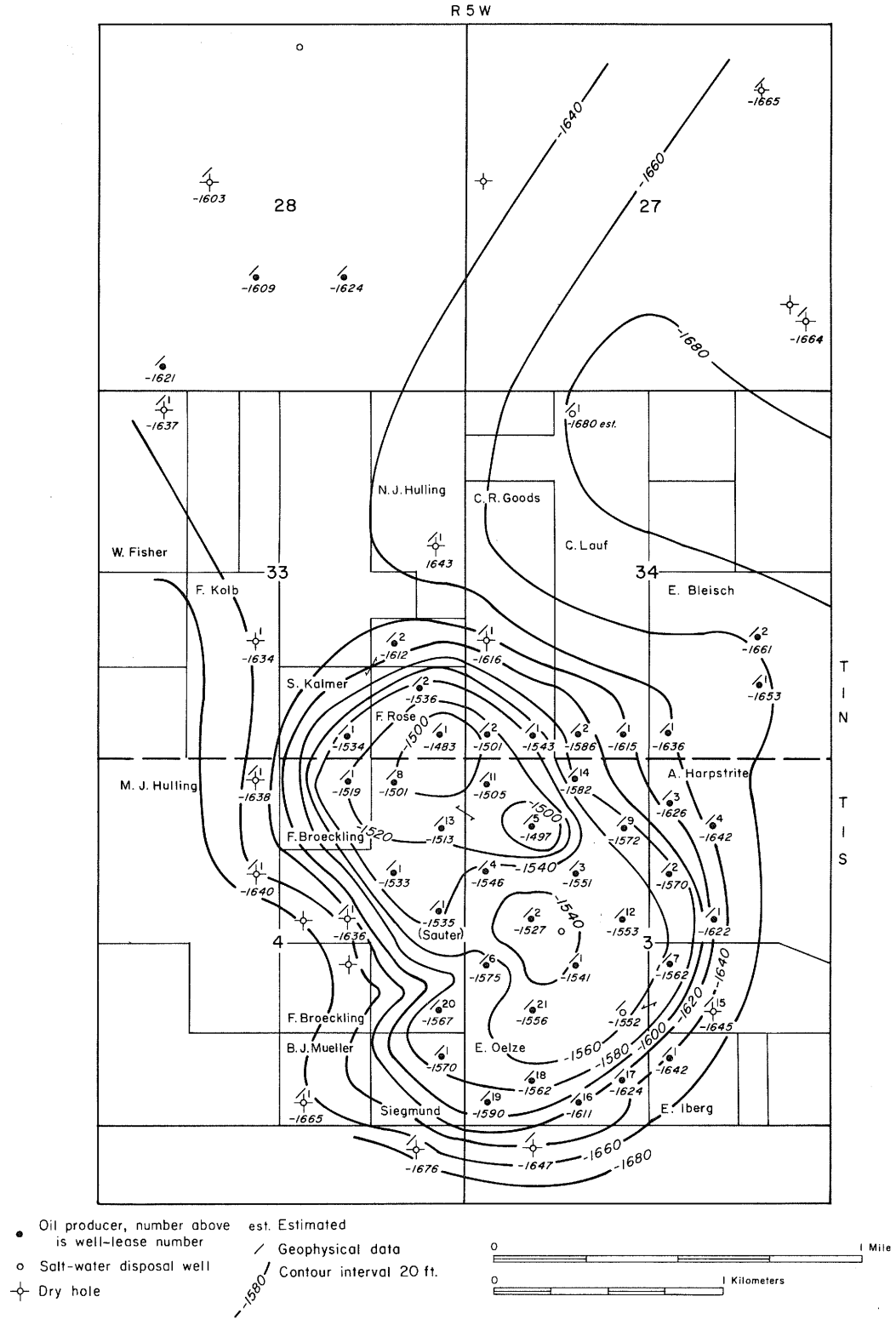


Fig. 49 - Structure map of the New Memphis field drawn on the top of the Silurian.

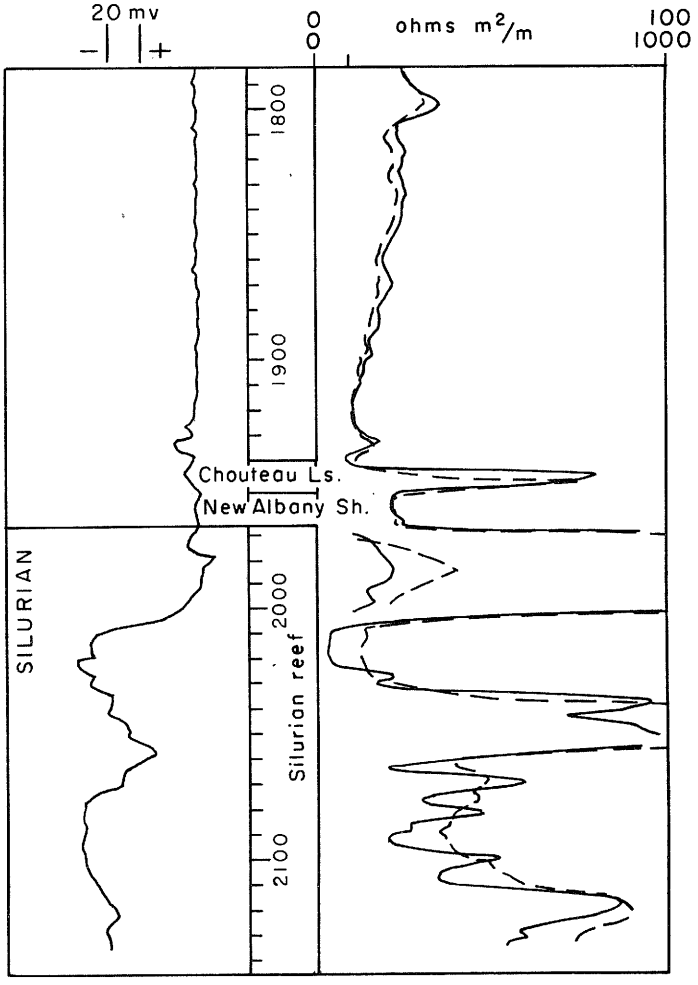
Pool Study 16

NEW MEMPHIS SOUTH FIELD
Clinton and Washington Counties

EXPLORATION METHOD LEADING TO DISCOVERY Subsurface study
STATUS OF FIELD Abandoned

DISCOVERY WELL
NAME Kohlbrecker No. 1 E. Krausz
LOCATION 17-1S-5W, cen. N½-NE-SE
COMPLETION DATE February 1952
ELEVATION 395 ft
CASING 10-in. to 106 ft, 5½-in. to 2,052 ft
TREATMENT Acidized with 1,000 gal
TOTAL DEPTH 2,052 ft
INITIAL PRODUCTION 40 BO/40 BW in 24 hr

PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Silurian
KIND OF TRAP Stratigraphic - a Silurian reef



Electric Log
Collins Bros. Oil Co. No. 1 Dill Comm.
NE-SW-NW 21-1S-5W, Washington County
El. 397 ft

NEW MEMPHIS SOUTH FIELD
Oil Production, bbl

Year	Annual	Cumulative
1952	743	743

Abandoned.

Fig. 50 - Oil production from the New Memphis South field and a portion of a geophysical log from the New Memphis South reef.

NEW MEMPHIS SOUTH FIELD continued

PRODUCTIVE AREA
PROVED 40 acres
PROBABLE 60 acres
APPROVED SPACING 20 acres

NUMBER OF WELLS THAT PRODUCED 2
NUMBER OF DRY HOLES 14 around reef

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Shows for approximately 100 ft into the reef have been reported.
CHARACTER OF OIL 37.4° API gravity
INITIAL FIELD PRESSURE Discovery well recorded 900 lb BHP on DST.
COMPLETION PRACTICES Pipe set through pay and perforated; well then acidized.

See figures 50, 51, and 52.

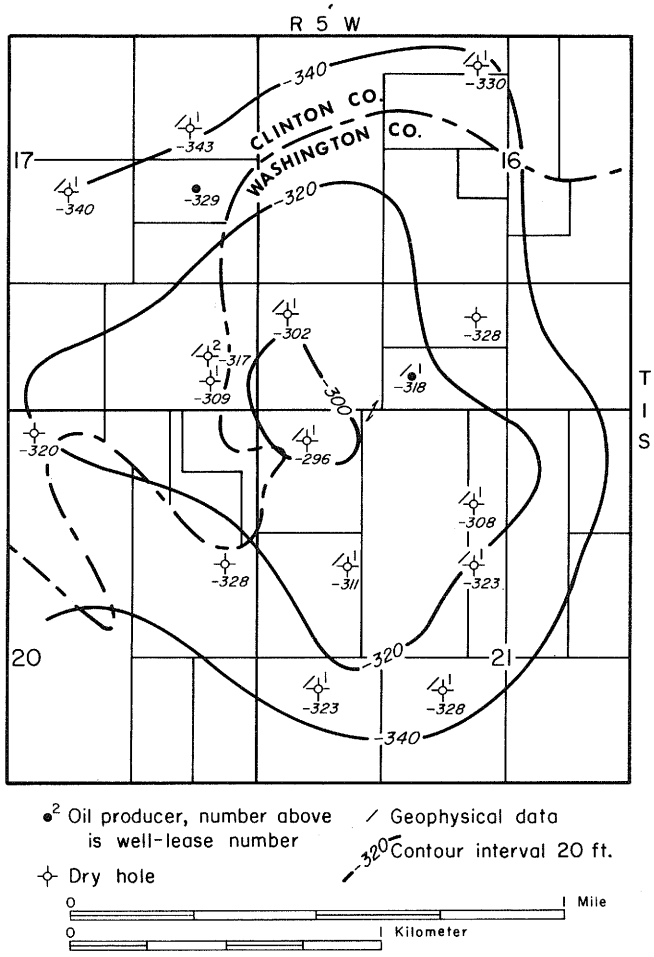


Fig. 51 - Structure map of the New Memphis South field drawn on the base of the Beech Creek Limestone (Mississippian).

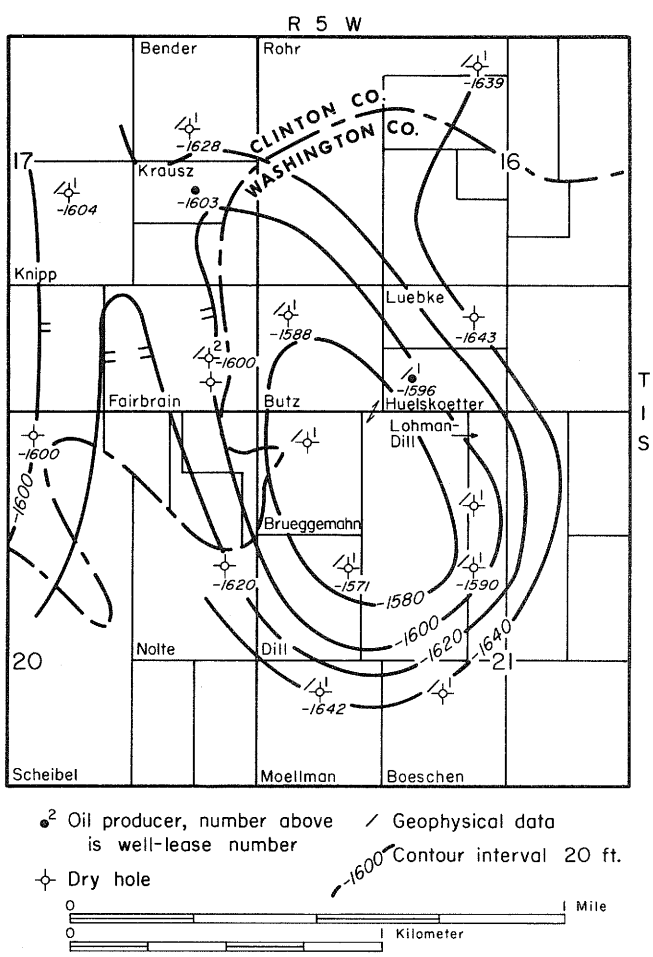


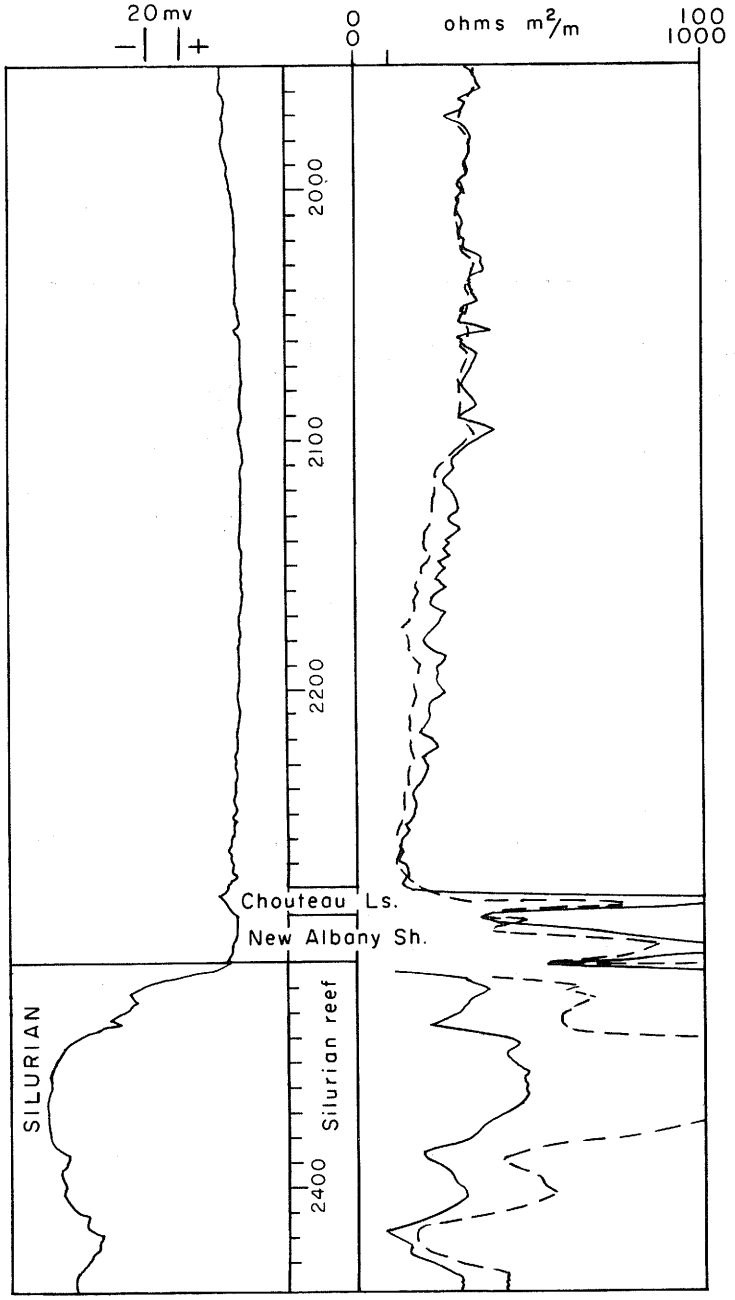
Fig. 52 - Structure map of the New Memphis South field drawn on the top of the Silurian.

Pool Study 17

OKAWVILLE FIELD
Washington County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Abandoned
DISCOVERY WELL
NAME Obering No. 1 Baldwin
LOCATION 15-1S-4W, NE-SE-SE
COMPLETION DATE May 1951
ELEVATION 440 ft

CASING $10\frac{3}{4}$-in. to 107 ft, $5\frac{1}{2}$-in. to 2,324 ft
TREATMENT Acidized first with 500 gal MCA, then with 1,500 gal
INITIAL PRODUCTION 56 BOPD



Electric Log
Obering No. 1 Toensing Comm.
NW-SW-SW 14-1S-4W, Washington County
El. 436 ft

OKAWVILLE FIELD
Oil Production, bbl

Year	Annual	Cumulative
1951	8,845	8,845
1952	7,156	16,001
1953	4,327	20,328
1954	3,257	23,585
1955	2,750	26,335
1956	5,403	31,738
1957	4,214	35,952
1958	4,067	40,019
1959	3,386	43,405
1960	2,835	46,240
1961	3,266	49,506
1962	2,675	52,181
1963	2,352	54,533
1964	2,363	56,896
1965	1,455	58,351
1966	1,835	60,186
1967	1,652	61,838
1968	1,436	63,274
1969	0	63,274
1970	360	63,634
1971	Abandoned	63,634
1972	Abandoned	63,634

Fig. 53 - Oil production from the Okawville field and a portion of a geophysical log from the Okawville reef.

OKAWVILLE FIELD continued

PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), TD 3,510 ft, in 15-1S-4W
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA
PROVED 60 acres
PROBABLE 60 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 4
NUMBER OF DRY HOLES 7, of which 3 were off reef
CHARACTER OF OIL 40° API gravity
INITIAL FIELD PRESSURE No pressures recorded on DST.
COMPLETION PRACTICES Pipe set into top of reef above pay and well then acidized.
MARKET FOR OIL Ashland Oil, Inc.

See figures 53, 54, and 55.

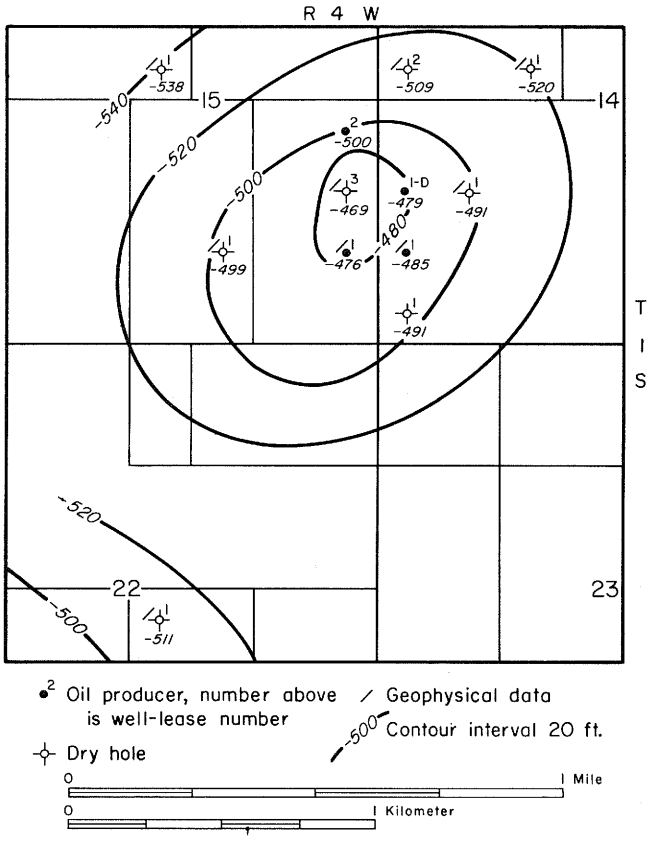


Fig. 54 - Structure map of the Okawville field drawn on the base of the Beech Creek Limestone (Mississippian).

