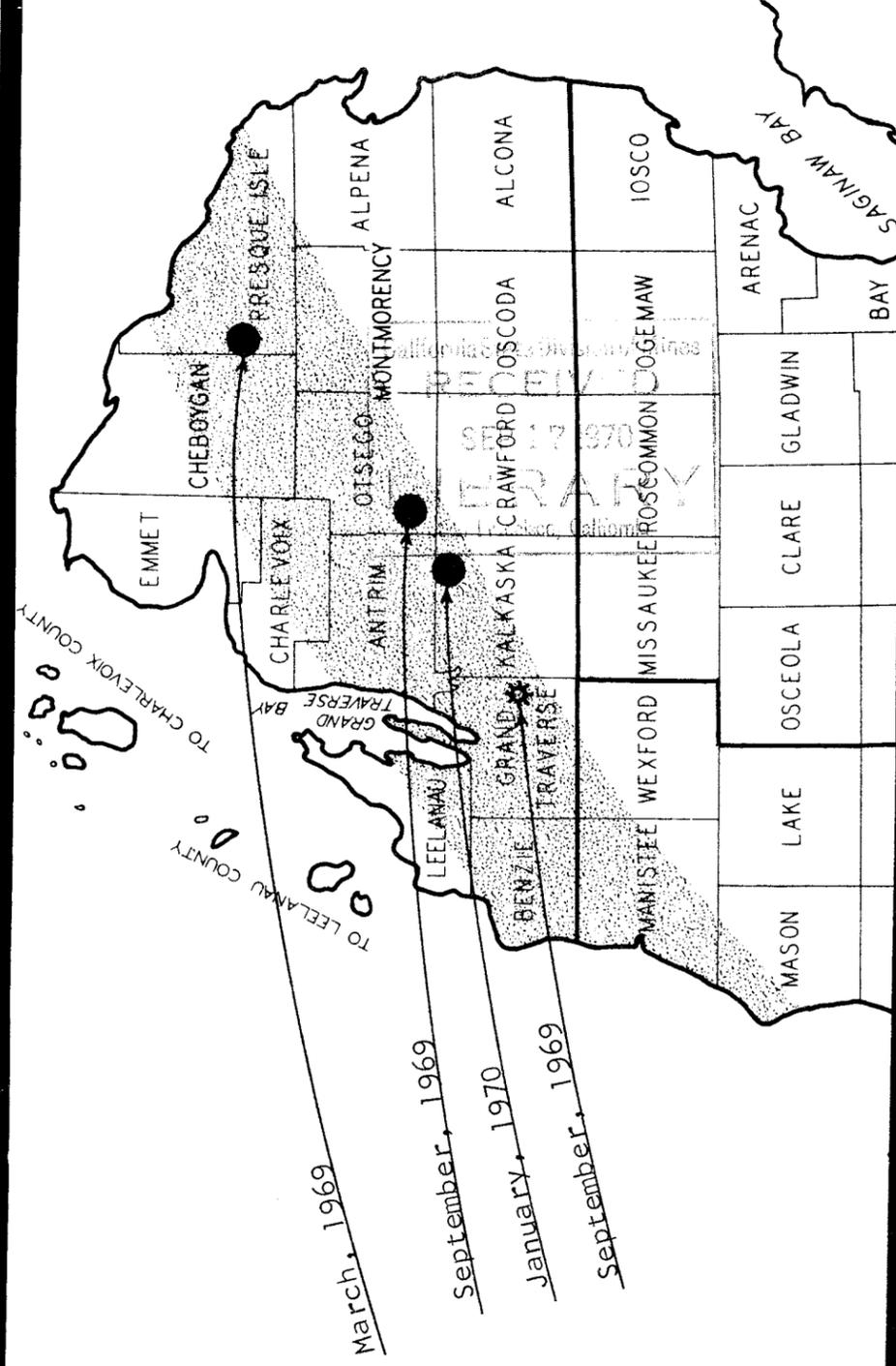




MICHIGAN'S OIL AND GAS FIELDS, 1969

ANNUAL STATISTICAL SUMMARY 12



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CONTENTS
 MICHIGAN'S OIL & GAS FIELDS, 1969

PART 1
 GENERAL INFORMATION

	Page	Page
Drilling Permits	3	New Legislation 11-12
Well Completions	4	Drilling Permits and Completions by
Drilled Footage	4	County, Table 1 14-15
Oil and Gas Districts (Map)	5	Oil and Gas Production by County,
Oil and Gas Production	6	Table 2 16
Oil and Gas Valuation	6	New Well Completions by Districts,
Oil and Gas Imports and Exports	6-7	Table 3 17
Discovery Wells	8-10	Oil and Gas Hearings 17
State Leased Acreage	11	New Publications 12
Deep Tests	11, 13	

PART 2

OIL AND GAS FIELDS

Part 2, Oil and Gas Fields, Explanation	18-19	Fluid Injection into Producing Formations
Oil and Gas Field Map	20-21	Oil Fields, Table 8 51
Michigan Oil and Gas Fields, Table 4	22-47	Gas Plant Operations by Plant or field,
Developed Gas Storage Reservoirs,		1969, Table 9 52
Table 5	48-49	Storage Facilities, Liquefied Petroleum
Undeveloped Gas Storage Reservoirs,		Gas, Table 10 53
Table 6	49	Michigan Oil Refineries 54
Miscellaneous Oil Wells, Table 7	50	

PART 3

CUMULATIVE RECORDS

Part 3, Cumulative Records, Explanation	55	Cumulative Oil and Gas Production by County
Precambrian Tests in Southern Peninsula	56	Through 1969, Table 15 63
Trends in Michigan Oil Production (Graph)	57	Cumulative Well Completions by County Through
Oil Production by Formation, 1969 and		1969, Table 16 64
Prior Years, Table 11	58	Permits, Discoveries, Well Completions, Wells
Cumulative Oil by Formation, 1969 and		at end of Year, 1969 and Prior Years,
Prior Years, Table 12	59	Table 17 66
Trends in Michigan Gas Production (Graph)	60	Stratigraphic Chart 68
Gas Production by Formation, 1969 and		Index 70
Prior Years, Table 13	61	Abbreviations 72
Cumulative Gas by Formation, 1969 and		
Prior Years, Table 14	62	

ACKNOWLEDGEMENTS

The information contained in this publication results from the joint efforts of the Survey's Oil and Gas Section under the direction of L. W. Price, geologist in charge. It brings together under one cover many oil and gas field statistical data not usually found in any other industry or government publication. Oil and gas field data of historical and general interest are included and thus preserved herein for future reference. The summary is, therefore, a source of information most useful in evaluating Michigan's past history and future prospects as an oil and gas province. Furthermore, the gathering, maintenance, and compilation of the many statistical data contained in the summary reflects, in part, the varied functions of the Oil and Gas Section.

Current oil and gas production figures are obtained from Michigan Department of Revenue records. Gas import figures are from Michigan Public Service Commission, Gas Section, compilations. All hydrocarbon production figures are preliminary and subject to correction as warranted.

Oil and Gas Section supervisors who directed staff members in the gathering and maintenance of basic records, and who assembled and contributed specific data are:

L. W. Price, geologist in charge, Oil and Gas Section - Oil and gas hearings data.

R. M. Acker, geologist and head, Regulatory Control Unit - Table 4, number of oil and gas wells and brine production; Tables 5 and 6 data (gas storage reservoirs).

W. G. Smiley, geologist and head, Production and Proration Unit - All production data except where noted; valuations; refinery and LPG storage data; secondary recovery data; recovery per drilled acre.

R. E. Ives, geologist and head, Petroleum Geology Unit - General drilling statistics and well completion data; discovery well and deep test data; drilled acreage; cumulative records.

Inquiries concerning information contained in this summary should be directed to the appropriate Oil and Gas Section unit as noted above.

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Lansing, Michigan
May, 1970

MICHIGAN'S OIL AND GAS FIELDS, 1969

INTRODUCTION

This issue of Michigan's oil and gas field statistical summary presents data related to various facets of the State's exploration and producing industry during 1969. Certain useful indices which show the trend of activities from year to year are shown in chart form and compared, where useful, to similar data for prior years. In addition, the summary contains abundant information of an historical nature which is useful in oil and gas field evaluation.

Certain figures for 1969, such as the number of exploratory and development wells drilled, service wells drilled, drilled footage, and number of discoveries, may differ from figures reported by regional or national trade journals and by commercial, petroleum industry reporting services. Differences are minor and due to methods of gathering and reporting well drilling data, and in determining a cut-off date for reporting statistics on a yearly basis.

The kinds of data listed herein are mainly derived from records received and maintained by the Geological Survey Division. The types of information reported in these summaries have been treated uniformly from year to year and reflect as near as possible the actual data that should be credited to the year as noted.

Part 1 of this publication summarizes significant information on oil and gas field activities and related work of the Oil and Gas Section of the Geological Survey during 1969. Part 2 contains specific information on Michigan's oil and gas fields and related activities for 1969. Part 3 contains cumulative records of importance to the petroleum industry. Data for 1969 has been included in the cumulative records.

1969 STATISTICAL DATA

* * * DRILLING PERMITS * * *

Of the 379 regular oil and gas permits issued in 1969, 166 were for exploratory wells, 158 for development, 48 for gas storage, 2 for LPG, and 5 for water injection. Included in the 379 permits were several issued to reopen and test previously drilled holes. Also, 6 permits issued in 1969 were terminated after permittee failed to commence drilling within 6 months after issuance of the permit. In addition, 21 deepening permits and 3 brine disposal well permits (issued to reopen and condition previously drilled holes for brine disposal) were issued. No geological test permits were issued in 1969. Table 1, page 14, shows the distribution of permits by county.

The geographic distribution, by district, of oil and gas permits issued through a three-year period, including 1969, is as follows:

DISTRICT	DRILLING PERMITS BY DISTRICT	
	1967	Permits Issued 1968 1969
Basin	91	88 113
Northern	11	17 32
Southeastern	178	143 126
Southwestern	72	61 41
Western	53	69 67
Totals	405	378 379

The nearly two-fold increase in permits issued for the Northern District points to the renewed interest in the region after several productive Niagaran reefs were found and partially developed in 1969. The increase in the Basin District is due mainly to issuance of permits for facility wells in the Coldwater, Michigan Stray gas

pool which is being prepared for eventual gas storage. The fluctuation in permits (BDW and regular) issued for gas storage and other types of service wells over a three-year span is shown as follows:

Service Wells	1967	1968	1969
Gas Storage	24	27	48
L.P.G., Wtr. Inj., Brine Disposal, etc.	2	9	10

26 36 58

*** WELL COMPLETIONS ***

There were 321 new-hole exploratory and development wells which reached total depth and were completed as producers or dry holes during the year. The figure does not include service wells, old wells drilled to deeper objectives, reworks, or others not directly related to new-hole exploratory or field development drilling. The results of exploratory and development drilling covering a three-year period are summarized as follows:

EXPLORATORY AND DEVELOPMENT WELL COMPLETIONS

Year	Exploratory Wells		Development Wells		Totals		
	Oil	Dry	Oil	Dry			
1967	7	2	171	69	38	106	393
1968	9	4	151	61	8	100	333
1969	7	3	148	66	6	91	321

In addition to new-hole exploratory and development well completions, there were 26 service wells of various types completed during the year. These do not

include reworked wells. The fluctuation in service well completions over a three year period is as follows:

SERVICE WELL COMPLETIONS

Year	GS	INJ	LPG	SMD	Totals
1967	24	0	0	0	24
1968	27	2	6	0	35
1969	20	5	0	1	26

*** DRILLED FOOTAGE ***

The fluctuation in total drilled footage, including old wells deepened to new objectives, over a three-year period is as follows:

Well Class	Amount of Drilled Footage	
	1967	1968
Exploratory	539,400	522,384
Development	686,672	564,827
Service	88,434	76,026*
	1,314,506	1,163,237

* Corrected figure. Shown as 776,026 in Annual Statistical Summary 10.

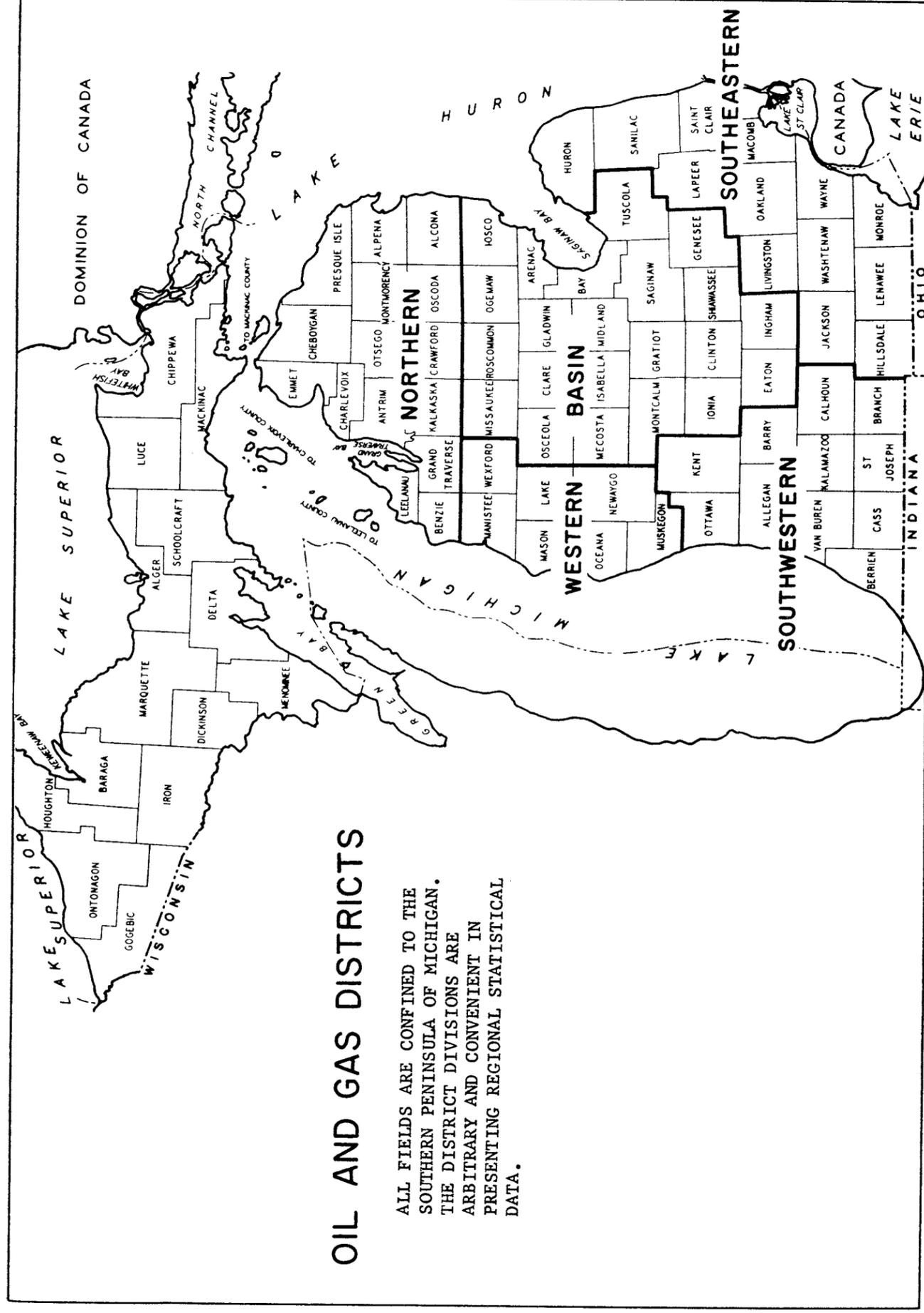
** Includes LPG, GS, BDW, and water injection wells.

*** OIL AND GAS PRODUCTION ***

Oil production amounted to 12,212,882 barrels as compared with 12,974,405 barrels in 1968. No large reserves were found and developed during 1969 that reversed the general decline in annual production. Gas production also decreased from 39,685,162 Mcf in 1968 to about 36,162,173 Mcf in 1969. Again, the Albion-Scipio Trend pools produced about 51% of the oil and 33% of the gas in 1969.

OIL AND GAS DISTRICTS

ALL FIELDS ARE CONFINED TO THE SOUTHERN PENINSULA OF MICHIGAN. THE DISTRICT DIVISIONS ARE ARBITRARY AND CONVENIENT IN PRESENTING REGIONAL STATISTICAL DATA.



The following charts show oil and gas production by month and by oil and gas districts in 1969.

OIL AND GAS PRODUCTION BY MONTH

Month	Barrels Oil	Production	MCF Gas
January	1,037,171		3,775,631
February	977,803		4,003,976
March	1,027,249		3,628,450
April	1,040,622		2,489,277
May	1,008,431		2,326,205
June	985,079		2,664,145
July	1,055,480		2,675,206
August	1,012,248		2,564,585
September	1,020,366		2,589,443
October	1,047,607		2,675,878
November	976,044		3,129,915
December	1,024,782		3,614,026
Totals	12,212,882		36,162,173

OIL AND GAS PRODUCTION BY DISTRICT

District	Barrels Oil	Production	MCF Gas
Basin	3,928,107		1,795,778
Northern	558,355		586,918
Southeastern	4,968,509		28,366,042
Southwestern	2,378,613		5,413,435
Western	379,298		0
Totals	12,212,882		36,162,173

Oil and gas production by individual field and pool is found in Part 2, Table 4. Annual and cumulative production by year, geologic formation, and county can be found in Part 3. Table 2 in this section lists oil and gas production by county in 1969.

*** LPG PRODUCTION ***

Total LPG production in 1969 amounted to about 2,115,894 barrels. Most of it was stripped from Michigan produced gas. Included in the total are about 627,833 barrels produced from gas imported into Michigan via pipeline and processed in the Willow Run plant. Part of the LPG's produced in the Reed City gas plant also came from imported gas. Additional details on gas plant operations are found in Part 2.

*** OIL AND GAS VALUATION ***

The average price paid at the wellhead for Michigan crude was \$3.07 per barrel. The value of this mineral resource amounted to about \$37,494,318 as compared with \$38,286,742 in 1968.

The average price of Michigan produced gas sold at the wellhead was \$.26 per Mcf. The value of this product amounted to about \$9,296,332 as compared with \$10,284,638 in 1968.

The estimated value of LPG's produced in 1969 was \$2.52 per barrel, or about \$.06 per gallon. The value of this product was \$5,332,053 as compared with \$3,960,043 in 1968.