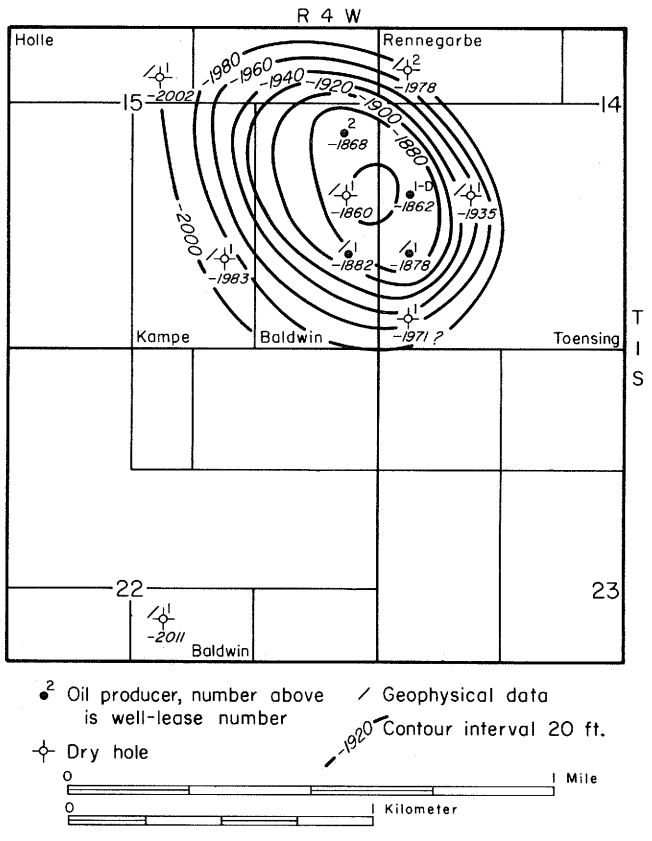


Fig. 55 - Structure map of the Okawville field drawn on the top of the Silurian.

Pool Study 18

OKAWVILLE NORTH CONSOLIDATED FIELD
Washington County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Reef portion shut down

DISCOVERY WELL
NAME Sun Oil Co. No. 1 A. Duerkob
LOCATION 3-1S-4W, SE-SW-SW
COMPLETION DATE July 1955
ELEVATION 414 ft
CASING 8 5/8-in. to 143 ft, 5 1/2-in. to 2,244 ft
TREATMENT None
TOTAL DEPTH 2,262 ft
INITIAL PRODUCTION 125 BO flowing per day

PRODUCING STRATA Silurian reef and non-reef Silurian dolomite
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), 3,070 ft, Brehm No. 1 Kockamohr, 5-1S-4W, NW-NW-SW
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA
PROVED 210 acres
PROBABLE 210 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 12
NUMBER OF DRY HOLES 21

CHARACTER OF OIL In the reef portion of the field in sec. 3, the gravity was 40.0° API.
INITIAL FIELD PRESSURE 1,090 lb on a DST.
COMPLETION PRACTICES Various - but all acidized

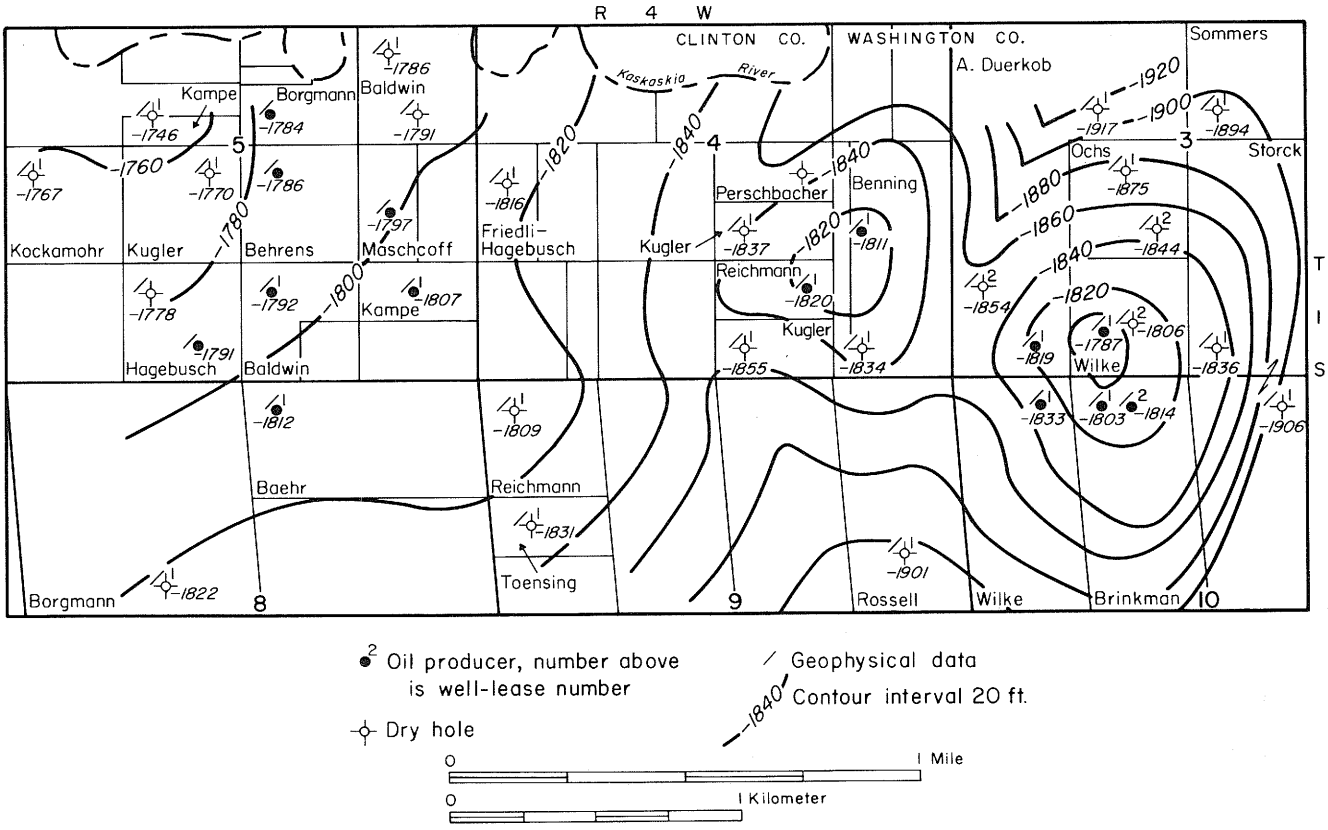


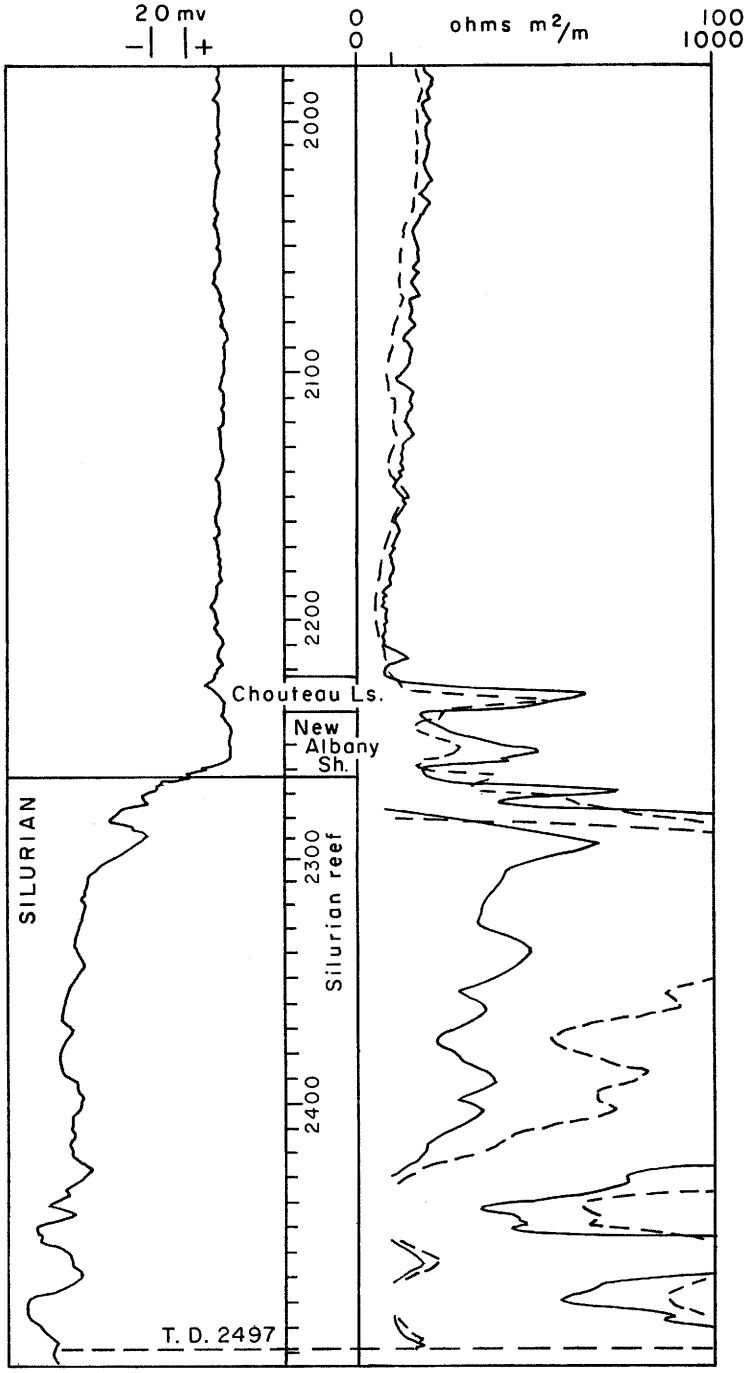
Fig. 56 - Structure map of the Okawville North Consolidated area drawn on the top of the Hunton Megagroup.

OKAWVILLE NORTH CONSOLIDATED FIELD continued

MARKET FOR OIL Ashland Oil, Inc.; Sohio Petroleum Co.

NOTES The reef portion of the field is made up of two reef cores, both of which have been eroded. The west reef core has been eroded more than the one to the east. The production from 5-1S-4W comes from Silurian dolomite and not from a reef.

See figures 56 and 57.



Electric Log
Sun Oil Co. No. 2 A. Duerkob
NW-SW-SW 3-1S-4W, Washington County
El. 411 ft

OKAWVILLE NORTH CONSOLIDATED FIELD
Oil Production, bbl

Year	Annual	Cumulative
1955	2,590	2,590
1956	5,342	7,932
1957	3,330	11,262
1958	6,828	18,090
1959	4,895	22,985
1960	4,867	27,852
1961	2,743	30,595
1962	1,920	32,515
1963	2,259	34,774
1964	1,870	36,644
1965	1,574	38,218
1966	1,156	39,374
1967	1,538	40,912
1968	2,717	43,629
1969	30,917	74,546*
1970	21,524	96,070
1971	18,876	114,946
1972	8,035	122,981

* More wells drilled.

Fig. 57 - Oil production from the Okawville North Consolidated area and a portion of a geophysical log from the Okawville North Consolidated reef.

Pool Study 19

PATOKA FIELD
Clinton and Marion Counties

EXPLORATION METHOD LEADING TO DISCOVERY Structure mapping of Herrin (No. 6) Coal Member, confirmed by seismographing.

STATUS OF FIELD Producing

DISCOVERY WELL

	Yankeetown ("Benoist") Pool	Devonian Pool
NAME	Adams Oil & Gas No. 1 Meryman	Adams Oil & Gas No. 1 D. Pugh
LOCATION	21-4N-1E, cen. SE-SW	29-4N-1E, cen. NW-SE
COMPLETION DATE	1937	January 1943
ELEVATION	498 ft	500 ft
CASING	6 5/8-in. to 96 ft, 4 1/2-in. to 1,396 ft	10 3/4-in. to 105 ft, 7-in. to 2,887 ft
TREATMENT	Shot	Acidized with 1,000 gal
TOTAL DEPTH	1,418 ft	2,908 ft
INITIAL PRODUCTION	86 BO flowing in 24 hr	110 BO/16 BW in 24 hr

PRODUCING STRATA Cypress, "Benoist," Aux Vases, Spar Mountain (all Mississippian); Geneva (Devonian); Galena (Trenton).

DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton) in many holes.

KIND OF TRAP An anticline with a Silurian reef at the northeast end. Devonian produced from the Grand Tower Limestone draped over the reef.

PRODUCTIVE AREA

	Field	Devonian
PROVED	1,140 acres	120 acres
PROBABLE	1,140 acres	?
APPROVED SPACING	10, 20, and 40 acres	20 acres

NUMBER OF DEVONIAN WELLS THAT PRODUCED 4

NUMBER OF DRY HOLES 41 Galena (Trenton) producing wells; 5 other holes, which were dry, tested only Devonian.

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Porous over approximately 40-ft section in the carbonate rocks of Devonian age.

CHARACTER OF OIL 40° API gravity

INITIAL PRESSURE 1,100 lb BHP (highest noted)

COMPLETION PRACTICES Generally pipe set on top of pay and well then acidized.

MARKET FOR OIL Sohio Petroleum Co.

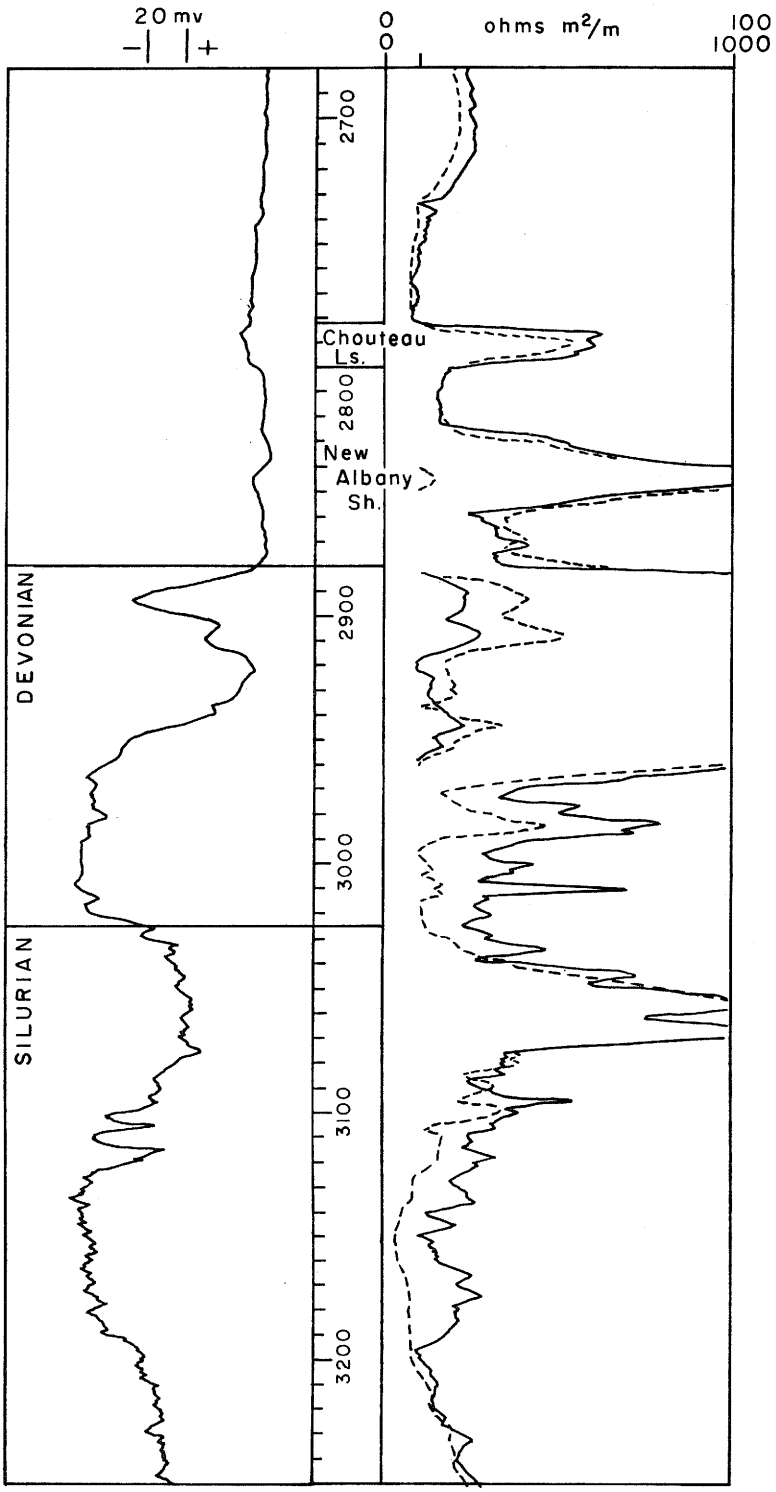
REFERENCES AND NOTES

Smoot, T. W., 1958, Relation of Silurian reefs to Ordovician structure in the Patoka oil area: Illinois Geol. Survey Circ. 258, 20 p.

Squires, Frederick, and others, 1950, Summary of water-flooding operations in Illinois, 1950: Illinois Geol. Survey Circ. 165, 40 p., map from page 33.

See figures 58, 59, and 60.

Electric Log
Central Oil Producers No. 1 Adams
SE-NW-SW 29-4N-1E, Marion County
El. 489 ft



PATOKA FIELD
Oil Production, bbl

Year	Annual	Cumulative
1936	57,625	57,625
1937	367,375	425,000
1938	742,000	1,167,000
1939	494,000	1,661,000
1940	418,521	2,079,521
1941	418,479	2,498,000
1942	343,000	2,841,000
1943	298,000	3,139,000
1944	630,000	3,769,000
1945	1,309,000	5,078,000
1946	1,644,000	6,722,000
1947	1,301,000	8,023,000
1948	776,000	8,799,000
1949	614,000	9,413,000
1950	641,000	10,054,000
1951	456,000	10,510,000
1952	318,000	10,828,000
1953	250,000	11,078,000
1954	198,000	11,276,000
1955	180,000	11,456,000
1956	231,000	11,687,000
1957	267,000	11,954,000
1958	356,720	12,310,720
1959	230,071	12,540,791
1960	270,728	12,811,519
1961	222,188	13,033,707
1962	215,840	13,249,547
1963	186,191	13,435,738
1964	171,402	13,607,140
1965	160,150	13,767,290
1966	146,736	13,914,026
1967	126,216	14,040,242
1968	124,192	14,164,434
1969	107,549	14,271,983
1970	85,268	14,357,251
1971	74,200	14,431,451
1972	57,300	14,488,751

Fig. 58 - Oil production from the Patoka field and a portion of a geophysical log from the Patoka reef.