*** OIL AND GAS IMPORTS AND EXPORTS ***

Domestic imports of crude oil via pipeline from western and midwestern states in 1969 amounted to 26,842,727 barrels, an increase over the 25,817,614 barrels imported in 1968. Canadian crude oil imports via pipeline from western Canada oil fields decreased from 14,299,426 barrels in 1968 to 12,463,050 barrels in 1969. Total imports to Michigan refineries amounted to 39,305,777 barrels as compared with 40,117,040 barrels in 1968.

Michigan produced crude oil exported to Northern

Indiana (Ft. Wayne) and Ohio (Cleveland) refineries or terminals amounted to 675,533 barrels, an increase over the 584,063 barrels exported in 1968.

1969 OIL IMPORTS (Bbls.)

	Domestic	Canadian	Total
January	1,756,553	1,228,272	2,984,825
February	1,740,536	1,169,863	2,910,399
March	2,321,141	932,714	3,253,855
April	1,825,831	827,957	2,653,788
May	2,313,375	769,929	3,083,304
June	2,665,600	732,468	3,398,068
July	2,541,676	814,099	3,355,775
August	2,570,226	846,988	3,417,214
September	2,256,352	1,078,965	3,335,317
October	2,776,577	955,439	3,732,016
November	2,028,174	1,332,996	3,361,170
December	2,046,686	1,773,360	3,820,046
Totals	26,842,727	12,463,050	39,305,777

1969 OIL EXPORTS (Bbls.)

January	59,797
February	60,364
March	57,187
April	50,524
May	55,501
June	43,552
July	61,491
August	55,358
September	49,600
October	54,555
November	53,687
December	73,917

Gas imports to Michigan markets and gas storage fields via pipelines, primarily from Texas, Louisiana, Oklahoma and Kansas fields, increased slightly in 1969. Compilations by the Gas Section, Michigan Public Service Commission, show gas imports of 769,675,508 Mcf. as compared with 696,781,346 Mcf. in 1968. Monthly imports of gas were as follows:

PIPELINE GAS IMPORTS (Mcf.)

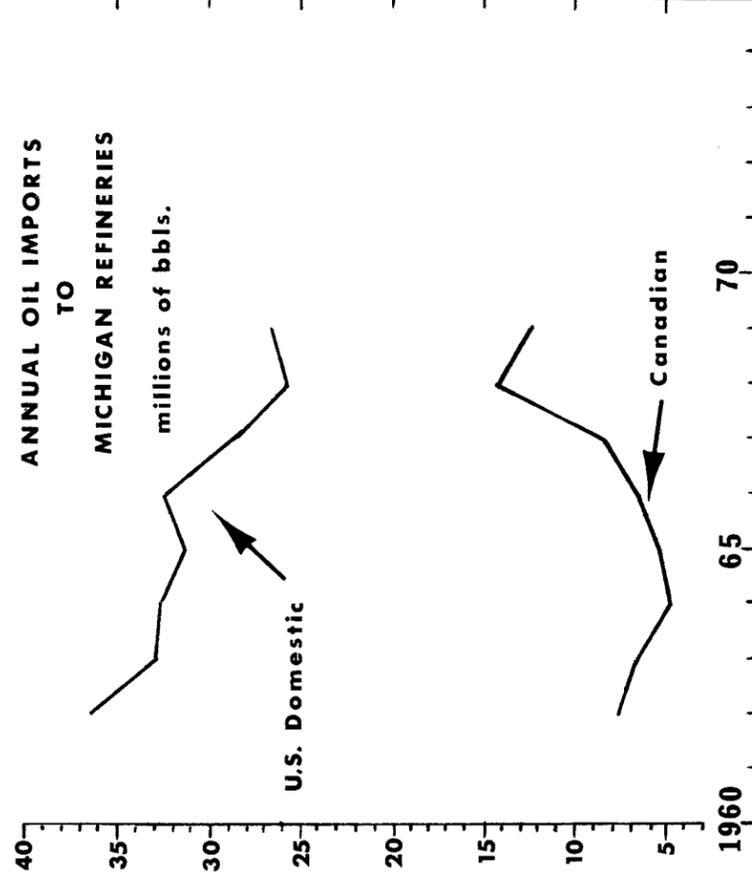
January	43,346,325
February	44,824,781
March	50,125,950
April	68,994,305
May	78,411,690
June	76,744,205
July	76,672,740
August	77,739,357
September	77,890,333
October	67,727,932
November	56,947,857
December	50,250,033
Total	769,675,508

ANNUAL OIL IMPORTS

TO

MICHIGAN REFINERIES

millions of bbls.



*** Discovery Wells ***

State-wide, the discovery-to-dry hole ratio for exploratory or new field wildcat wells was about 1:16 as compared to 1:12 in 1968. Locally, in St. Clair and Macomb Counties where about 27% of the wildcats were drilled in 1969 (about 40% in 1968), the ratio was about 1:42 as compared with 1:16 in 1968. In the Northern District, an area now being explored more intensively, the success ratio was about 1:5 in 1969.

Except for the new fields in the Northern District, most discoveries were found in established producing regions. Those in the Northern District will provide incentive for exploration throughout most of this sparsely drilled region. The locations of new fields and pools in relation to older fields are shown on map segments, page 10. Completion details on all discoveries credited to 1969 are listed on the adjacent page.

Few of the new oil discoveries appear to have an oil or gas yield greater than a Class E field as defined below. The classifications are based on potential yields as defined by the American Association of Petroleum Geologists, Committee on Statistics of Drilling.

- Class A - Over 50 million barrels oil or 300 BCF gas
- Class B - 25-50 million barrels oil or 150-300 BCF gas
- Class C - 10-25 million barrels oil or 60-150 BCF gas
- Class D - 1 - 10 million barrels oil or 6-60 BCF gas
- Class E - 1 million barrels or less oil, or less than 6 BCF gas
- Class F - Abandoned as non-profitable

The most significant discoveries (and exploratory failures) were drilled in the Northern District. The district covers about 8,226 square miles and has a drilled well density of about 1 well per 22 square miles. Many of the wells included in the well density ratio are shallow field wells in the southern part of the district. Large parts of the region were core-drilled to shallow marker beds in the 1940's and 1950's but relatively little drilling was done. In the past few years, the region has been extensively investigated by seismic and gravimeter

surveys. Drilling objectives in this region are primarily Silurian age, Niagaran reefs.

State-wide, Devonian and Silurian reservoir rocks were again the most popular drilling objective. From stratigraphically youngest to oldest, about 5% of all exploratory wells were quit in Mississippian, Michigan Stray and Berea formations; 18% in Devonian, Traverse limestone; 17% in Devonian, Dundee and Reed City rocks; 3% in Devonian, Detroit River sour zone and Richfield rocks; 37% in Middle Silurian, Niagaran rocks; 4% in Middle Ordovician, Trenton-Black River rocks; 15% in Lower Ordovician, Prairie du Chien Rocks; and 1% in Cambrian or older rocks. Most of the Silurian and deeper drilling was done in the shallower parts of the basin.

An analysis of discoveries according to reservoir formation for a three-year period is as follows:

ANALYSIS OF DISCOVERY WELLS BY GEOLOGIC SYSTEM

System	Formation or Pay	Number of Discoveries	
		1967	1968 1969
Pennsylvanian	"Michigan Stray Ss."	-	1
Mississippian	"Berea"	1	-
Devonian	Antrim Shale	-	-
	"Traverse Lime"	1	6
	Dundee	3	1
	"Reed City"	-	1
Silurian	Detroit River	-	-
	"Sour Zone"	-	1
	Richfield	-	1
Ordovician	Salina A-1 or A-2	-	-
	Niagaran Reef *	3	4
Cambrian	Trenton-Black River	1	1
	Prairie du Chien (Gas Shows Reported)	-	-

* Most reefs also have associated Salina A-1 oil or gas pays.

1969 DISCOVERY WELLS

Field	County, Location, Permit No.	Operator and Lease	Comp. Date	Depth to Pay	Total n=(N)IP BOPD	Initial Production t=(T)IP MCFGPD	Prod. Form.	Basis for Loc.	AAPG Pool Class
Crystal Valley, South	Oceana 20-16N-16W SP 27855	Muskegon Dev. Co. & McClure Oil Co. Gatewood #1	12-10	1739	1740	F35t	Traverse	Sub.	E
East China	St. Clair 25-4N-16E SP 27765	Montcalm Dev. Corp. East China Twp. School et al #1	12-2	2344	2363	100t (est.)	Niagaran	Sub.	E
Gaylord-Tecon Lake	Otsego 11-29N-4W SP 27677	Shell Oil Co. Lake Horicon & Savage et al #1-11	9-31	6180	6420	F136t	Niagaran	Seis.	E
Olivet	Eaton 24-1N-6W SP 27461	Fortuna Oil Co. Kellogg #1	6-11	4450	4828	P3t	Trent. BR	Sub.	E
Onaway	Presque Isle 29-35N-2E SP 27576	Cook Bros. et al Draysey #1	3-30	2727	2791	P36t	Niagaran	Grav.	E
Pentwater Lake	Oceana 26-16N-18W SP 27847	J.R. Barwick May #1	12-6	1612	1614	P35t	Traverse	Sub.	E
South Boardman	Gd. Traverse 12-26N-9W SP 27726	McClure Oil Co. State-Union #1	9-14	6779	6922	18400t & Cond. 1800t	Niagaran	Grav.	D
Woodstock	Lenawee 18-5S-1E SP 27450	Hanners Drilg. Co. Sawyer #1	2-12	1466	1467		Traverse	Sub.	E
Marathon	Lapeer 16-9N-9E SP 26615	D.&G. Oil Co. Spaven #1	1-22	3036	3090	F100t	Det. River	Sub.	E
Rosebush	Isabella 36-16N-4W SP 27405	The MOCO McGuire #1	3-4	4790	4838	P6t	Det. River	Sub.	E

NEW POOL DISCOVERIES

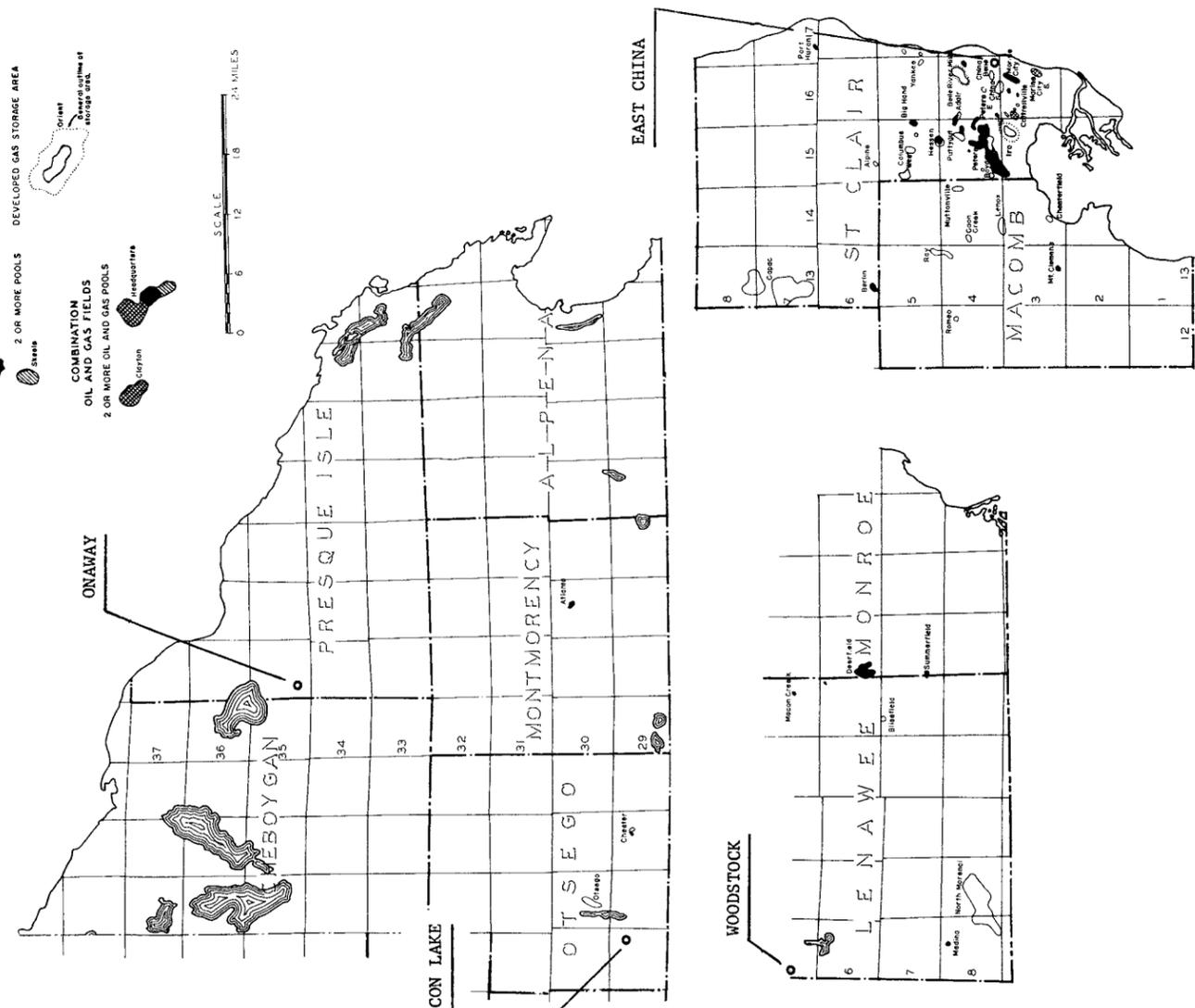
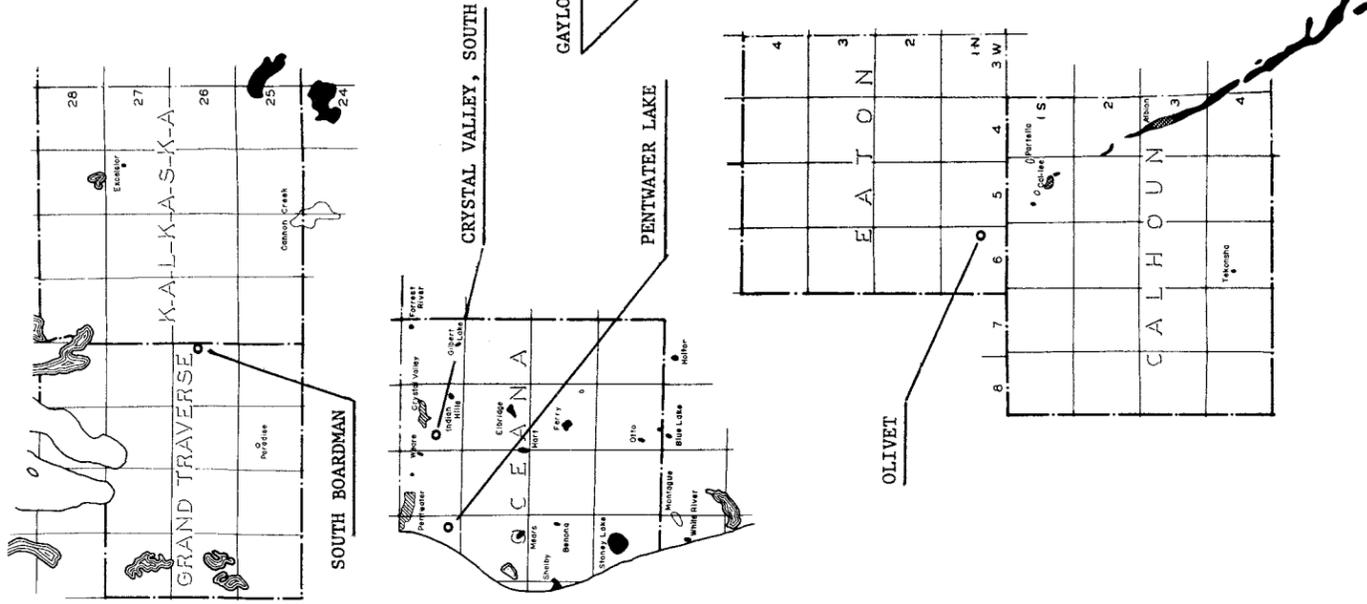
NOTE: t=(T)IP refers to initial potential after acid, sand-fracture, or a combination of well stimulation methods
n=(N)IP refers to natural potential or production

LOCATION OF NEW FIELD DISCOVERIES

EXPLANATION

- OIL FIELDS
- SINGLE POOL
- SEWER CREEK
- 2 OR MORE POOLS
- COMBINATION OIL AND GAS FIELDS
- 2 OR MORE OIL AND GAS POOLS
- GAS FIELDS
- FOUNTAIN
- DEVELOPED GAS STORAGE AREA
- ORIENT
- ORIENT STORAGE AREA