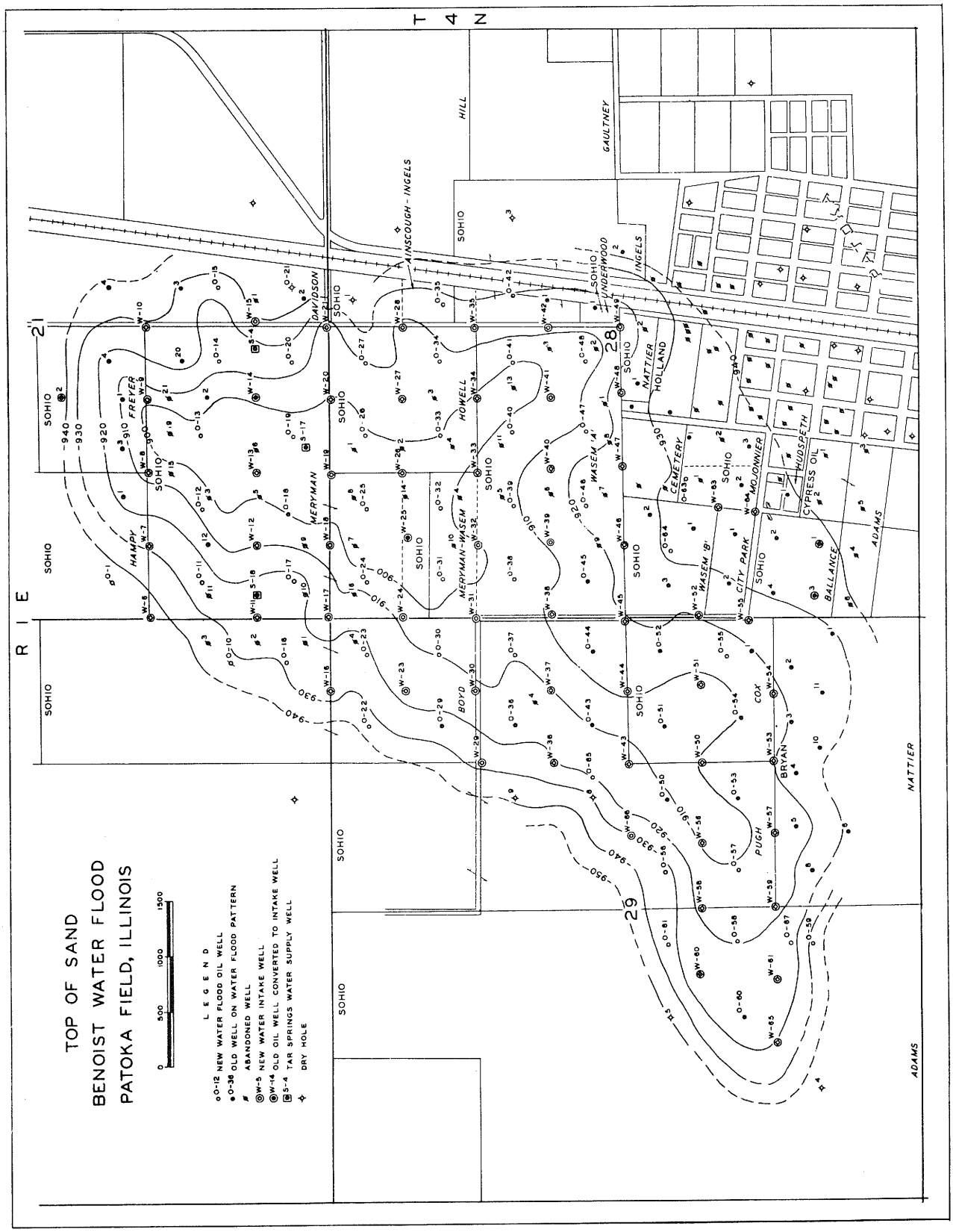


Fig. 59 - Structure map of the Patoka field on the top of the Yankeetown ("Benoist") Sandstone (Mississippian) (Squires and others [1950, p. 33]).

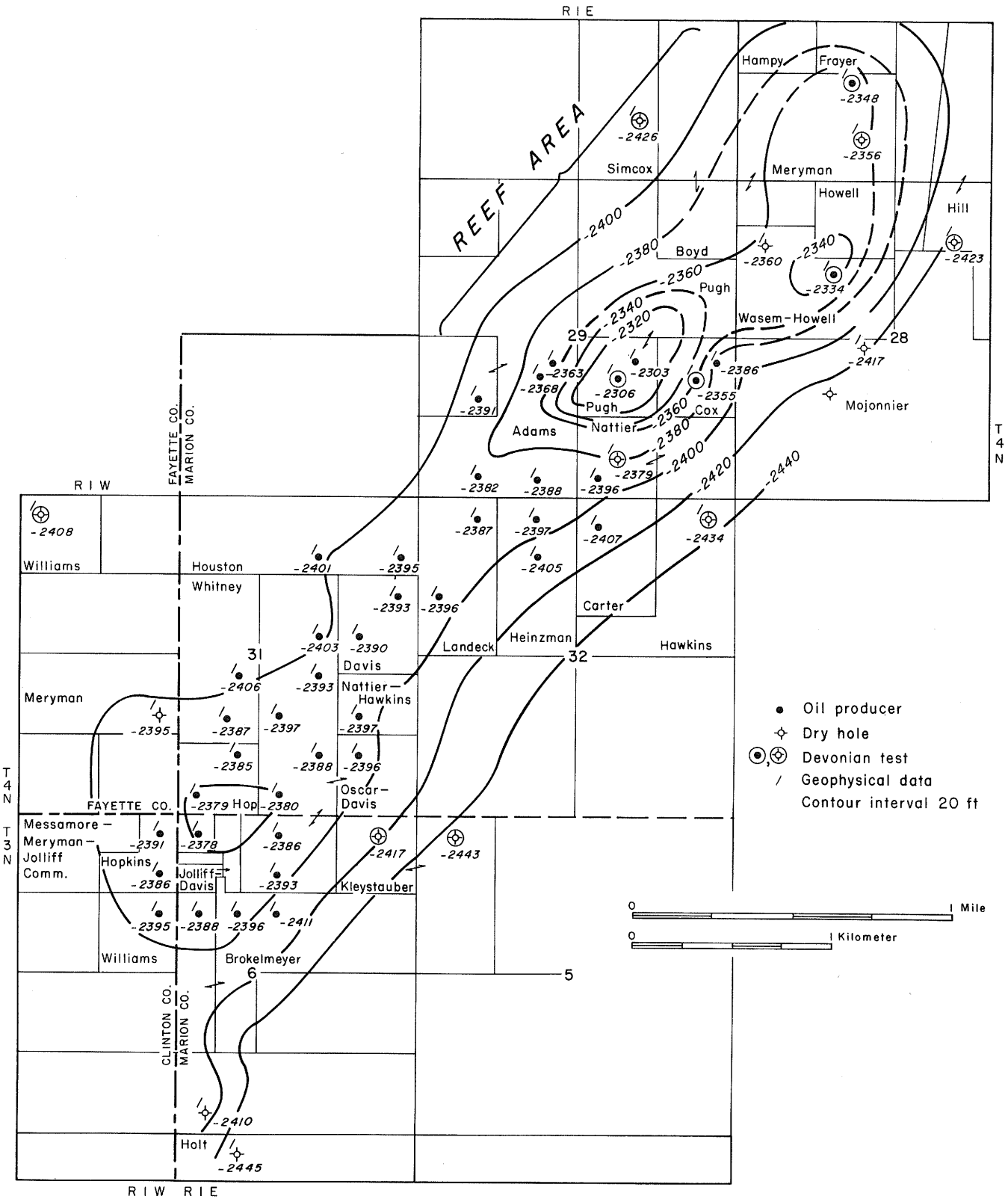


Fig. 60 - Structure map of the Patoka field drawn on the top of the Hunton Megagroup.

Pool Study 20

PATOKA EAST FIELD
Marion County

EXPLORATION METHOD LEADING TO DISCOVERY Subsurface geology and seismographing
STATUS OF FIELD Producing from waterflood of Chesterian sands

DISCOVERY WELL

	Cypress	Reef
NAME	Obering No. 1 Thulman Hrs.	Talbot et al. (Beach-Talbot) No. 1-T Davidson
LOCATION	35-4N-1E, NW-NW-NW	34-4N-1E, 662 ft S.L., 300 ft W.L., SE-NE
COMPLETION DATE	January 1941	September 1952
ELEVATION	517 ft	515 ft
CASING	10 3/4-in. to 45 ft, 7-in. to 1,340 ft	5 1/2-in. to 3,122 ft
TREATMENT	None	Unknown
TOTAL DEPTH	1,363 ft	4,178 ft
INITIAL PRODUCTION	46 BO, no water, per day	172 BOPD

PRODUCING STRATA Cypress, "Benoist," "McClosky" (all Mississippian), and Devonian; all draped over reef.
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), 34-4N-1E, TD 4,178 ft
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA

	Cypress	Devonian
PROVED	500 acres	80 acres
PROBABLE	500 acres	80 acres
APPROVED SPACING	10 acres	20 acres
NUMBER OF WELLS THAT PRODUCED	64	4
NUMBER OF DRY HOLES	6	2

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Approximately 30 ft of porous, vugular, sucrosic dolomite
CHARACTER OF OIL 35° API gravity

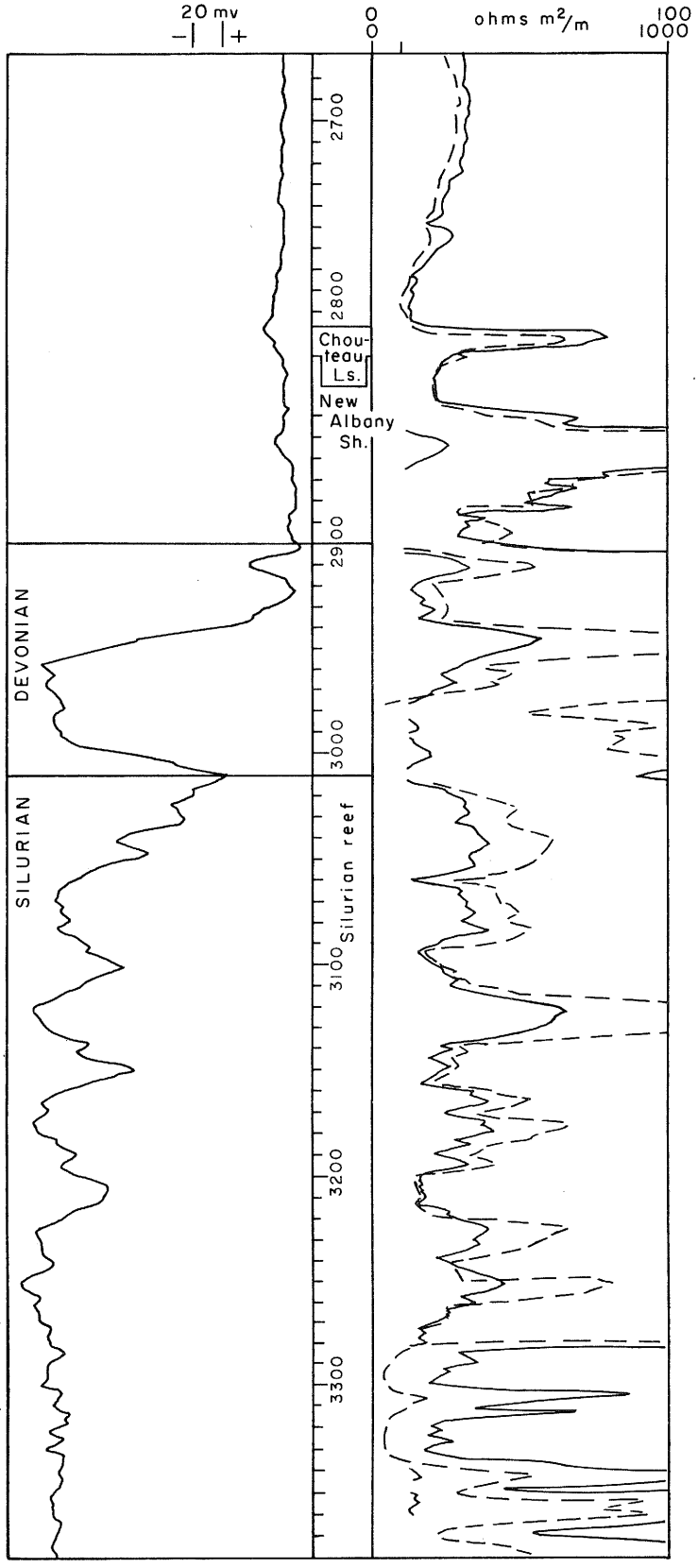
Temperature (F)	100°	77°	50°
Viscosity (cP)	6.19	9.31	18.43

INITIAL FIELD PRESSURE Not known in Devonian
COMPLETION PRACTICES Pipe set on Devonian and well then acidized
MARKET FOR OIL Sohio Petroleum Co. and Shell Oil Co.

REFERENCES AND NOTES

Lester, John, 1968, Patoka East field, Marion County, Illinois, in Geology and petroleum production of the Illinois Basin: a symposium: Evansville, Indiana: Illinois and Indiana-Kentucky Geological Societies, p. 195-200.

See figures 61, 62, and 63.



Electric Log
Beach-Talbot No. 1-T Davidson
SE-NE 34-1N-4E, Marion County
El. 515 ft DF

PATOKA EAST FIELD
Oil Production, bbl

Year	Annual	Cumulative
1941	663,000	663,000
1942	680,000	1,343,000
1943	470,000	1,813,000
1944	361,000	2,174,000
1945	286,000	2,460,000
1946	236,000	2,696,000
1947	198,000	2,894,000
1948	172,000	3,066,000
1949	153,000	3,219,000
1950	133,000	3,352,000
1951	117,000	3,469,000
1952	124,000	3,593,000
1953	180,000	3,773,000
1954	114,000	3,887,000
1955	100,000	3,987,000
1956	92,000	4,079,000
1957	66,705	4,145,705
1958	69,425	4,215,130
1959	68,512	4,283,642
1960	65,319	4,348,961
1961	62,737	4,411,698
1962	61,642	4,473,340
1963	61,551	4,534,891
1964	66,834*	4,601,725
1965	93,478	4,695,203
1966	114,508	4,809,711
1967	104,540	4,914,251
1968	116,343	5,030,594
1969	106,181	5,136,775
1970	94,112	5,230,887
1971	79,500	5,310,387
1972	73,400	5,383,787

*Secondary recovery begun.

Fig. 61 - Oil production from the Patoka East field and a portion of a geophysical log from the Patoka East reef.

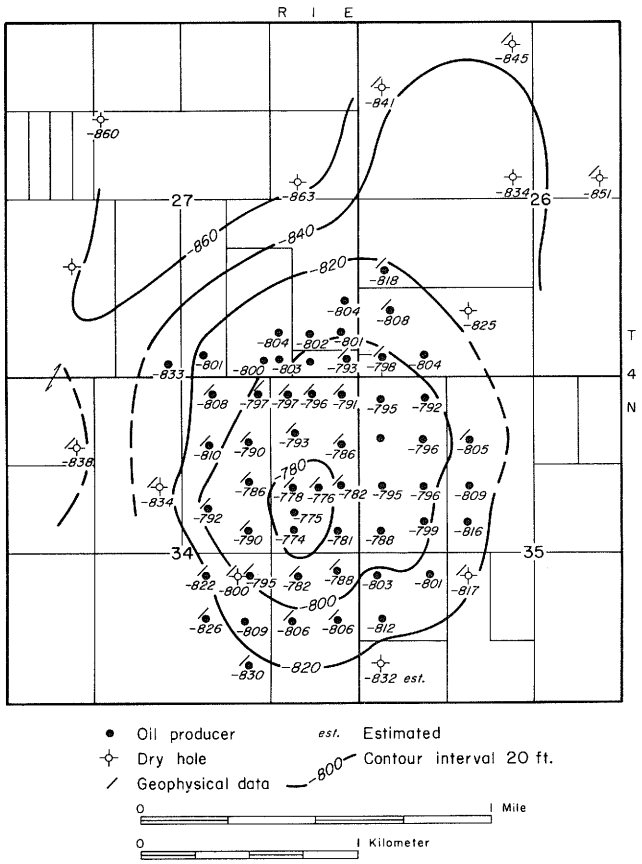


Fig. 62 - Structure map of the Patoka East field drawn on the base of the Beech Creek Limestone (Mississippian).

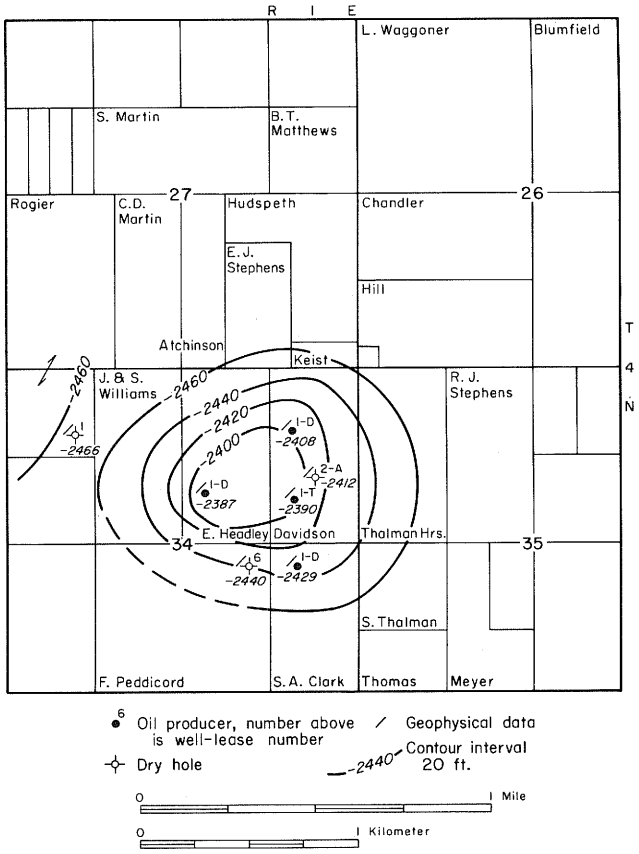


Fig. 63 - Structure map of the Patoka East field drawn on the top of the Hunton Megagroup.