SCALE 0 6 12 18 24 MILES



*** Deep Tests ***

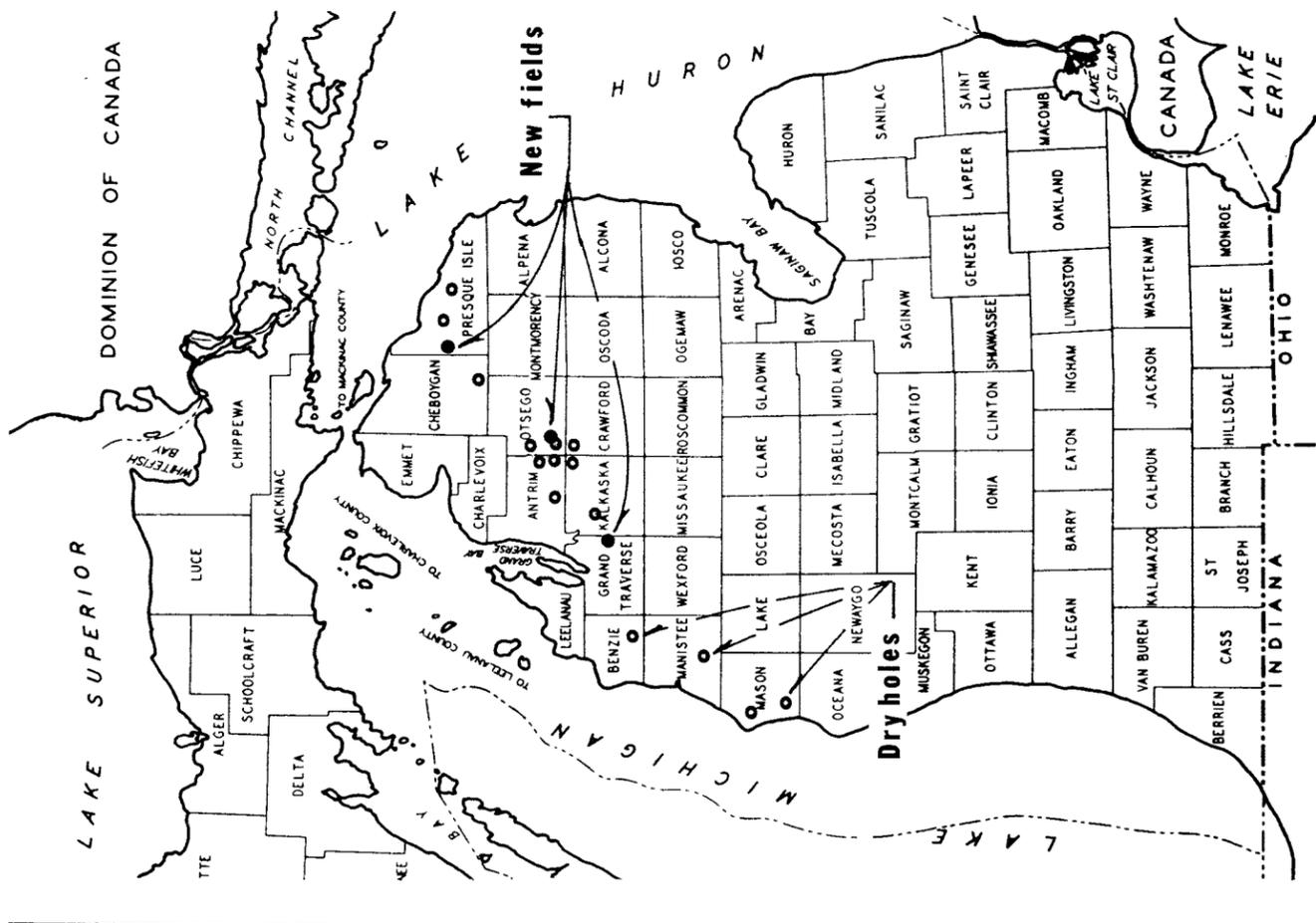
No firm criteria have been established for designating dry-hole exploratory wells as important deep tests. Selections are most often based on the geologic age of the strata penetrated in reference to the location of similar tests in the basin, and the relative abundance of similar tests in the area. Actual drilled depth is not the determining factor. Deeper pool tests in designated fields may also qualify as deep tests. Tests selected for 1969 are listed on page 13. Those drilled in the northern part of the basin are shown on the adjacent map, along with the new discoveries resulting from the current exploration campaign in this region.

*** State Acreage Under Lease ***

State-owned lands under lease for oil and gas development at the end of 1969 amounted to 1,011,068 acres as compared with 939,756 acres at the end of 1968. Most of the newly leased land is in the northern part of the Southern Peninsula, and was leased in connection with the recent exploratory drilling and evaluation of the area. Revenue from oil and gas bonus, rental and royalty, and other fees amounted to \$2,119,264 in 1969 as compared with \$2,002,870 in 1968.

*** New Legislation ***

Recent legislation will have a definite bearing on many of the mineral operations in the state. To be known as the "Mineral Well Act", Act No. 315 of the Public Acts of 1969 was signed into law by the Governor and became effective in March of 1970. Its purpose is to provide control of the drilling, operating and abandoning of mineral wells to prevent surface and underground waste; to provide for a Supervisor of Mineral Wells and prescribe his powers and duties; to provide for an Advisory Board and prescribe its duties; to provide for inspecting, repairing and plugging of mineral wells and for entering on private property for that purpose; to provide for the



assessing of certain fees; to provide for the promulgation of rules and orders to enforce this act; and to prescribe penalties.

The Mineral Well Act is comprehensive and too long to print herein. Certain items, as cited in the act, are of probable interest to the oil and gas exploration and producing industry. Different classes of mineral wells have been incorporated into the act, and are as follows:

"Mineral well" means any well subject to the provisions of this act.

"Brine well" means a well drilled or converted for the purpose of producing natural or artificial brine.

"Test well" means a well, core hole, core test, observation well or other well drilled from the surface to determine the presence of a mineral, mineral resource, ore, or rock unit, or to obtain geological or geophysical information or other subsurface data, but shall not include holes drilled in the operation of a quarry, open pit or underground mine.

"Storage well" means a well drilled into a subsurface formation to develop an underground storage cavity for subsequent use in storage operations.

"Disposal well" means a well drilled or converted for subsurface disposal of waste products or processed brine and its related surface facilities.

"Exploratory purposes" means test well drilling for the specific purpose of discovering or outlining an orebody or mineable mineral resource.

Jurisdiction of the new law is through the offices of the Geological Survey Division, Michigan Department of Natural Resources. The State Geologist is the Supervisor of Mineral Wells, and is counseled by a Mineral Well Advisory Board. Copies of the Mineral Well Act can be obtained from the Geological Survey Division.

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DEEP TESTS

County	Location	Operator and Lease	Permit Number	System and Formation	Total Depth	Explo. Class	Remarks
Antrim	24-29N-7W	McClure Oil Co. #1 Bailey	27483	Sil., Niag.	6142	NFW	
Antrim	26-30N-5W	Shell Oil Co. #1-26 Gates, G.G	27750	Sil., Cabot Head	6631	NFW	
Antrim	25-29N-5W	Shell Oil Co. #1-25 State-Mancelona	27676	Sil., Clinton	7000	NFW	
Benzie	12-25N-14W	Northern Mich. Explo. Co. etal #1 Van Aken, H.	27643	Sil., Niag.	5282	NFW	
Cheboygan	23-33N-1W	Northern Mich. Explo. Co. etal #1-23 State-Nunda	27609	Sil., Clinton	4495	NFW	SSO & G
Clinton	6-7N-1W	McClure Oil Co. #1 Fox	27811	Ord., P.D.C.	7787	NFW	SO & G in Trav.
Crawford	2-28N-4W	Shell Oil Co. #1-2 Wood, G.A.	27678	Sil., Clinton	7241	NFW	SSO & G
Ionia	31-6N-6W	Hunting Oil Co. #1 Possehn, B.K.	27700	Ord., P.D.C.	6400	NFW	SO & G in Several Form.
Jackson	36-3S-2W	Geo. Swan & Mich. Con. Gas Co. #1 Reed, W. & A.	27672	Ord., P.D.C.	4700	NFW	
Kalamazoo	31-3S-10W	Ashland Oil & Refining Co. #1 Hayward, R.	27508	Ord., P.D.C.	3660	NFW	
Kalkaska	1-28N-5W	Pan Am. Pet. Corp. #1 State-Blue Lake	27482	Sil., Clinton	7140	NFW	SO & G
Kalkaska	19-27N-7W	Pan Am. Pet. Corp. #1 State-Kalkaska	27825	Sil., Niag.	7150	NFW	
Manistee	23-22N-15W	Miller Bros. & Northern Mich. Explo. Co. #1 Con. Pwr. Co.	27531	Sil., Clinton	5380	NFW	
Mason	23-19N-18W	Miller Bros. #1-A Cartier Oil Co. etal	27817	Sil., Cabot Head	4780	NFW	
Mason	4-17N-17W	Miller Bros. #1 Christenson	27852	Sil., Niag.	4620	NFW	
Otsego	13-30N-4W	Shell Oil Co. #1-13 State-Hayes	27749	Sil., Niag.	6268	NFW	
Otsego	23-29N-4W	Shell Oil Co. #1-23 State-Hayes	27674	Sil., Niag.	6869	NFW	
Presque Isle	7-34N-5E	McClure Oil Co. #1 Ristow, H.A.	27705	Sil., Clinton	3400	NFW	SSO & G
Presque Isle	24-35N-3E	McClure Oil Co. #1 State-Ocqueoc	27725	Camb., Tremp.	4737	NFW	Camb. Test
St. Clair	17-5N-15E	P.J. O'Neil #1 Houston, M.	27504	Ord., Trenton	4135	NFW	
Van Buren	30-4S-16W	McClure Oil Co. #1 Daly	27501	Ord., P.D.C.	2771	NFW	
Washtenaw	28-3S-5E	Texaco, Inc. #1 Kuebler, D.&B.	27649	Sil., Clinton	2503	NFW	SG
Wayne	22-4S-10E	Marathon Oil Co. #1 Woodhaven	BD#146	Precambrian	3752	BDW	Granite

TABLE 1 DRILLING PERMITS AND WELL COMPLETIONS BY COUNTY, 1969 (Sheet 1 of 2)

COUNTY	OIL AND GAS PERMITS ISSUED	Does not include reworked wells or old wells drilled deeper				RESULTS			SERVICE WELLS			TOTAL COMPLETIONS
		OIL AND GAS TESTS Exploratory	OIL AND GAS TESTS Development	Oil Wells	Gas Wells	Dry Holes	G.S.	SWD	Wtr. Inj.			
Allegan	4	3	2	1								5
Antrim	2	3										3
Arenac	1	1										1
Barry	1	1										1
Benzie	1	1										1
Branch	8	8										8
Calhoun	24	4	28	7	1	24						32
Cass		1				1						1
Cheboygan	1	1				1						1
Clare	6	1	6	2	1	3						6
Clinton	1	1				1						1
Crawford	7	1				1					5	6
Eaton	6	7		3	1	6						7
Genesee	2	1				1						1
Gladwin	2	1				1						1
Grand Traverse	3	1			1							1
Gratiot	8	7		3		7						8
Hillsdale	3	2	2			4						4
Ionia	1	1				1						1
Isabella	35	1	1	2		7						9
Jackson	8	5	3	1		7						8
Kalamazoo		2				2						2
Kalkaska	3	2				2						2
Kent	1	1				1						1
Lake	26	3	23	15		11						26
Lapeer	6	1	3	2		2						4
Lenawee	3	1	2			1	2					3
Livingston	2		2			1						2

Table 1 DRILLING PERMITS AND WELL COMPLETIONS BY COUNTY, 1969 (Sheet 2 of 2)

Macomb	23	18	1			19						19
Manistee	2	2				2						2
Mason	9	4	6	1		9						10
Mecosta	9	4	4	1		7						8
Missaukee	10	3	7	3		7						10
Montcalm	3	2				2						2
Muskegon	5	1	4			5						5
Newaygo	11	4	10	1		13						14
Oakland	3		2									2
Oceana	13	11	2	2	2	11						13
Ogemaw	1	1	1			1						1
Osceola	23	9	5	2		12			11			25
Otsego	8	3	2	2		3						5
Ottawa	3	2	1			3						3
Presque Isle	7	4	1	1		4						5
Saginaw	1	1				1						1
Shiawassee	2	1	2	1		2						3
St. Clair	74	24	41	27	1	37			1			66
Tuscola	2	1	1	1		1						2
Van Buren		1				1						1
Washtenaw	2	1	1			2						2
Wayne	2									1		1
Wexford	1	1				1						1
Totals	379	158	163	73	9	239	20	1	5			347
51 Counties												

Includes 6 permits which were issued and terminated in 1969

TABLE 2 -- OIL AND GAS PRODUCTION BY COUNTY IN 1969

County	Barrels Oil	MCF Gas	County	Barrels Oil	MCF Gas
Allegan	140,710	304,288	Roscommon	157,169	268,262
Arenac	230,636	---	Saginaw	21,703	---
Barry	12,176	---	Shiawassee	10,224	---
Bay	285,430	---	St. Clair	721,072	13,384,648
Calhoun	2,066,564	4,791,510	Tuscola	66,924	---
Cass	1,063	---	Van Buren	8,994	---
Clare	538,675	150,654	Washtenaw	5,978	---
Crawford	449,852	422,080	Wayne	18,675	---
Eaton	340	---	Wexford	---	---
Genesee	10,123	---			
Gladwin	318,691	---	Totals:	12,212,882	36,162,173
Gratiot	11,683	587			
Hillsdale	2,914,889	5,141,476			
Huron	1,883	---			
Isabella	223,855	2,024			
Jackson	1,223,028	2,423,171			
Kalkaska	92,822	---			
Kent	73,891	13,417			
Lake	197,443	---			
Lapeer	71,443	37,286			
Lenawee	85	13,869			
Livingston	735	---			
Macomb	7,362	7,365,592			
Mason	56,863	---			
Mecosta	222,040	84,120			
Midland	200,161	---			
Missaukee	561,135	777,967			
Monroe	3,171	---			
Montcalm	120,615	4,043			
Muskegon	54,327	---			
Newaygo	37,542	---			
Oakland	188	---			
Oceana	33,123	---			
Ogemaw	275,216	438,754			
Osceola	673,487	69,367			
Oscoda	1,598	---			
Otsego	12,769	164,838			
Ottawa	75,215	304,220			
Presque Isle	1,314	---			

TABLE 3. NEW WELL COMPLETIONS BY DISTRICTS, 1969

Classification of New Well Completions	Basin				Districts			Totals
	Oil (1)	Northern	Western	Southeastern	Southwestern	Southeastern	Totals	
Exploratory Wells:	2	2	2	0	0	1	7	
Gas (1)	0	1	0	0	0	2	3	
D & A	39	13	24	23	49	29	148	
Development Wells:	11	1	17	8	29	4	66	
Oil (2)	1	0	0	1	1	24	6	
Gas (2)	15	2	28	22	91	0	91	
D & A	0	5	0	0	0	1	5	
WI	0	0	0	0	0	1	1	
BDW	0	0	0	0	0	1	1	
GS	19	0	0	0	0	1	20	
Totals:	87	24	71	54	111	347	347	
(1) Includes deeper pool discoveries.	(2) Does not include oil or gas wells resulting from rework operations.							

*** PUBLIC HEARINGS ***

Act No. 61 of the Public Acts of 1939, as amended, provides for hearings on oil and gas matters. Act No. 326 of the Public Acts of 1937, as amended, provides for hearings on matters pertaining to natural dry gas. Hearings on matters of local concern involving the administration of rules and regulations, such as exceptions to spacing orders, or pooling of interests to form drilling units, are conducted by the Supervisor of Wells, the State Geologist. Hearings on matters involving broad policies and practices having field-wide or state-wide application are conducted by the Supervisor of Wells and before the Advisory Board. Oil and gas hearings held during 1969 are summarized below.

Hearings Per Month	OIL AND GAS HEARINGS - 1969												
	January	February	March	April	May	June	July	August	September	October	November	December	Total
Items or Causes Heard and Actions by the Supervisor of Wells	2	1	1	2	3	3	1	2	1	4	0	3	23
Spacing Orders:													
Emergency													
Adopted	2		1										.1
Amended	1			1						2			.8
Abrogated													.4
Proration Orders:													.2
Adopted													
Off-Pattern Permits Issued	1				1								.2
Show Cause Hearings Held:													.6
On Operation of Pool													
On Unsatisfactory Lease													.1
Operation													
Utilization of Pool													.1
Water Flood Project													.1
Net Gas-Oil Ratio Project													.1
Items Heard, No Action Taken	4	2	1	4	6	1	1	4	1	3	0	3	.5
Total Items or Causes	4	2	1	4	6	1	1	4	1	3	0	3	.5

PART 2, OIL AND GAS FIELDS
EXPLANATION

Part 2 brings together general information mainly on Michigan's oil and gas fields, gas storage reservoirs, LPG storage facilities, gas plant operations and refinery facilities. Oil and gas fields are listed alphabetically by field name. Developed and undeveloped gas storage reservoirs, all of which were originally classified as oil or gas accumulations, are also integrated in the listing, but for convenience they are also shown on separate tables.

MICHIGAN OIL AND GAS FIELDS, TABLE 4. The symbol on the left margin of the table indicates the official classification of fields and pools at the end of the year. Field names are listed in the second column and the producing pool, or pools, are shown under the heading Producing Formation or Pool. Most fields consist of one pool with oil or gas production coming from a single formation. Some fields have 2 or more separate pools, each producing from a different formation or stratigraphic interval and at a different depth.

Location of Fields according to township, range and sections are found at the bottom of the field block. The listed sections are those which have, or have had, producing wells assigned to the field.

The Pay Zone part of the table generally refers to data for the discovery well. The indicated pay thickness generally relates to the amount of pay opened or perforated in the discovery well and does not necessarily indicate total net pay for the reservoir.

The Deepest Formation Tested column indicates the deepest total depth and formation penetrated in the field.

The Number of Oil and Gas Wells column indicates the number of successful field wells drilled in the field to the end of the specified year, the number completed as producing wells during the year, the number of producing wells abandoned during the year, the number producing at the end of the year, and the number shut-in or shut-down

GAS STORAGE RESERVOIRS. Most gas storage reservoirs were originally classified as gas fields or pools. Upon depletion or near depletion of native gas, they were converted to storage reservoirs. Undeveloped gas reservoirs are gas pools that have been designated to become storage reservoirs at some future time.

The producing sections listed in gas storage reservoir tables do not necessarily relate to current gas storage area or boundaries. The sections, or parts of sections, listed are those which contained at least one producible oil or gas well assigned to the field or pool prior to conversion to gas storage. Also, the sections do not necessarily relate to potential or future gas storage area or boundary.

LPG STORAGE. Surface and underground storage facilities for liquified petroleum gas.

OIL WELL GAS. This is casinghead gas produced incidental to the production of oil from pools or fields generally classified as oil accumulations.

OIL AND GAS WELL RECORDS. Descriptive geological logs and drillers logs are available for over 27,500 Michigan oil and gas tests, including exploratory and development wells. Individual logs may be purchased at small cost from the Geological Survey Division.

WELL SAMPLE SETS. Well cuttings for over 9,000 wells are available for inspection at the Geological Survey, Lansing, Michigan. Samples are contained in glass vials arranged in open trays. The Survey does not maintain a core collection.

Other sample and core repositories are located at: Subsurface Laboratory, Department of Geology, University of Michigan, Ann Arbor, Michigan.

Department of Geology, Wayne State University, Detroit, Michigan.

at the end of the year. Most of the latter category are producible wells, but for various reasons they were not in operation.

The Drilled Acres column indicates the total number of acres assigned to the field or pool according to individual well drilling units assigned to each producing well completed in the field or pool. A field may have a 10 or 20-acre drilling unit for one pool and a 40-acre drilling unit for a deeper formation pool within the field. During the development of a field or pool, the drilling unit size may change, thus subsequent wells are assigned acreage accordingly. In past years, drilling units generally have been 10, 20, or 40 acres. During 1969, a few new pools in the Northern District were assigned 80, 160, and 640-acre units. Gas well units, especially for Michigan Stray Sandstone reservoirs, have generally been 160-acre units. Other sizes currently in use for gas wells are 40, 80, 320, and 640-acre units. Changes in drilling units, off pattern wells, etc. complicate the maintenance of accurate acreage figures during the life of a given field or individual pool. The figures cited in the column are not entirely accurate, but do provide as near as possible an indication of the areal size of the field. Where possible, drilled acreage is shown for individual pools. The figures do not indicate the areal extent of the oil or gas reservoir.