Pool Study 21

RACCOON LAKE FIELD
Marion County

EXPLORATION METHOD LEADING TO DISCOVERY Seismographing
STATUS OF FIELD Producing

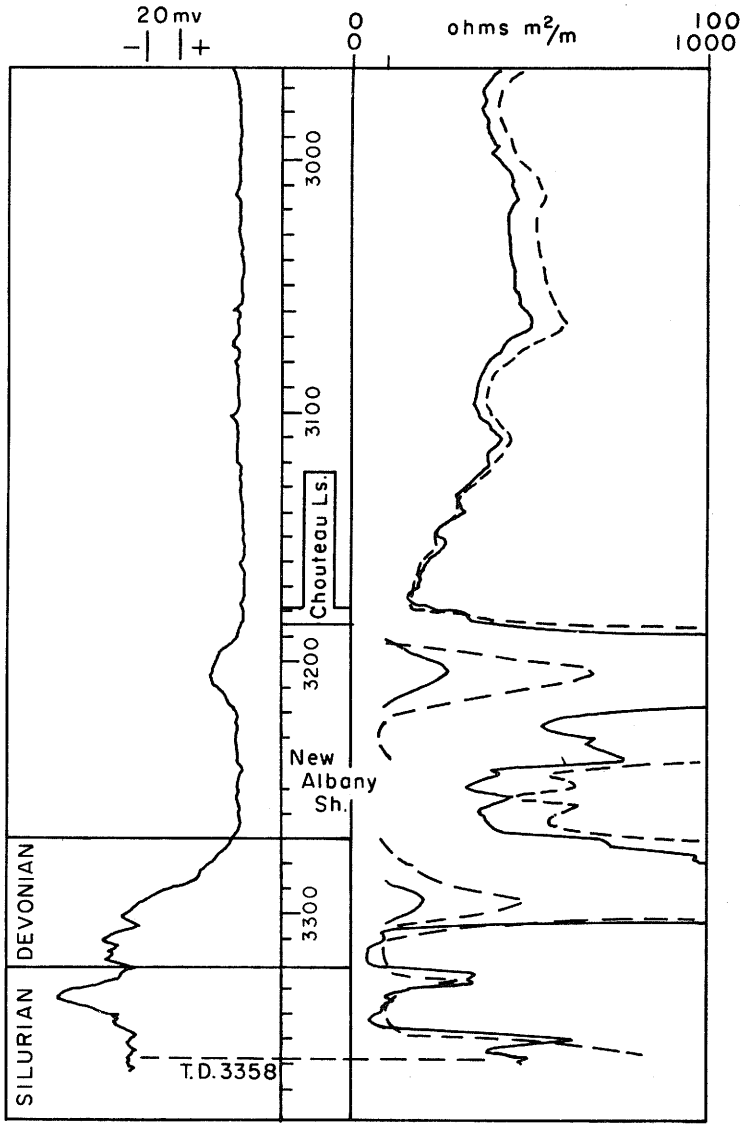
DISCOVERY WELL

	Mississippian	Hunton
NAME	Texas Co. No. 1 Franke-Meyer Unit	Texas No. 10 C. Langenfeld
LOCATION	3-1N-1E, NW-SW-SE	3-1N-1E, NW-SE
COMPLETION DATE	July 1949	October 1951
ELEVATION	513 ft	477 ft
CASING	10-in. to 83 ft, 7-in. to 1,914 ft	10-in. to 73 ft, 7-in. to 3,376 ft
TREATMENT	Shot	Perforated and acidized at 3,256-3,320 ft
TOTAL DEPTH	2,067 ft	3,385 ft
INITIAL PRODUCTION	214 BO in 24 hr from Rosiclare and "McClosky"	109 BP/101 BW in 24 hr

PRODUCING STRATA Cypress, "Benoist," "Ohara," Rosiclare, "McClosky" (all Mississippian); Devonian; Silurian.
DEEPEST STRATIGRAPHIC UNIT PENETRATED Silurian, several wells in 3-1N-1E
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCING AREA (Reef)
PROVED 230 acres
PROBABLE 230 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 16 (plugged in 1967)
NUMBER OF DRY HOLES 10
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK 0 to 15 ft of dolomite in the Geneva Member (Devonian); reef thickness unknown.
CHARACTER OF OIL Not known
INITIAL FIELD PRESSURE Some wells flowed; some recorded slightly over 1,000 lb BHP on a DST.
COMPLETION PRACTICES Pipe set through pay and perforated; well then acidized.
MARKET FOR OIL Texas Pipeline
NOTES Waterflooding begun: 1961, "McClosky" and Rosiclare
1965, Cypress and "Benoist"

See figures 64, 65, and 66.

Electric Log
The Texas Co. No. 3 Franke-Meyer Unit
NE-SW-SE 3-1N-1E, Marion County
El. 513 ft



RACCOON LAKE FIELD
Oil Production, bbl

Year	Annual	Cumulative
1949	122,556	122,556
1950	368,069	490,625
1951	222,768	713,393
1952	660,443	1,373,836
1953	549,844	1,923,680
1954	320,803	2,244,483
1955	193,544	2,438,027
1956	157,333	2,595,360
1957	135,339	2,730,699
1958	99,111	2,829,810
1959	79,713	2,909,523
1960	71,268	2,980,791
1961	60,720	3,041,511
1962	48,442	3,089,953*
1963	41,240	3,131,193
1964	48,009	3,179,202
1965	40,558	3,219,760
1966	36,620	3,256,380
1967	27,665	3,284,045
1968	23,164	3,307,209
1969	14,209	3,321,418
1970	12,267	3,333,685
1971	11,500	3,345,185
1972	10,500	3,355,685

* Secondary recovery begun.

Fig. 64 - Oil production from the Raccoon Lake field and a portion of a geophysical log from the Raccoon Lake reef.

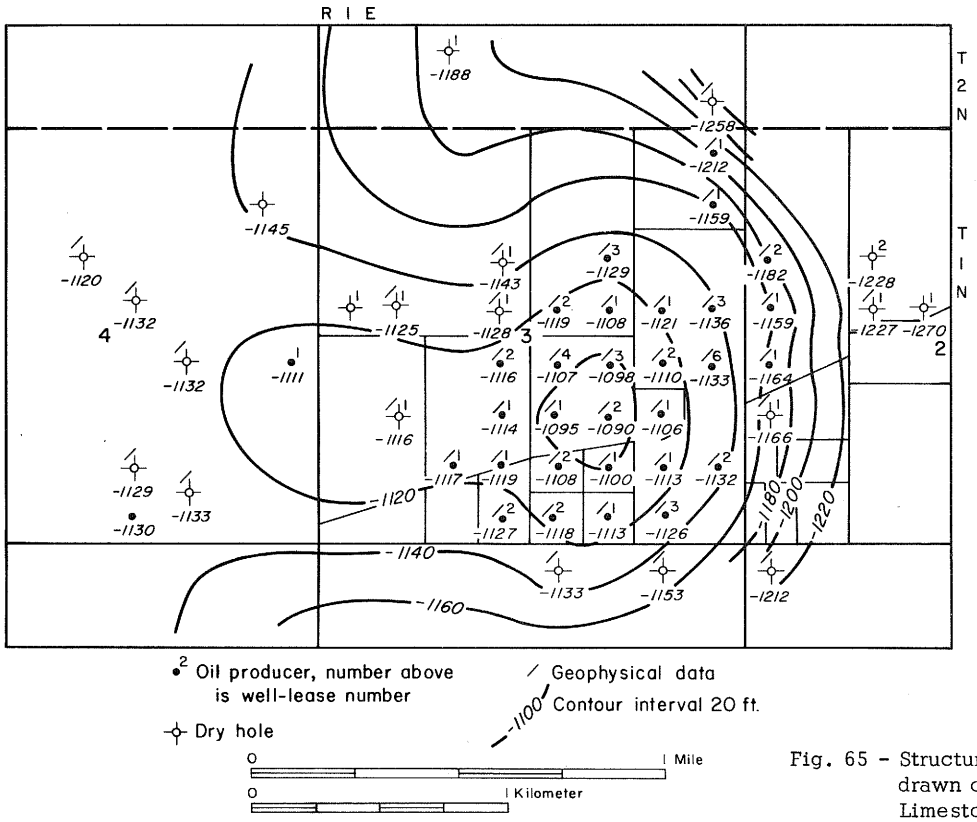


Fig. 65 - Structure map of the Raccoon Lake field drawn on the base of the Beech Creek Limestone (Mississippian).

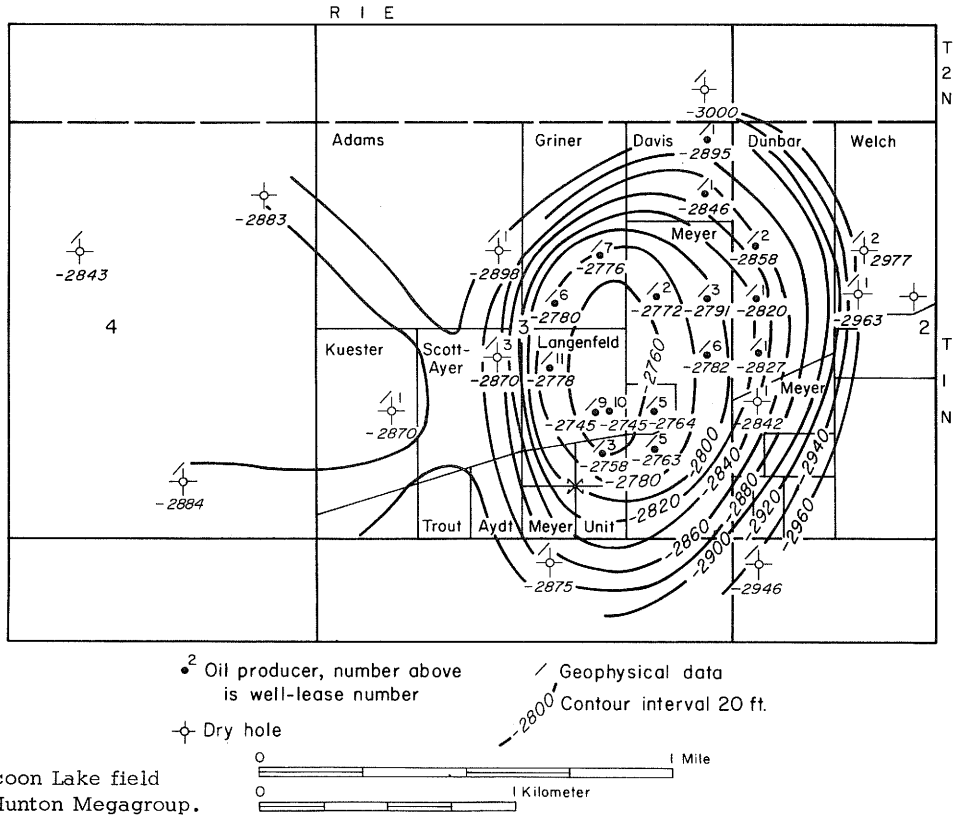


Fig. 66 - Structure map of the Raccoon Lake field drawn on the top of the Hunton Megagroup.

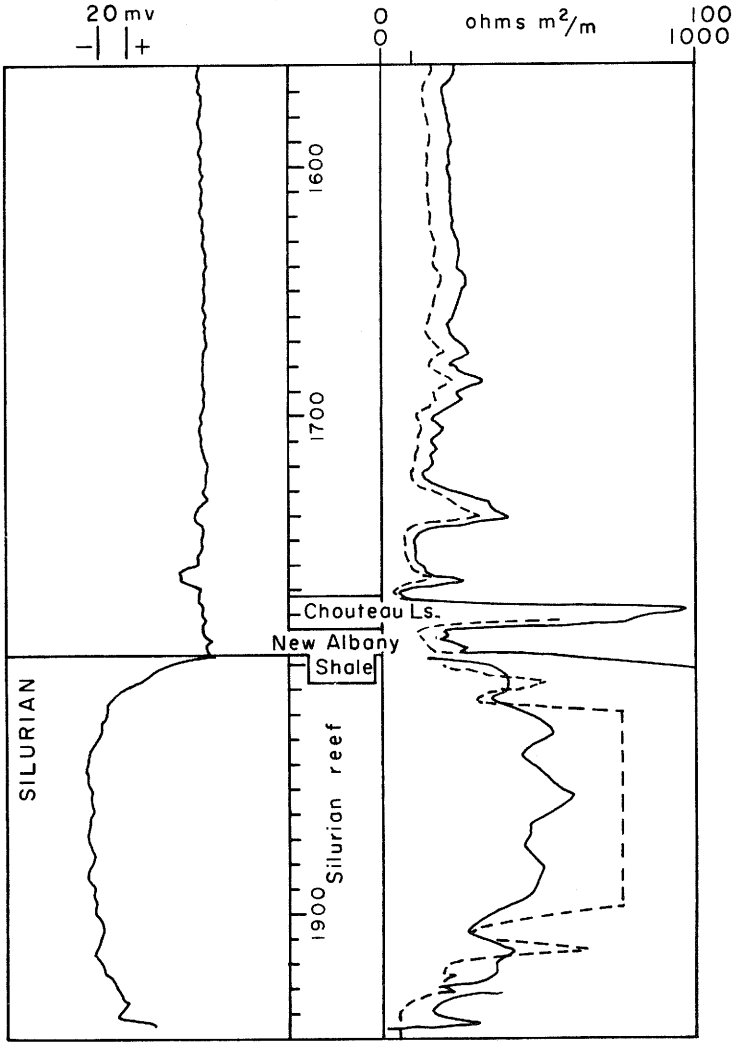
Pool Study 22

ST. LIBORY FIELD
St. Clair County

EXPLORATION METHOD LEADING TO DISCOVERY Core drilling program proved existence of a coal high.
STATUS OF FIELD Part of the field is a shut-in gas field.

DISCOVERY WELL
NAME Luttrell & Depoister No. 1 Lickenbrock
LOCATION 25-1S-6W, SW-NE-SW
COMPLETION DATE July 1963
ELEVATION 395 ft
CASING 8 5/8-in. to 80 ft, 4 1/2-in. to 1,838 ft
TREATMENT Acidized with 600 gal; acid frac. with 10,000 gal and 15,000 lb sand.
TOTAL DEPTH 1,947 ft
INITIAL PRODUCTION 500 BW and 700,000 cu ft of gas in 24 hr

PRODUCING STRATA Silurian reef - gas also found in Cypress and Aux Vases of Mississippian age.
DEEPEST STRATIGRAPHIC UNIT PENETRATED Silurian
NUMBER OF DRY HOLES 12



Electric Log
Natural Gas Pipeline No. 2 J. Wennemann
NE-NE-SE 26-1S-6W, St. Clair County
El. 400 ft

Fig. 67 - A portion of a geophysical log from the St. Libory reef.

ST. LIBORY FIELD continued

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK More than 100 ft of Silurian reef rock has been drilled

CHARACTER OF OIL 26.8° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	21.36	36.79	81.34

INITIAL FIELD PRESSURE BHP 927 lb

COMPLETION PRACTICES Only a few wells tested; none completed.

NOTES One or two wells made a very small amount of oil from Silurian. This reef does not appear to be completely tested.

See figures 67, 68, and 69.

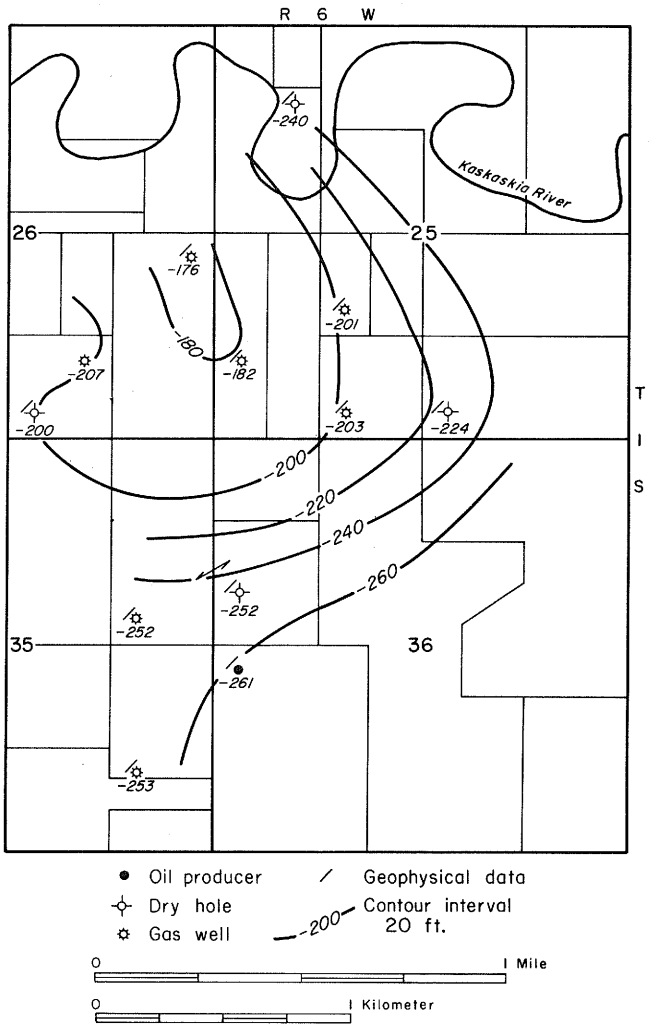


Fig. 68 - Structure map of the St. Libory reef drawn on the base of the Beech Creek Limestone (Mississippian).

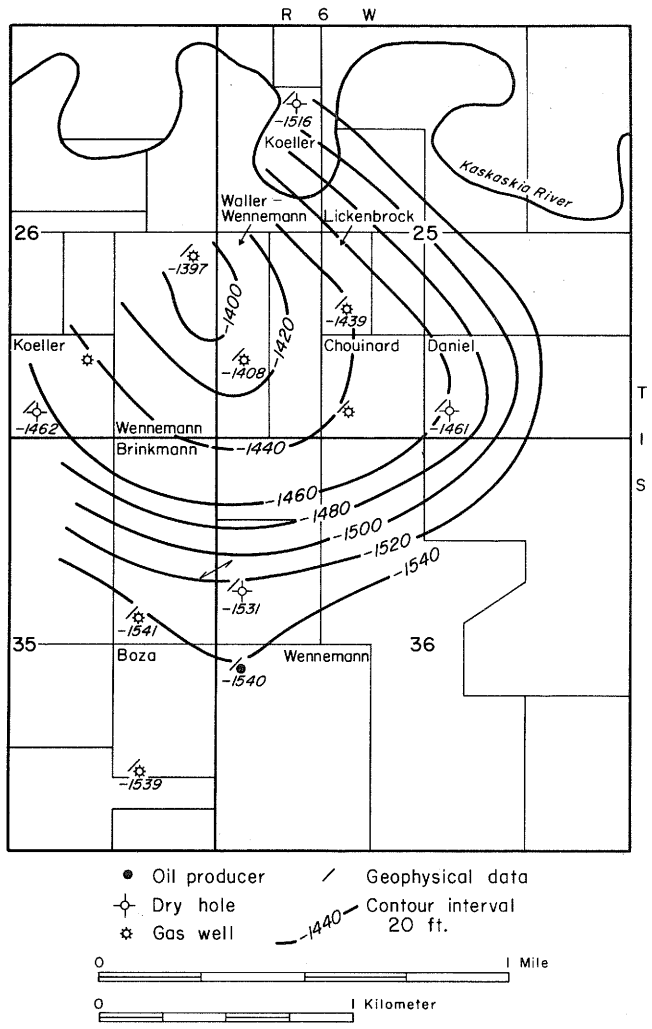


Fig. 69 - Structure map of the St. Libory reef drawn on the top of the Silurian.

Pool Study 23

SANDOVAL FIELD
Marion County

EXPLORATION METHOD LEADING TO DISCOVERY Discovery of oil seep in a coal mine
STATUS OF FIELD Abandoned

DISCOVERY WELL

	Pennsylvanian	Devonian
NAME	Marion County Oil Co. No. 1 Sherman	Southwestern Oil & Gas No. 21 Benoist
LOCATION	9-2N-1E	8-2N-1E, NW-NW-NE
COMPLETION DATE	November 1, 1908	December 20, 1938
ELEVATION	Not known	517 ft
CASING	Not known	5 3/16-in. to 2,896 ft
TREATMENT	Not known	Natural
TOTAL DEPTH	Not known	2,926 ft
INITIAL PRODUCTION	Not known, but from Pennsylvanian sand.	319 BO flowing in 19 hr

PRODUCING STRATA Cypress, "Benoist" (both Mississippian); Geneva (Devonian)
DEEPEST STRATIGRAPHIC UNIT PENETRATED St. Peter Sandstone (Ordovician), TD 5,023 ft, 4-2N-1E, Martin No. 1 Robinson
KIND OF TRAP Silurian reef is called a stratigraphic trap whereas pay zones draped over reef are structural traps. Geneva Dolomite Member draped over reef. No Silurian production.
PRODUCTIVE AREA (Reef only)
PROVED 280 acres
PROBABLE 280 acres
APPROVED SPACING 20 acres now; none when most of the field was drilled
NUMBER OF WELLS THAT PRODUCED 33
NUMBER OF DRY HOLES 11
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Geneva Dolomite about 15 ft thick, draped over reef. Three sands also produce over dome.
CHARACTER OF OIL

Temperature (F)	100°	77°	50°
Viscosity (cP)	4.81	6.54	12.89

COMPLETION PRACTICES In most wells, pipe set on top of pay and well then acidized.
MARKET FOR OIL Sohio Petroleum Co.; Ashland Oil, Inc.

REFERENCES AND NOTES

Bell, A. H., 1927, Structure of Centralia and Sandoval oil fields, Illinois: Illinois Geol. Survey Illinois Petroleum 10, 12 p.

Brownfield, R. L., 1954, Structural history of the Centralia area: Illinois Geol. Survey Rept. Inv. 172, 31 p.

Hoover, W. F., 1944, Correlation of subsurface Devonian of Sandoval pool, Madison Co., Illinois, with Devonian outcrop of southwestern Illinois: Am. Assoc. Petroleum Geologists Bull., v. 28, no. 10, p. 1528-1534.

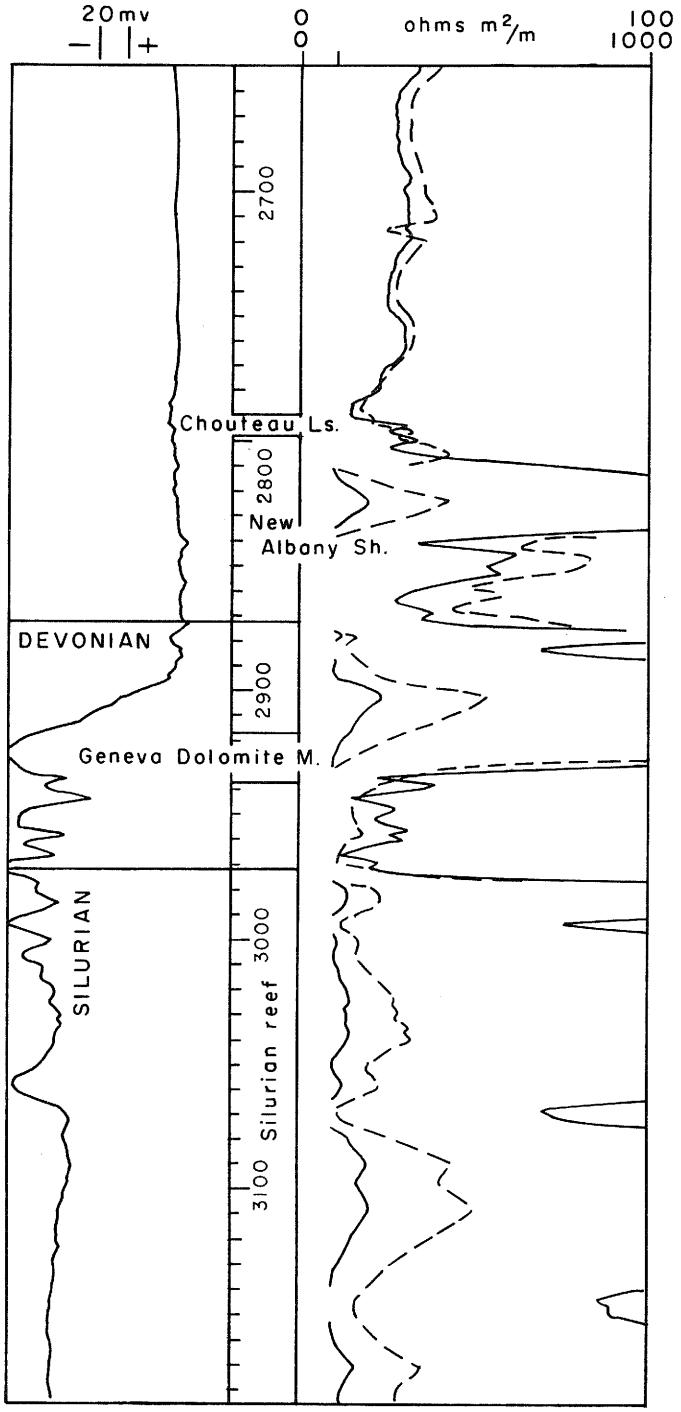
Moulton, G. F., and A. H. Bell, 1929, Three typical oil fields of the Illinois region, in Structure of typical American oil fields: Am. Assoc. Petroleum Geologists, v. 2, p. 115-141.

Spitznagel, K. A., 1939, Sandoval Devonian structure: Oil and Gas Jour., v. 38, no. 18, p. 23-24.

Squires, Frederick, and A. H. Bell, 1943a, Water flooding of oil sands in Illinois: Illinois Geol. Survey Rept. Inv. 89, 101 p.

See figures 70, 71, and 72.

Electric Log
Bradley Producing Co. No. 16 Warfield
SW-SW-SE 5-2N-1E, Clinton County
El. 520 ft DF



SANDOVAL FIELD
Oil Production, bbl

Year	Annual	Cumulative
1934	34,300	2,550,000
1935	27,000	2,577,000
1936	30,160	2,607,160
1937	23,800	2,630,960
1938	15,000	2,645,960
1939	814,000*	3,459,960
1940	721,000	4,180,960
1941	450,000	4,630,960
1942	263,000	4,893,960
1943	144,000	5,037,960
1944	96,000	5,133,960
1945	81,000	5,214,960
1946	89,000	5,303,960
1947	71,000	5,374,960
1948	61,000	5,435,960
1949	52,000	5,487,960
1950	44,000	5,531,960
1951	42,000	5,573,960
1952	39,000	5,612,960
1953	40,000	5,652,960
1954	33,000	5,685,960
1955	35,000	5,720,960
1956	29,000	5,749,960
1957	25,000	5,774,960
1958	25,000	5,799,960
1959	17,000	5,816,960
1960	22,000	5,838,960
1961	21,000	5,859,960
1962	20,000	5,879,960
1963	21,000	5,900,960
1964	22,000	5,922,960
1965	24,000	5,946,960
1966	51,500	5,998,460
1967	40,400	6,038,860
1968	27,400	6,066,260
1969	17,800	6,084,060
1970	9,800	6,093,860
1971	0	6,093,860
1972	0	6,093,860

* Hunton production begun.

Fig. 70 - Oil production from the Sandoval field and a portion of a geophysical log from the Sandoval reef.

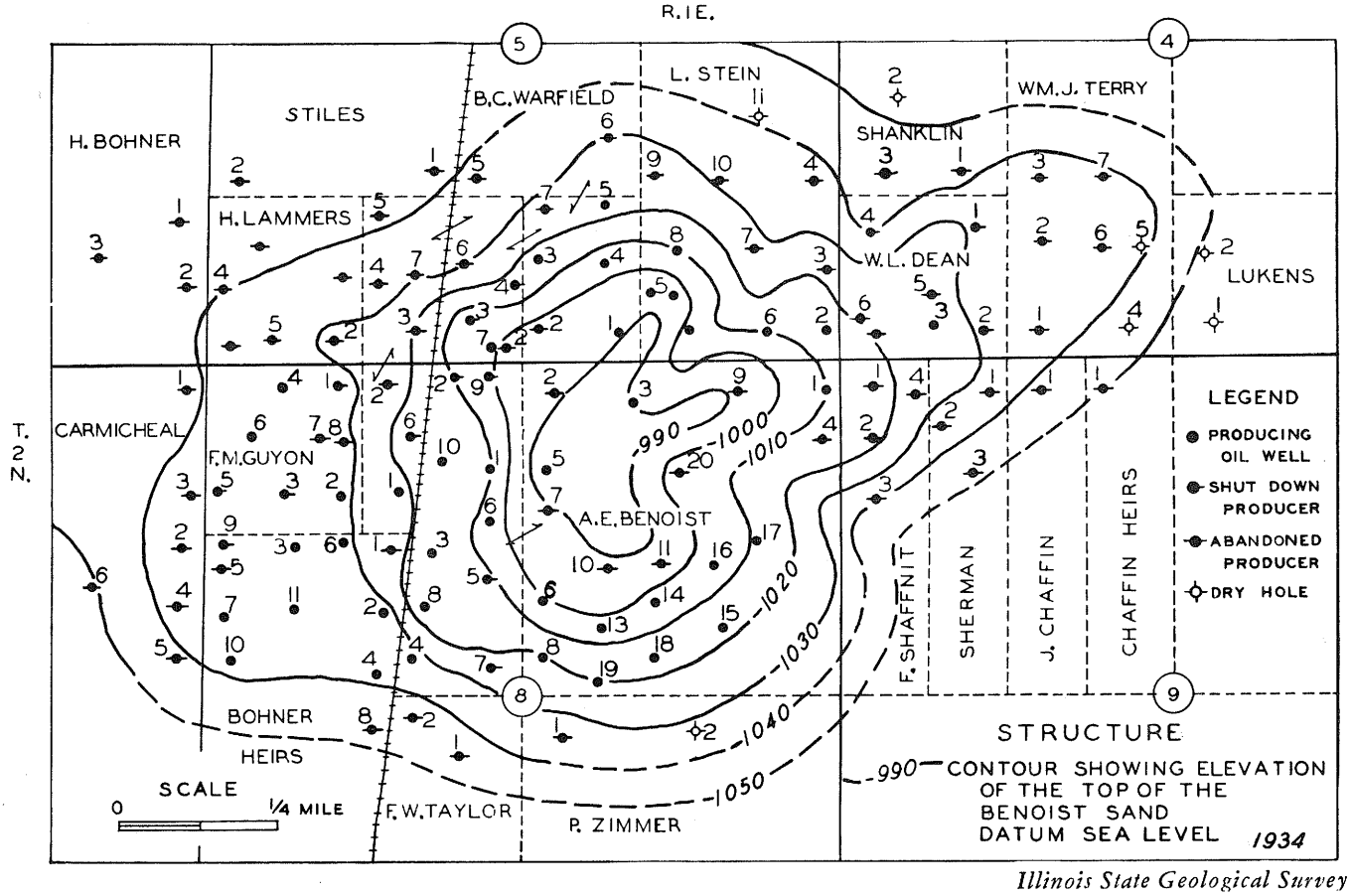


Fig. 71 - Structure map of the Sandoval field on the top of the Yankeetown ("Benoist") Sandstone (Mississippian) (Squires and Bell, 1943, fig. 39, p. 56).

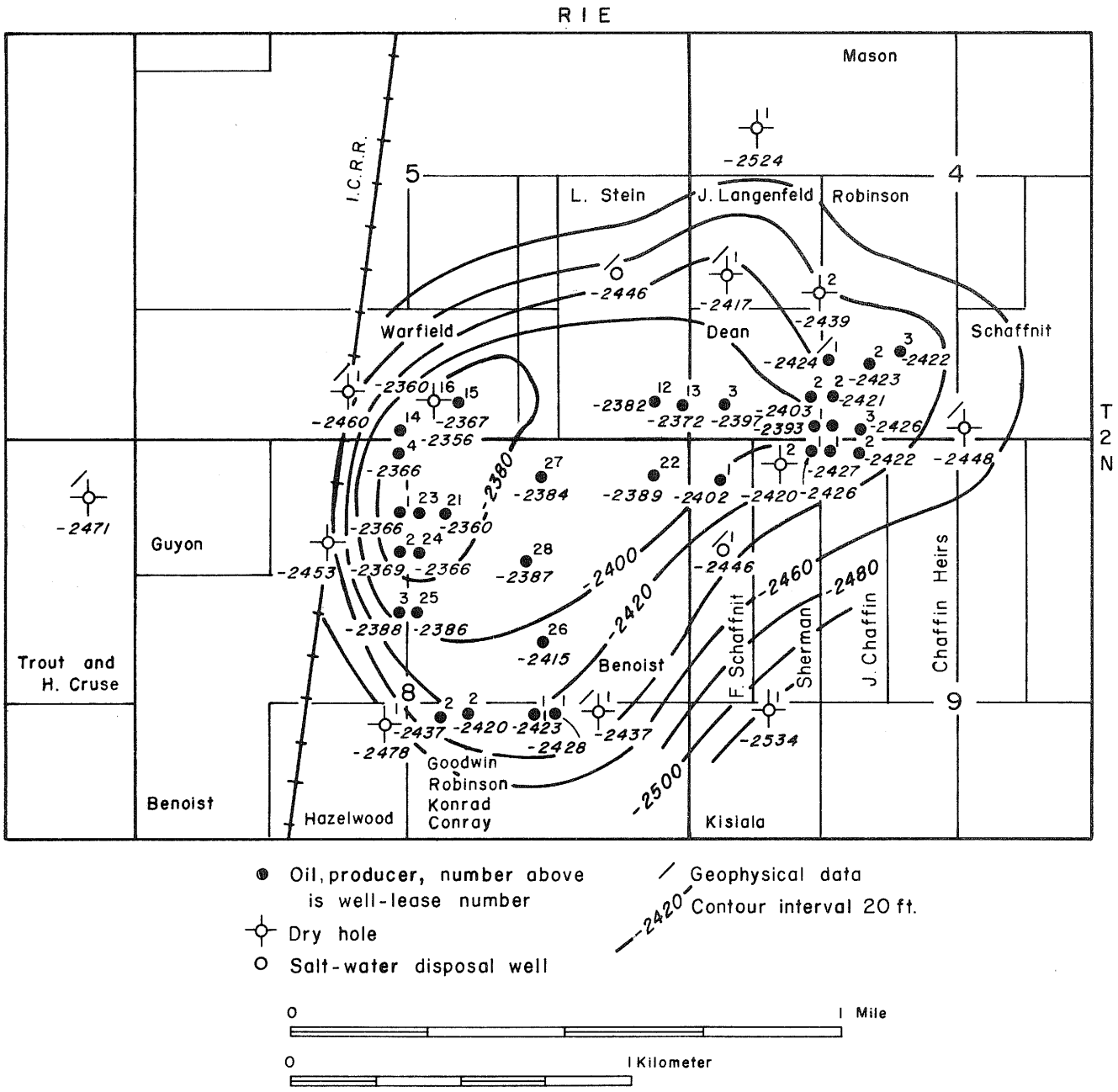


Fig. 72 - Structure map of the Sandoval field drawn on the top of the Hunton Megagroup.

Pool Study 24

TILDEN FIELD
Randolph County

EXPLORATION METHOD LEADING TO DISCOVERY A known coal high was tested to the Silurian.
STATUS OF FIELD Producing

DISCOVERY WELL
NAME Jet Oil Co. No. 1 C. Easdale
LOCATION 16-4S-5W, SE-NE-NW
COMPLETION DATE October 1952
ELEVATION 497 ft
CASING 10-in. to 68 ft, 7-in. to 2,146 ft
TREATMENT Pipe set through pay and perforated at 2,210-2,218 ft, followed by a small clean-out acidizing.
TOTAL DEPTH 2,228 ft
INITIAL PRODUCTION 310 BOPD produced by swabbing and flowing.