Recovery Per Drilled Acre figures for oil pools result from dividing the drilled acres figure into the cumulative oil production figure.

GAS FIELDS. Because of slow field development, small reserves, or lack of marketing facilities, some fields are listed as "shut-in" and show no production figures. Others produce small quantities of unmetered gas and are not considered commercial. Production from these fields is used for domestic purposes and, in some cases, lease fuel.

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Department of Geography, Central Michigan University, Mt. Pleasant, Michigan.

MICHIGAN OIL AND GAS FIELDS

SOUTHERN PENINSULA

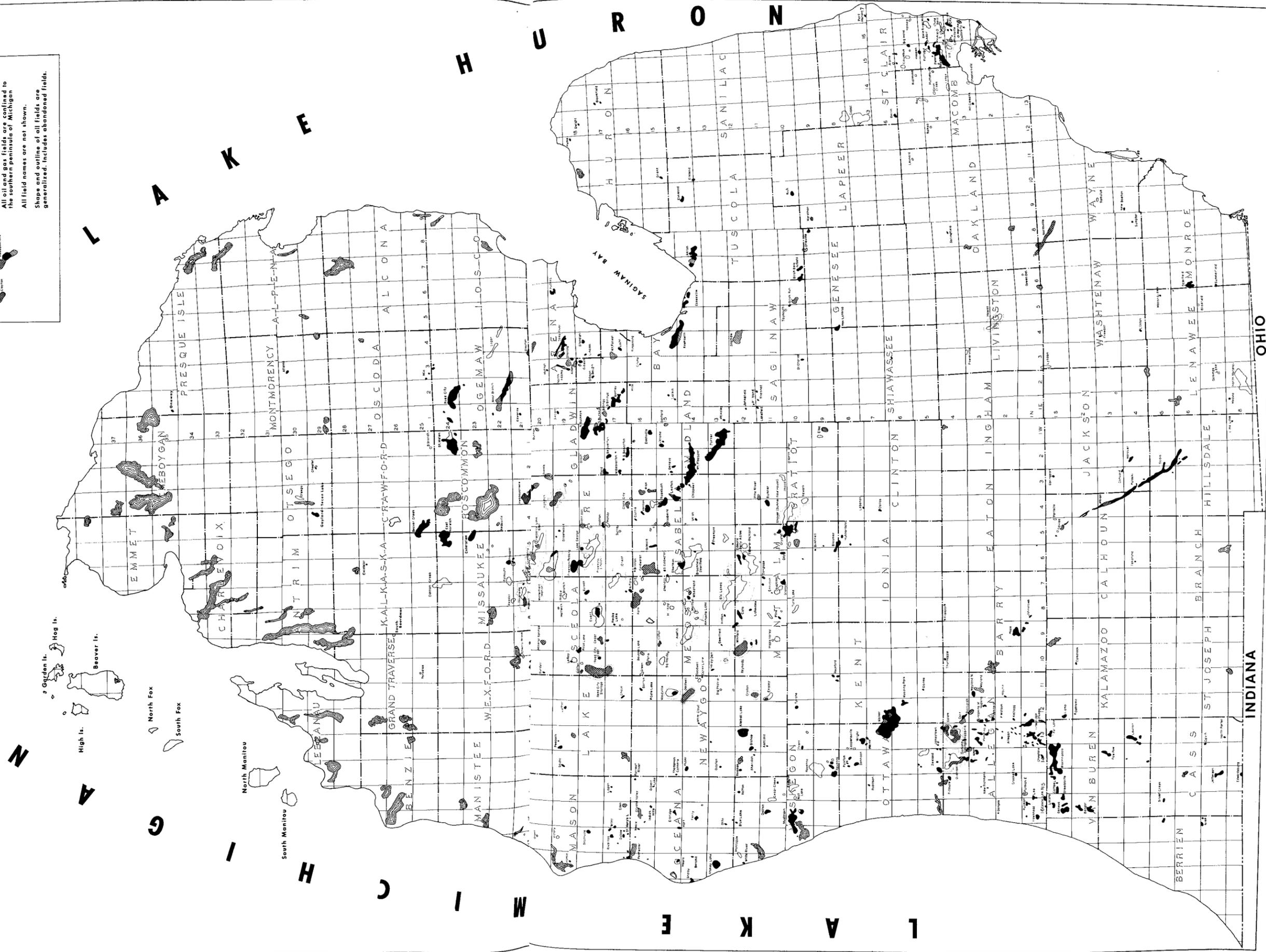


OIL FIELDS
 SINGLE POOL
 2 OR MORE POOLS

GAS FIELDS
 DEVELOPED GAS STORAGE AREA

COMBINATION OIL AND GAS FIELDS
 2 OR MORE OIL AND GAS POOLS

All oil and gas fields are confined to the southern peninsula of Michigan.
 All field names are not shown.
 Shape and outline of all fields are generalized. Includes abandoned fields.



INDIANA

OHIO

TABLE 4 MICHIGAN OIL AND GAS FIELDS

Table with columns: FIELD NAME, COUNTY, YEAR OF DISCOVERY, PRODUCING SECTION, DEPTHS, PAY ZONE, DEEPEST FORMATION, NUMBER OF OIL OR GAS WELLS, OIL PRODUCTION, GAS PRODUCTION, RECOVERY PER ACRE, BRINE PRODUCTION, TOTAL DISPOSAL.

SEE PAGE 21 FOR MAP AND TOWNSHIPS ASSOCIATED WITH ALBION-SCIPPIO TREND

* CORRECTED FROM PREVIOUS YEAR

TABLE 4 MICHIGAN OIL AND GAS FIELDS Continued

Table with columns: FIELD NAME, COUNTY, YEAR OF DISCOVERY, PRODUCING SECTION, DEPTHS, PAY ZONE, DEEPEST FORMATION, NUMBER OF OIL OR GAS WELLS, OIL PRODUCTION, GAS PRODUCTION, RECOVERY PER ACRE, BRINE PRODUCTION, TOTAL DISPOSAL.

OIL AND GAS FIELDS

TABLE 4 MICHIGAN OIL AND GAS FIELDS Continued

FIELD NAME	COUNTY TOWNSHIP PRODUCING SECTIONS	YEAR OF DISC.	PRODUCING FORMATION OR POOL	DEPTH IN FEET	PAY ZONE THICKNESS AND LITHOLOGY	DEEPEST FORMATION OR POOL TESTED	NUMBER OF OIL OR GAS WELLS						OIL PRODUCTION - BBL. PRODUCED IN 1969	GAS PRODUCTION - Mcf. PRODUCED IN 1969	RECOVERY PER ACRES DRILLED (BBL.)(1969)	BRINE PRODUCTION					
							TO END	ABAND. IN 1969	PRODUCING IN 1969	SHUT IN AT END	SHUT DOWN	CUMULATIVE THROUGH 1969					DISPOSAL SURFACE	TOTAL BBL. DAY			
CEDAR	OSCEOLA	1945	MICHIGAN STRAY	1490	7 S	SYLVANIA	5165	5	0	0	4	0	1,402,820	800	1,800	0	1,800				
		1943	DUNDEE	3810	2 L	46-0	10	0	0	7				400							
		1945	RICHFIELD	5060	6 L	44-7	2	0	0	2	14,361	1,093,204	60	2,377	0	0	0				
CEDAR CREEK	CEGAR TWP., 18N-9W, SECTIONS 27, 28, 32, 33 (MICHIGAN STRAY)	1940	"BEREA"	1125	7 0	DUNDEE	2252	7	ABANDONED 1960			624,528	1120								
CEDAR CREEK SEC. 23	CEGAR CREEK TWP., 11N-15W, SECTIONS 7, 17, 18, 19, 20, 32	1951	TRAVERSE	1951	2 L	DUNDEE	2453	2	ABANDONED 1968			2,652	50	53							
CHASE	CEGAR CREEK TWP., 11N-15W, SECTIONS 19, 29	1943	"BEREA"	2460	4 SL	DETROIT RIVER	3734	2	0	0	1	144	7,971	20	399						
CHERRY GROVE	WEXFORD	1952	TRAVERSE	3145	4 0	DUNDEE	3598	1	ABANDONED 1953			4,814	10	481							
CHERRY GROVE SEC. 15	WEXFORD	1957	MICHIGAN STRAY	1356	35 S	DUNDEE	4080	5	0	0	1	1	924,719	640							
CHESHIRE	CHERRY GROVE TWP., 21N-10W, SECTION 13	1947	TRAVERSE	1289	2 L	TRAVERSE	1548	3	ABANDONED 1958			9,290	30	310							
CHESTER	CHESHIRE TWP., 4N-14W, SECTIONS 26, 27	1965	ANTRIM	1360	7 SH	NIAGARAN	6870	16	0	0	16	3	150,784	640							
CHESTER, SEC. 15	CHESTER TWP., 29N-24W, SECTIONS 10, 11, 14, 15, 16	1951	SALINA	6610	5 0	41-0	6870	1	ABANDONED 1956			2,752	40	69							
CHESTERFIELD	CHESTER TWP., 29N-24W, SECTION 15	1962	NIAGARAN	2508	7 0	40-3	2707	7	0	0	3	7,382	37,631	0	124,498	280	134	25	0	25	
CHINA BELLE	CHESTERFIELD TWP., 3N-14E, SECTION 29	1963	NIAGARAN	2355	15 0	NIAGARAN	2951	3	0	0	3	207	1,633	39,906	366,258	120	3	0	3	0	3
CHINA, SEC. 12	ST. CLAIR	1962	NIAGARAN	2509	11 0	39-1	2631	2	0	0	2	0	11,895	0	27,721	80	149				
CHINA, SEC. 31	ST. CLAIR	1959	SALINA																		
	CHINA TWP., 4N-16E, SECTION 31																				
CHINA, SOUTH	CHINA TWP., 4N-16E, SECTIONS 28, 33, 34	1961	SALINA-NIAGARAN	2324	14 0	CLINTON	2743	11	0	0	5	4	523,443	440							
CHIPPEVA, SEC. 10	ISABELLA	1961	TRAVERSE	3193	1 L	TRAVERSE	3220	1	ABANDONED 1964			1,250									
CLARE CITY	CLARE-ISABELLA	1937	MICHIGAN STRAY	1290	5 S	DUNDEE	3865	8	0	0	1		2,294,990	720							
CLARE CITY	CLARE-ISABELLA	1938	MICHIGAN STRAY	1303	2 S	30-2	3853	7	0	0	5	1,123	75,068	120	626						
CLAYTON	AREMAC	1936	BEREA	1180	10 S	SYLVANIA	4163	31	0	0	17	2	0	5,111,048	1560						
	CLAYTON TWP., 20N-4E, SECTIONS 4, 5, 8, 9, 10, 11, 14, 15																				
	CLAYTON TWP., 20N-4E, SECTIONS 4, 5, 8, 9, 10, 11, 14, 15																				