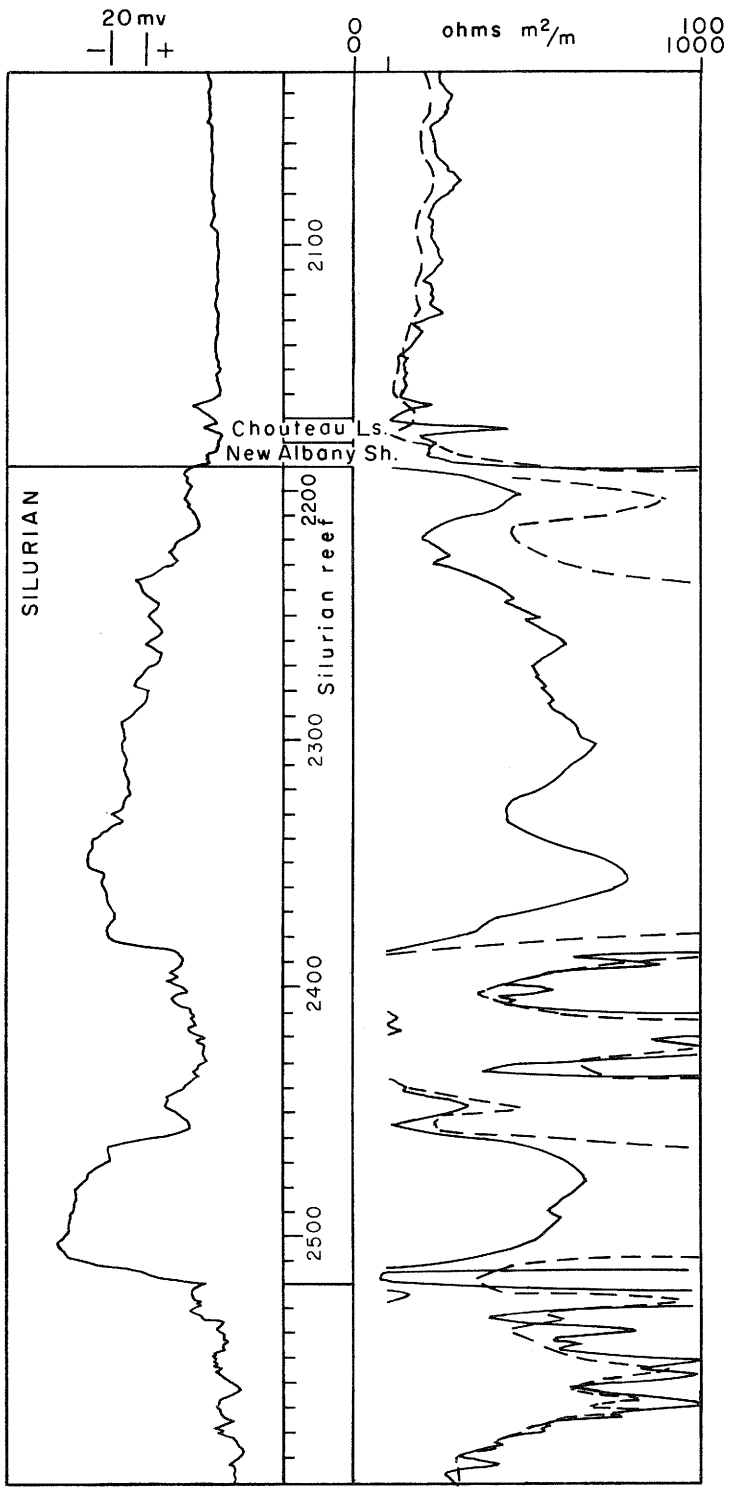
PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), TD 3,096 ft, Jet Oil Co. No. 2 F. Easdale, 16-4S-5W, Galena top 2,985 ft
KIND OF TRAP Stratigraphic - a Silurian reef
PRODUCTIVE AREA
PROVED 610 acres
PROBABLE 610 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 29
NUMBER OF DRY HOLES 12 wells around the edges of the reef
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK As much as 130 ft of oil was noted, but most of pay seemed to come from top 60 ft.
CHARACTER OF OIL 42° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	7.51	11.22	49.56

INITIAL FIELD PRESSURE A BHP of 950 lb was noted on a DST. Some wells flowed.
COMPLETION PRACTICES In most wells casing set on top of pay and well then acidized with small amounts of MCA.
MARKET FOR OIL Ashland Oil, Inc.

See figures 73, 74, and 75.

Electric Log
Jet Oil No. 2 Frank Easdale
Cen. E½-SW-NW 16-4S-5W, Randolph County
El. 494 ft



TILDEN FIELD
Oil Production, bbl

Year	Annual	Cumulative
1952	412,404	412,404
1953	517,956	930,360
1954	360,530	1,290,890
1955	300,330	1,591,220
1956	216,648	1,807,868
1957	182,448	1,990,316
1958	178,673	2,168,989
1959	171,954	2,340,943
1960	171,721	2,512,664
1961	213,453	2,726,117
1962	186,248	2,912,365
1963	162,802	3,075,167
1964	144,810	3,219,977
1965	121,510	3,341,487
1966	102,970	3,444,457
1967	108,390	3,552,847
1968	120,912	3,673,759
1969	132,506	3,806,265
1970	117,432	3,990,781*
1971	109,700	4,100,481
1972	97,000	4,197,481

* Adjusted.

Fig. 73 - Oil production from the Tilden field and a portion of a geophysical log from the Tilden reef.

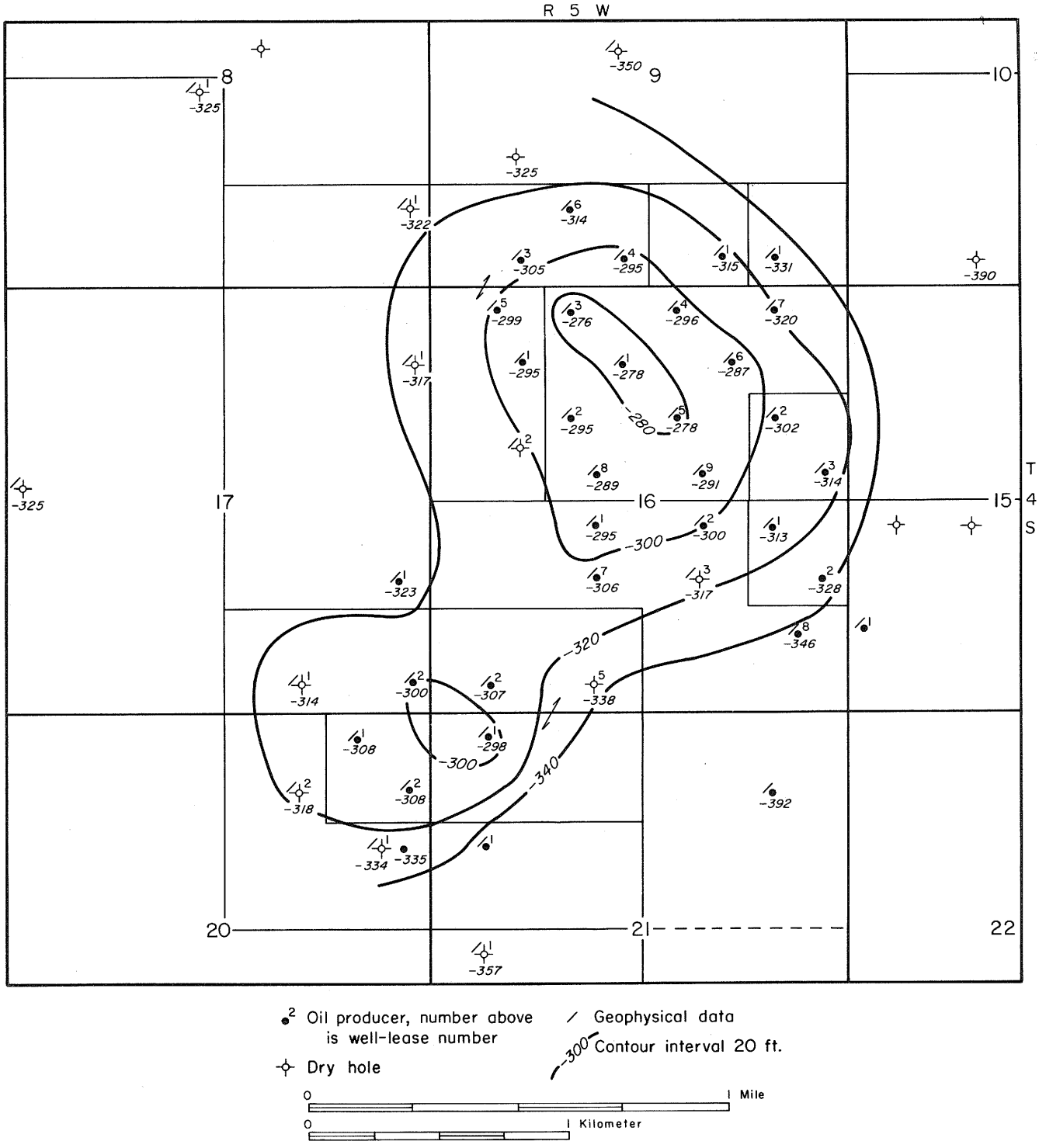


Fig. 74 - Structure map of the Tilden field drawn on the base of the Beech Creek Limestone (Mississippian).

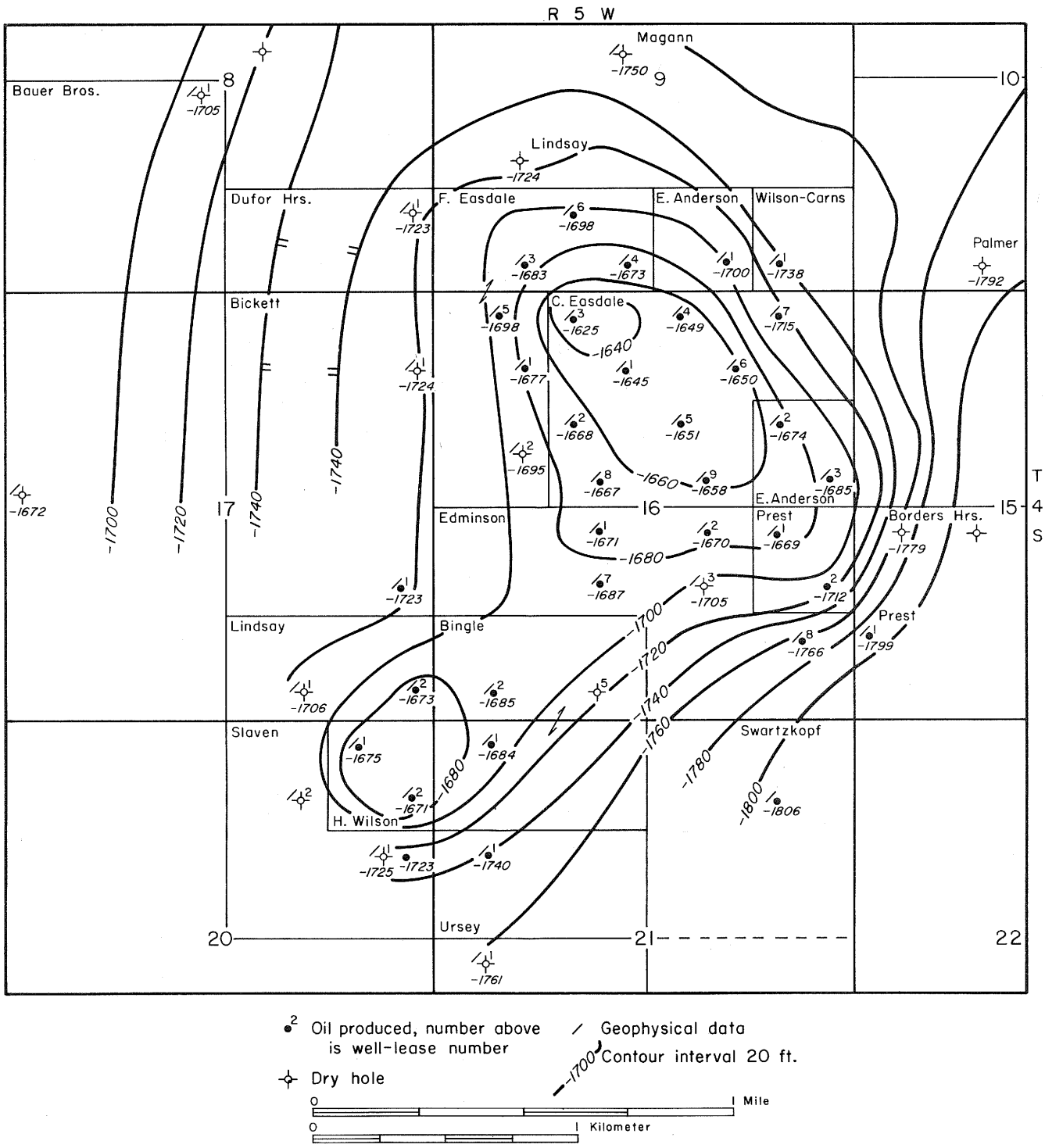


Fig. 75 - Structure map of the Tilden field drawn on the top of the Silurian.

Pool Study 25

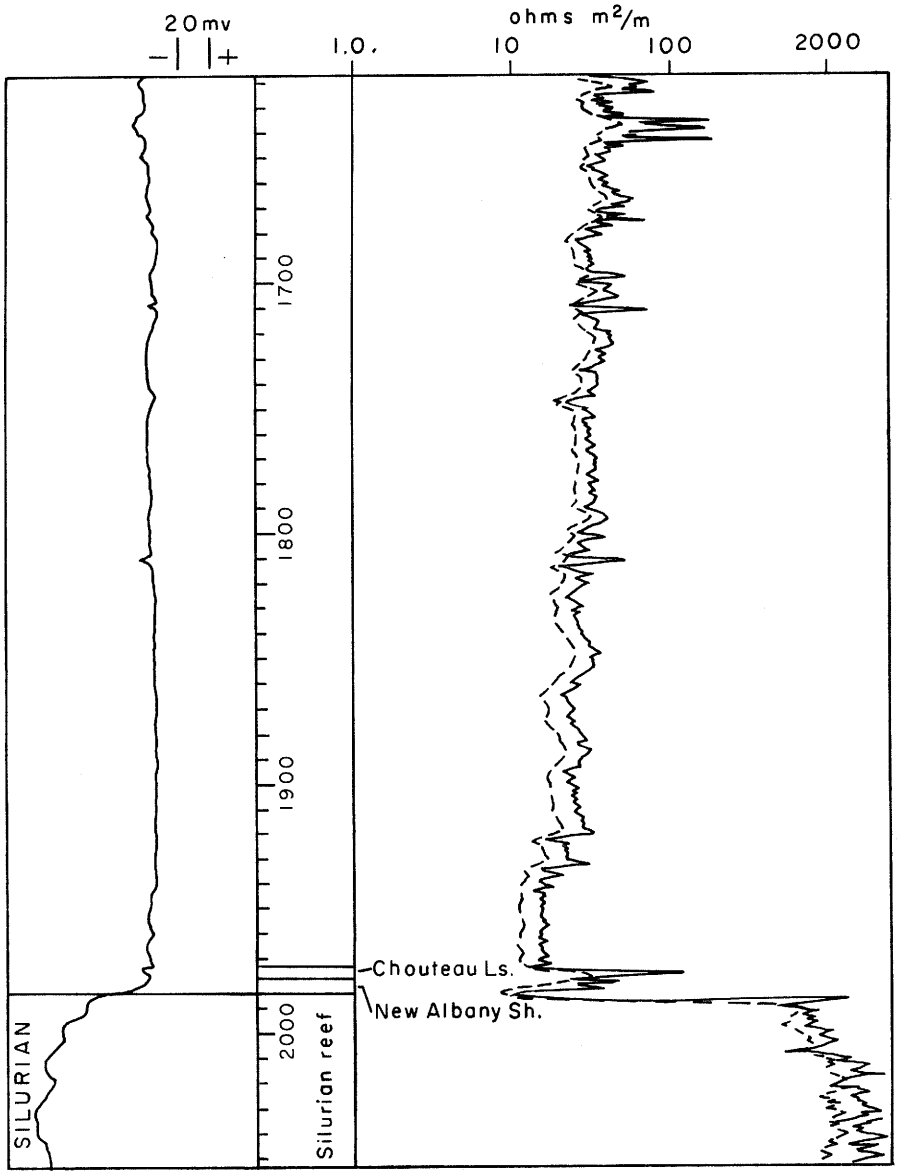
TILDEN NORTH FIELD
St. Clair and Washington Counties

EXPLORATION METHOD LEADING TO DISCOVERY Subsurface geology indicated a small high in 36-3S-6W.

STATUS OF FIELD Producing oil in reef and storing gas in the Cypress Sandstone (Mississippian).

DISCOVERY WELL Reef

NAME Donnewald No. 1 Hunter
LOCATION 26-3S-6W, SW-NE-SE
COMPLETION DATE November 1968
ELEVATION 528 ft
CASING 8 7/8-in. to 210 ft, 5 1/2-in. to 2,190 ft
TREATMENT Perforated from 2,090-2,189 ft, well then acidized with 500 gal MCA.
TOTAL DEPTH 2,190 ft
INITIAL PRODUCTION 70 BO and a trace of water per day



Electric Log
Donnewald No. 1 Hunter
SW-NE-SE 36-3S-6W
St. Clair County
El. 528 ft

TILDEN NORTH FIELD
Oil Production, bbl

Year	Annual	Cumulative
1969	195,003	195,003
1970	184,802	379,805
1971	106,400	486,205
1972	65,600	551,805

Fig. 76 -
Oil production from the Tilden North field and a portion of a geophysical log from the Tilden North reef.

TILDEN NORTH FIELD continued

PRODUCING STRATA Silurian reef
DEEPEST STRATIGRAPHIC UNIT PENETRATED Silurian
KIND OF TRAP A Silurian reef
PRODUCTIVE AREA
PROVED 180 acres
PROBABLE 200 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 14
NUMBER OF DRY HOLES 7
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Silurian reef rock. At least 100 ft of reef rock has been tested.
CHARACTER OF OIL 42.12° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	3.25	4.38	20.38

INITIAL FIELD PRESSURE Some wells flowed.

COMPLETION PRACTICES In some wells, pipe set on top of pay, well drilled out and cleaned out, then acidized; in some, pipe set through pay section and perforated, and well then acidized.
MARKET FOR OIL Ashland Oil, Inc.
REFERENCES AND NOTES

In Illinois Geological Survey Illinois Petroleum 86, there is a discussion of the gas field and the map shows a high in the SE¼ of 36-3S-6W.

Buschbach, T. C., and D. C. Bond, 1967, Underground storage of natural gas in Illinois: Illinois Geol. Survey Illinois Petroleum 86; see p. 45, 48, and 49.

See figures 76, 77, and 78.

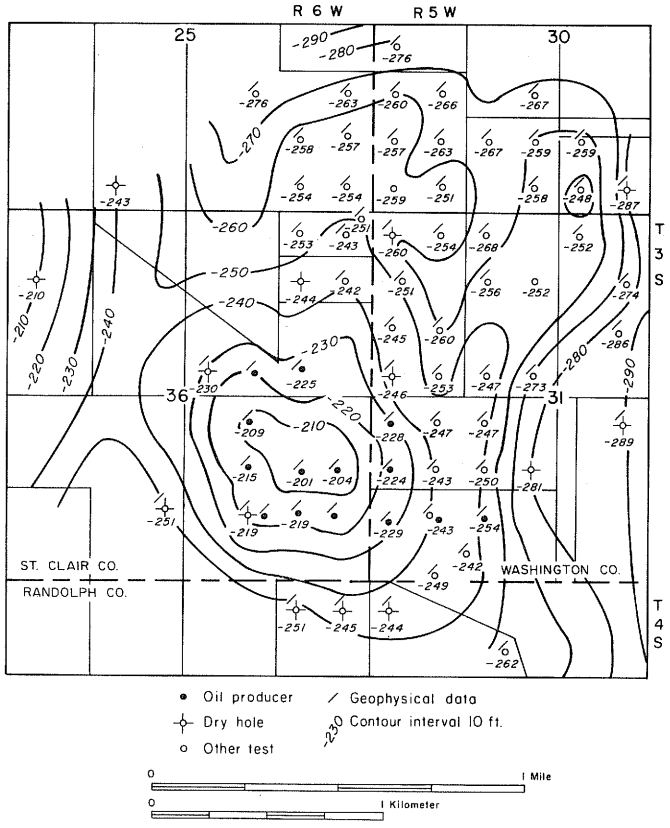


Fig. 77 - Structure map of the Tilden North field drawn on the base of the Beech Creek Limestone (Mississippian).

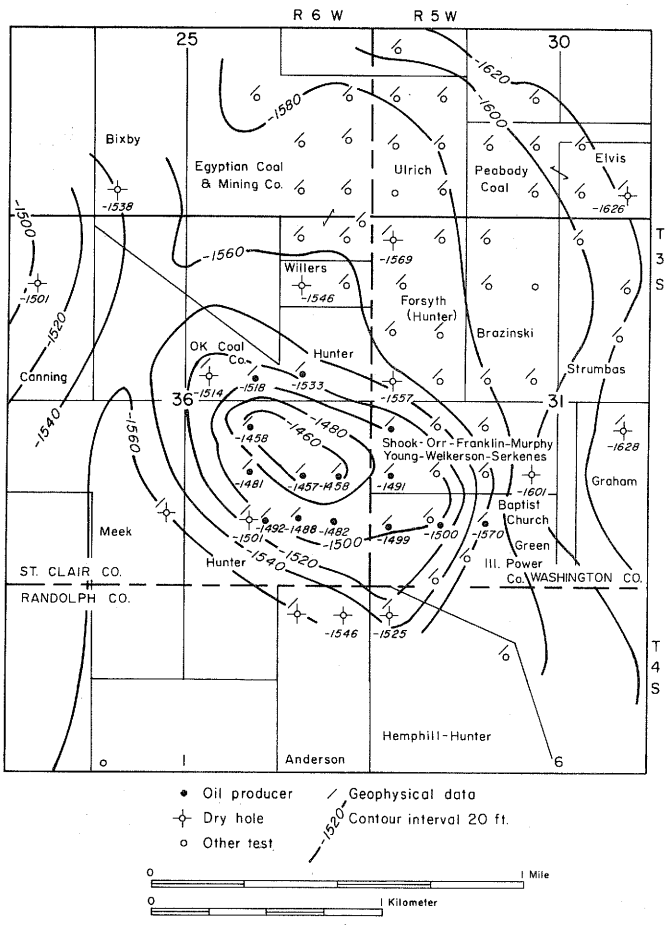


Fig. 78 - Structure map of the Tilden North field drawn on the top of the Silurian reef.

Pool Study 26

TONTI FIELD
Marion County

EXPLORATION METHOD LEADING TO DISCOVERY Deepening of the shallow pools.
STATUS OF FIELD Producing in shallow pays; part being waterflooded.

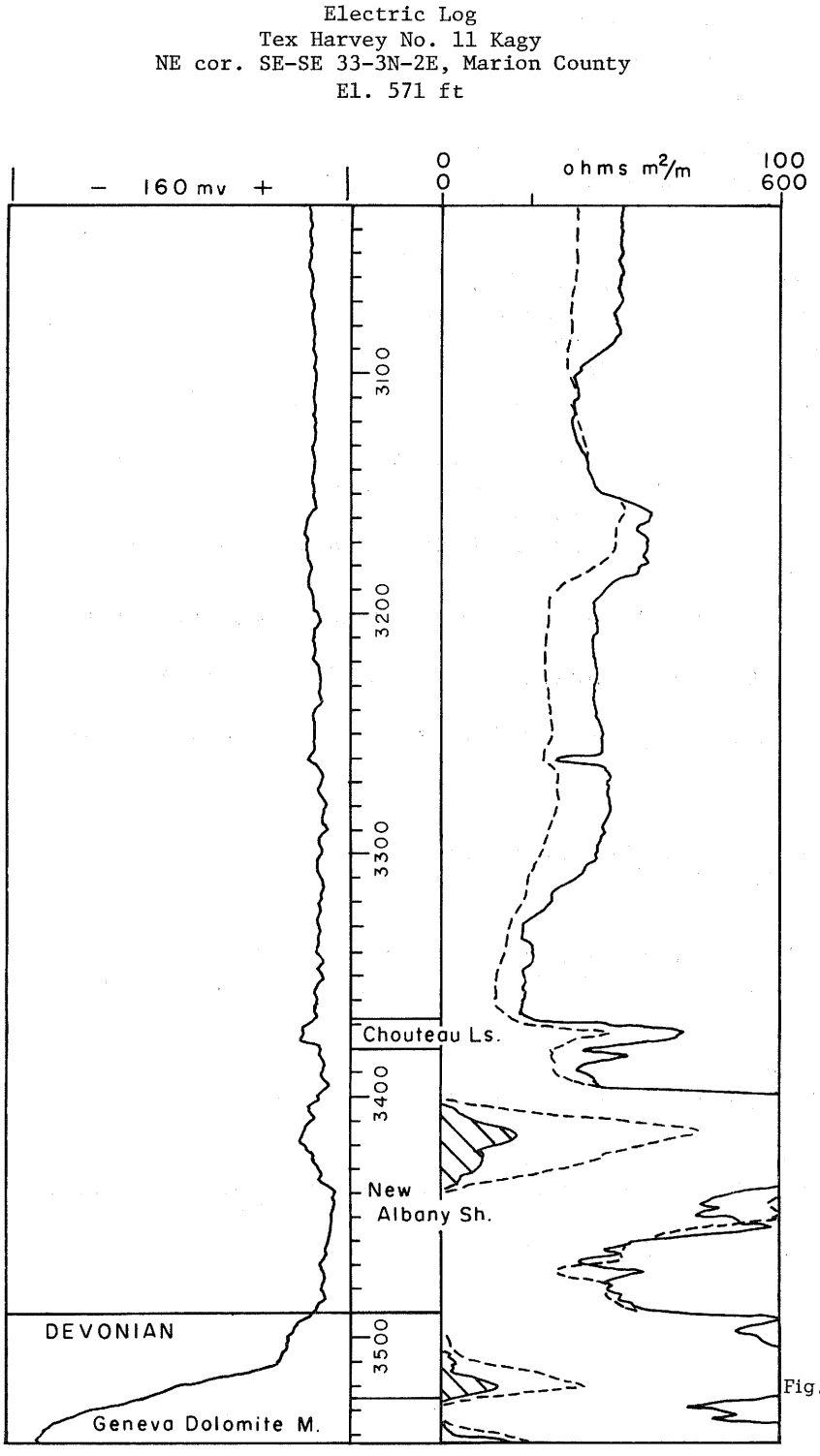
DISCOVERY WELLS

	Field	Reef
NAME	Harvey No. 1 Salem State Bank	Harvey No. 6 "B" J. K. Kagy, Jr.
LOCATION	33-3N-2E, N½-NE-SE	33-3N-2E, 460 ft S.L., 200 ft E.L., SE-SE-SE
COMPLETION DATE	May 1939	January 1940
ELEVATION	573 ft	568 ft
CASING	10-in. to 60 ft, 7-in. to 2,161 ft	10-in. to 107 ft, 7-in. to 3,510 ft
TREATMENT	Acidized with 500 gal	Perforated, well then acidized with 500 gal, then 1,000 gal
TOTAL DEPTH	2,193 ft	3,547 ft
INITIAL PRODUCTION	157 BO/35 BW per day from "McClosky"	4,200 BOPD flowing from 3,414-3,430 ft

PRODUCING STRATA "Benoist," Aux Vases, Spar Mountain, "McClosky" (all Mississippian); and Devonian
DEEPEST STRATIGRAPHIC UNIT PENETRATED Galena (Trenton), Harvey No. 11 Kagy, TD 4,900 ft, 33-3N-2E, SE¼
KIND OF TRAP Suspected of being a Silurian reef with draped Geneva Dolomite Member (Devonian).
PRODUCTIVE AREA (Reef only)
PROVED 80 acres
PROBABLE ?
APPROVED SPACING None at time of original drilling; later, 20 acres
NUMBER OF WELLS THAT PRODUCED 8
NUMBER OF DRY HOLES 4

THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Geneva Dolomite, approximately 40 ft from top of Devonian carbonate. Approximately 15 ft of dolomite has been noted. Silurian reef if present is not known to be tested.
CHARACTER OF OIL 37° API gravity
INITIAL FIELD PRESSURE Some wells flowed.
COMPLETION PRACTICES In most wells pipe set through pay section and perforated; well then acidized.
MARKET FOR OIL Texaco, Inc.; Ashland Oil, Inc.; Pure Oil Co.
NOTES There are not enough Devonian wells to draw a completely satisfactory structure map (fig. 81).

See figures 79, 80, and 81.



TONTI FIELD
Oil Production, bbl

Year	Annual	Cumulative
1939	909,000	909,000
1940	2,560,000	3,469,000
1941	1,260,000	4,729,000
1942	859,000	5,588,000
1943	689,000	6,277,000
1944	597,000	6,874,000
1945	479,000	7,353,000
1946	424,000	7,777,000
1947	430,000	8,207,000
1948	529,000	8,736,000
1949	400,000	9,136,000
1950	322,000	9,458,000
1951	264,000	9,722,000
1952	224,000	9,946,000
1953	215,000	10,161,000
1954	206,000	10,367,000
1955	194,000	10,561,000
1956	182,000	10,743,000
1957	198,000	10,941,000
1958	225,240	11,166,240
1959	243,906	11,410,146
1960	247,923	11,658,069
1961	233,717	11,891,786
1962	222,827	12,114,613
1963	184,669	12,299,282
1964	169,789	12,469,071
1965	216,529	12,685,600
1966	204,131	12,889,731
1967	277,199	13,166,930
1968	133,283	13,300,213
1969	60,326	13,360,539
1970	61,265	13,421,804
1971	69,100	13,490,904
1972	69,800	13,560,704

Fig. 79 - Oil production from the Tonti field and a portion of a geophysical log from the Tonti reef.

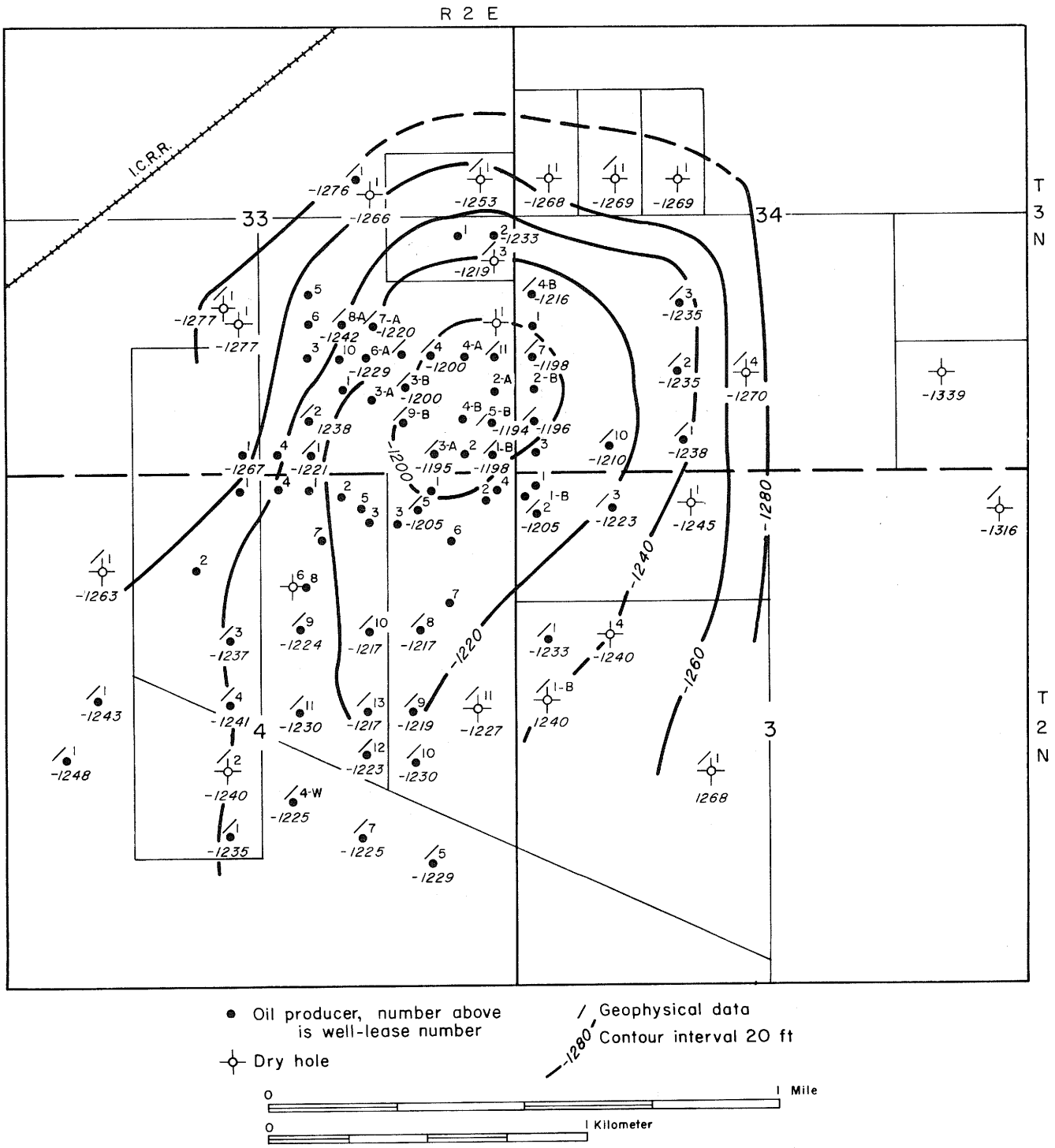


Fig. 80 - Structure map of the Tonti field drawn on the base of the Beech Creek Limestone (Mississippian).

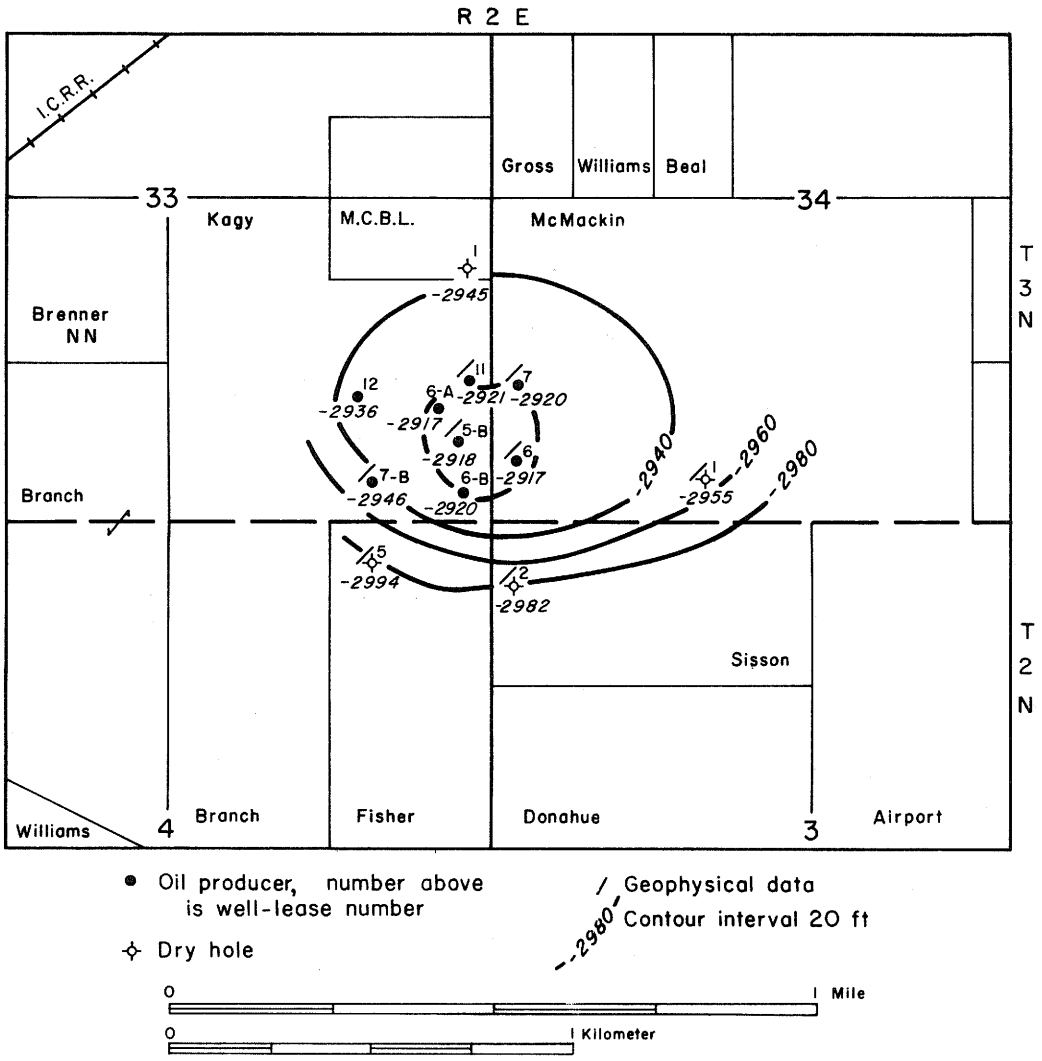


Fig. 81 - Structure map of the Tonti field drawn on the top of the Devonian.

Pool Study 27

WEAVER FIELD
Clark County

EXPLORATION METHOD LEADING TO DISCOVERY Radar scanning and surface work
STATUS OF FIELD Producing

DISCOVERY WELL
NAME Schafer and Grandholm No. 1 Cusick
LOCATION 20-11N-10W, NW-NE-SW
COMPLETION DATE June 1949
ELEVATION 541 ft
CASING 10-in. to 74 ft, 5 1/2-in. to 2,133 ft
TREATMENT Pay section acidized
TOTAL DEPTH 2,135 ft
INITIAL PRODUCTION 6 BO/150 BW per day from Devonian limestone

PRODUCING STRATA "Cole" (Mississippian) at 1,560 ft and Devonian
DEEPEST STRATIGRAPHIC UNIT PENETRATED Silurian
KIND OF TRAP Stratigraphic - porous beds of the Grand Tower (Jeffersonville) Formation of Devonian age are draped over the reef.

PRODUCTIVE AREA (Reef only)
PROVED 500 acres
PROBABLE 500 acres
APPROVED SPACING 20 acres
NUMBER OF WELLS THAT PRODUCED 44
NUMBER OF DRY HOLES 13

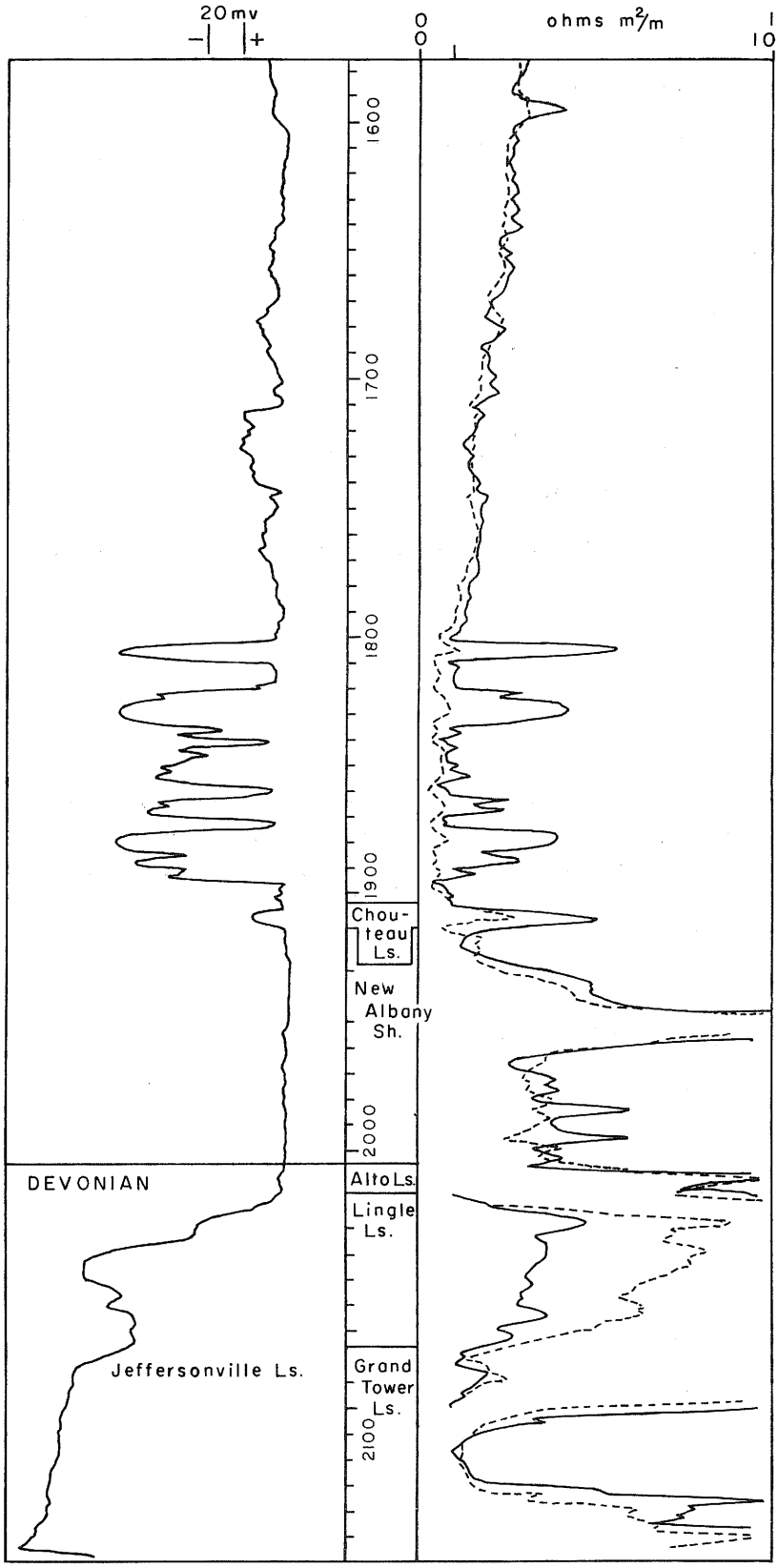
THICKNESS AND LITHOLOGY OF RESERVOIR ROCK Fossiliferous and dolomitic limestones with well-developed porosity; generally reported less than 20 ft thick in total section.

CHARACTER OF OIL 36.6° API gravity

Temperature (F)	100°	77°	50°
Viscosity (cP)	5.15	7.26	10.27

INITIAL FIELD PRESSURE Some wells originally flowed.
COMPLETION PRACTICES Pipe set above pay, well then acidized.
MARKET FOR OIL Sohio Petroleum Co.

See figures 82, 83, and 84.



Electric Log
Ward Dayton No. 3A Hewitt
NE-SE-NE 30-11N-10W, Clark County
El. 550 ft KB

WEAVER FIELD

Oil Production, bbl

Year	Annual	Cumulative
1949	27,510	27,510
1950	197,929	225,439
1951	266,223	491,662
1952	235,540	727,202
1953	185,701	912,903
1954	149,599	1,062,502
1955	130,823	1,193,325
1956	113,103	1,306,428
1957	85,258	1,391,686
1958	102,098	1,493,784
1959	96,482	1,590,266
1960	80,760	1,671,026
1961	73,570	1,744,596
1962	64,100	1,808,696
1963	59,220	1,867,916
1964	61,170	1,929,086
1965	57,060	1,986,146
1966	49,969	2,036,115
1967	47,552	2,083,667
1968	42,233	2,125,900
1969	38,561	2,164,461
1970	33,683	2,198,144
1971	31,700	2,229,844
1972	32,300	2,262,144

Fig. 82 - Oil production from the Weaver field and a portion of a geophysical log from the Weaver reef.

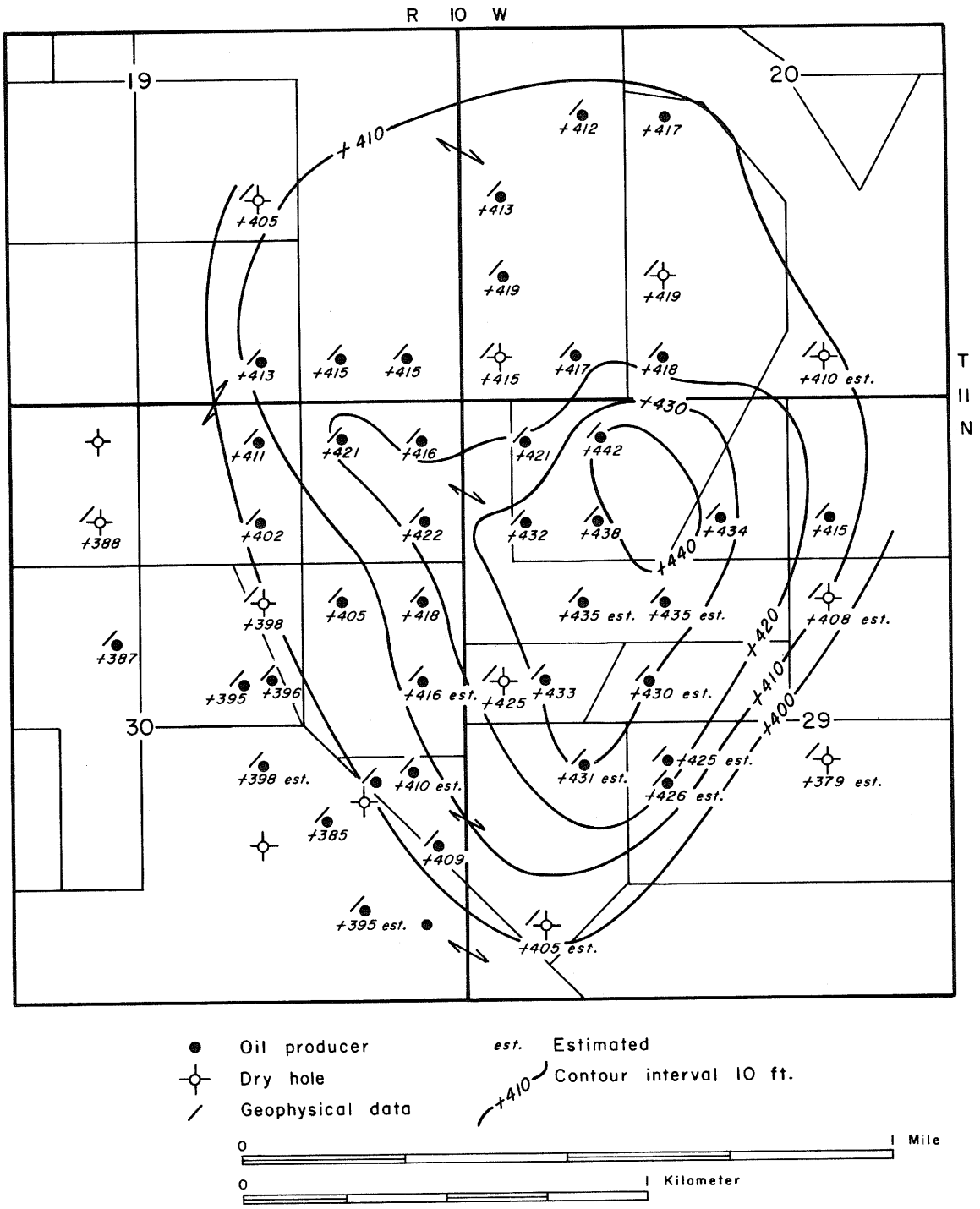


Fig. 83 - Structure map of the Weaver field drawn on the base of the West Franklin Limestone Member (Pennsylvanian).

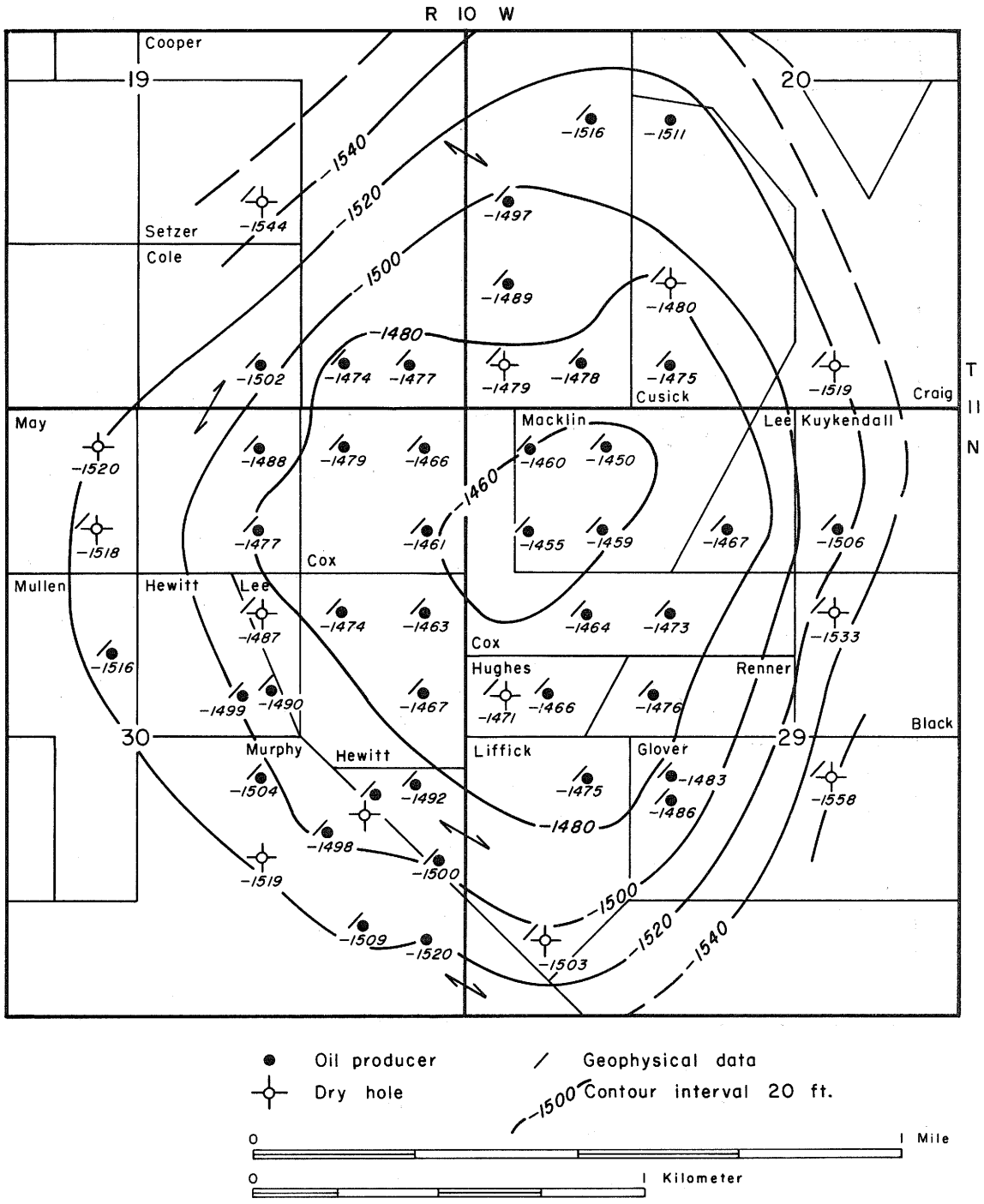


Fig. 84 - Structure map of the Weaver field drawn on the top of the Middle Devonian carbonate.

REFERENCES AND SELECTED BIBLIOGRAPHY*

Bretz, J H., 1939, Geology of the Chicago region. Pt. 1, General: Illinois Geol. Survey Bull. 65, 118 p.

Brigham, R. J., 1972, Structural geology of southwestern Ontario and southeastern Michigan: Ontario Mines and Northern Affairs, Petroleum Resources Section Paper 71-2: Toronto, 110 p.

Dawson, T. A., 1941, The Devonian formations of Indiana: Part 1. Outcrop in southern Indiana: Indiana Dept. Conservation, Div. Geology, 48 p.

Durham, R. J., 1970, Stratigraphic reefs versus ecologic reefs: Am. Assoc. Petroleum Geologists Bull., v. 54, p. 1931-1932.

Fairbridge, R. W., 1950, Recent and Pleistocene coral reefs of Australia: Jour. Geol., v. 58, no. 4, p. 330-401.

Lowenstam, H. A., 1948, Marine pool, Madison County, Illinois, Silurian reef producer, in Howell, J. V., ed., Structure of typical American oil fields, v. 3: Am. Assoc. Petroleum Geologists, p. 153-188; Illinois Geol. Survey Rept. Inv. 131, 40 p.

Lowenstam, H. A., 1949, Niagaran reefs in Illinois and their relation to oil accumulation: Illinois Geol. Survey Rept. Inv. 145, 36 p.

Lowenstam, H. A., 1950, Niagaran reefs of the Great Lakes area: Jour. Geol., v. 58, no. 4, p. 430-487.

Lowenstam, H. A., 1957, Niagaran reefs in the Great Lakes area, in Paleoecology, Ladd, H. S., ed., Treatise on marine ecology and paleoecology: Geol. Soc. America Memoir 67, v. 2, p. 215-248.

Lowenstam, H. A., and E. P. DuBois, 1946, Marine pool, Madison County, a new type of oil reservoir in Illinois: Illinois Geol. Survey Rept. Inv. 114, 30 p.

Martin, Rudolf, 1967, Morphology of some Devonian reefs in Alberta: a palaeogeomorphological study, in Oswald, D. H., ed., International symposium on the Devonian System, Calgary, 1967, v. 2: Calgary, Alberta, Canada: Alberta Soc. Petroleum Geologists, p. 365-385.

Mast, R. F., 1970, Size, development, and properties of Illinois oil fields: Illinois Geol. Survey Illinois Petroleum 93, 42 p.

Meents, W. F., 1973, Silurian reefs, southwestern Illinois, July 1973: Unpubl. map, Illinois State Geol. Survey.

Meents, W. F., and D. H. Swann, 1965, Grand Tower Limestone (Devonian) of southern Illinois: Illinois Geol. Survey Circ. 389, 34 p.

North, W. G., 1969, The Middle Devonian strata of southern Illinois: Illinois Geol. Survey Circ. 441, 48 p.

Rogers, J. E., Jr., 1972, Silurian and Lower Devonian stratigraphy and paleobasin development: Illinois Basin - central United States: Univ. Illinois Ph.D. dissertation.

Schwalb, H. R., 1955; The Geneva (Middle Devonian) Dolomite in Illinois: Illinois Geol. Survey Circ. 204, 7 p.

Shouldice, J. R., 1955, Silurian reefs of southwestern Ontario: Canadian Inst. Mining and Metall. Bull. 48, p. 500-503.

Stevenson, D. L., and L. L. Whiting, 1967, Geologic structure of the Devonian-Silurian Hunton Limestone Megagroup in Illinois: Illinois Geol. Survey Illinois Petroleum 87, 5 p.

Sutton, D. G., and A. H. Sutton, 1937, Middle Devonian of southern Indiana: Jour. Geol., v. 45, pt. 3, p. 320-331.

* See pool studies for further references pertinent to individual pools.

Van Den Berg, Jacob, and T. F. Lawry, 1973, Petroleum Industry in Illinois, 1972: Illinois Geol. Survey Illinois Petroleum 100, 122 p.

Whiting, L. L., and D. L. Stevenson, 1965, The Sangamon Arch: Illinois Geol. Survey Circ. 383, 20 p.

Willman, H. B., 1973, Rock stratigraphy of the Silurian System in northeastern and northwestern Illinois: Illinois Geol. Survey Circ. 479, 55 p.

Workman, L. E., 1944, Subsurface geology of the Devonian System in Illinois: Illinois Geol. Survey Bull. 68, p. 189-199; Illinois Geol. Survey Extract Bull. 68, p. 189-199.

Workman, L. E., and Tracey Gillette, 1956, Subsurface stratigraphy of the Kinderhook Series in Illinois: Illinois Geol. Survey Rept. Inv. 189, 46 p.

Illinois State Geological Survey Illinois Petroleum 102
98 p., 84 figs., 1 table, 3000 cop., 1974
Urbana, Illinois 61801