TABLE 4 MICHIGAN OIL AND GAS FIELDS Continued

FIELD NAME	COUNTY TOWNSHIP PRODUCING SECTIONS	YEAR OF DISC.	PRODUCING FORMATION OR POOL	DEPTH IN FEET	PAY ZONE THICKNESS AND LITHOLOGY	DEEPEST FORMATION OR POOL TESTED	NUMBER OF OIL OR GAS WELLS						OIL PRODUCTION - BBL. PRODUCED IN 1969	GAS PRODUCTION - Mcf. PRODUCED IN 1969	RECOVERY PER ACRES DRILLED (BBL.)(1969)	BRINE PRODUCTION					
							TO END	ABAND. IN 1969	PRODUCING IN 1969	SHUT IN AT END	SHUT DOWN	CUMULATIVE THROUGH 1969					DISPOSAL SURFACE	TOTAL BBL. DAY			
CLAYTON	AREMAC-OGEMAW	1935	DUNDEE	2465	12 DL	34-2	4163	80	0	0	47	5	1290		1,348	22	1,270				
		1953	DETROIT RIVER	3507	9 0	43-9															
		1947	RICHFIELD	3790	9 0	36-2							46,719	6,291,515	200	4,222	0	0	0	0	
CLARE LAKE	VAN BUREN	1930	TRAVERSE	1380	1 L	TRAVERSE	1399	14	ABANDONED 1953			17,490		140	125						
	PINE GROVE TWP., 15-13W, SECTIONS 3, 4, 9, 10																				
CLINTON	WASHTENAW	1953	TRAVERSE	986	2 0	TRENTON	3606	2	ABANDONED 1962			2,093		20	105						
COFFEE LAKE	BRIDGEWATER TWP., 4S-4E, SECTION 28	1946	TRAVERSE	1128	1 L	TRAVERSE	1130	11	ABANDONED 1954			34,649		110	315						
COLDWATER	REFER TO TABLE 6 UNDEVELOPED GAS STORAGE RESERVOIRS																				
COLDWATER	ISABELLA	1944	DUNDEE	3692	25 L	48-0	5090	81	0	0	52	16	89,456	21,698,055	0	6,311,307	3200	6,781	28,356	0	28,226
	COLDWATER TWP., 16N-6W, SECTIONS 19, 20, 21, 28, 29, 30, 31, 32, 33, 34																				
	COLDWATER TWP., 16N-6W, SECTIONS 19, 20, 21, 28, 29, 30, 31, 32, 33, 34																				
COLDWATER, SOUTH	ISABELLA	1951	DUNDEE	3729	4 0	DUNDEE	3743	1	ABANDONED 1959			10,941		20	547						
	SHERMAN TWP., 15N-6W, SECTION 8																				
SOLE LAKE	NEWAYGO	1968	TRAVERSE	2928	8 L	TRAVERSE	2938	2	1	0	2	20,430	21,855	40	546	335	0	355			
COLFAX	BARTON TWP., 16N-11W, SECTIONS 29, 30	1945	MICHIGAN STRAY	1240	8 S	DETROIT RIVER	4043	4	0	0	1		0	485,844	640						
		1964	DUNDEE	3503	25 L	43-0							2,260	40	57						
		1957	DUNDEE-REED CITY	3474	9 0								0	5,121	160						
	COLFAX TWP., 15N-3W, SECTIONS 4, 5																				
COLLIN	ST. CLAIR	1968	SALINA-NIAGARAN	2196	4 0	NIAGARAN	2364	2	0	0	2	131	2,019	59,089	80	25					
	COTTRELLVILLE TWP., 3N-16E, SECTION 20																				
COLUMBUS	ST. CLAIR	1964	SALINA-NIAGARAN	2728	190 0																
	COLUMBUS TWP., 5N-15E, SECTIONS 15, 16, 21, 22																				
COLUMBUS, SEC. 3	ST. CLAIR	1968	NIAGARAN	3105	15 0																
	COLUMBUS TWP., 5N-15E, SECTIONS 3, 10																				
COLUMBUS, SEC. 23	ST. CLAIR	1965	NIAGARAN	2900	464 0																
	COLUMBUS TWP., 5N-15E, SECTION 23																				
COLUMBUS, NORTH	COLUMBUS	1968	NIAGARAN	3666	8 0	NIAGARAN	3326	8	6	0	8	79,862	77,212	200	386	0	146				
	COLUMBUS TWP., 5N-15E, SECTIONS 5, 6																				
COLUMBUS, WEST	ST. CLAIR	1967	SALINA-NIAGARAN	3183	14+ 0	CLINTON	3370	13	0	0	13	5	1,878,580	6,931,327	520	26	0	26			
	COLUMBUS TWP., 5N-15E, SECTIONS 7, 17, 18																				
CONROCK, SEC. 5	KALAMAZOO	1949	TRAVERSE	1430	3 L	TRAVERSE	1480	2	ABANDONED 1952			974		20	49						
	CONROCK TWP., 25-10W, SECTION 5																				
CONCORD	JACKSON	1953	TRAVERSE	1627	1 L	SALINA	2417	5	ABANDONED 1958			6,437		50	129						
	CONCORD TWP., 36-3W, SECTIONS 35, 36																				
COON CREEK	MACOMB	1963	NIAGARAN	3034	20 0	NIAGARAN	3093		ABANDONED 1968			134,116	80								
	LENOX TWP., 4N-14E, SECTION 18																				

TABLE 4 MICHIGAN OIL AND GAS FIELDS Continued

FIELD NAME	COUNTY TOWNSHIP PRODUCING SECTIONS	YEAR OF DISC.	PRODUCING FORMATION OR POOL	PAY ZONE THICKNESS IN LITHOLOGY A.P.I.	DEPTH IN FEET	OIL GRAVITY A.P.I.	DEEPEST FORMATION OR POOL TESTED	NUMBER OF OIL OR GAS WELLS TO COMP. PRODUCING END IN 'IN' AT END 1 9 6 9	ABANDONED 1959	CUMULATIVE OIL PRODUCTION - BBL. IN 1969	CUMULATIVE GAS PRODUCTION - Mcf. THROUGH 1969	RECOVERY PER ACRE DRIILLED ACRES (BBL.)	BRINE PRODUCTION		
													DISPOSAL SUBSURFACE	TOTAL SURFACE DAY	
COOPERSVILLE	OTTAWA	1939	"BEREA"	5 0	1240		TRAVERSE	3	ABANDONED 1959	108,839	240				
	WRIGHT TWP., 8N-13W, SECTIONS 7, 19														
COTTRELLVILLE	ST. CLAIR	1961	SALINA-NIAGARAN	6 0	2262	38.7	CLINTON	12 0 0 0	8	7,798	108,654	280	388	0 0 0 0	
	CHINA TWP., 4N-16E, SECTION 31						IRA TWP., 3N-15E, SEK SECTION 12								
COTTRELLVILLE	ST. CLAIR	1959	SALINA-NIAGARAN	37 0	2293		CLINTON	2 0 0 0	2	135,929	1,831,196	240		10 0 0 0	
	COTTRELLVILLE TWP., 3N-16E, SECTIONS 6, 7, 8														
	REFER TO TABLE 5 DEVELOPED GAS STORAGE RESERVOIRS														
CRANBERRY LAKE	CLARE	1952	TRAVERSE	7 L	5120	39.0	RICHFIELD	5223	7	ABANDONED 1965	PRODUCTION COMBINED WITH CRANBERRY LAKE, TRAVERSE, AND RICHFIELD				
CRANBERRY LAKE	CLARE	1943	DUNDEE	2 L	3835	42.8		8 0 0 3	1			70		600 0 0 600	
	1953	DETROIT RIVER S2	4801	16 0	48.8			1	ABANDONED 1962	PRODUCTION COMBINED WITH CRANBERRY LAKE, TRAVERSE, AND RICHFIELD					
	1951	RICHFIELD	5048	15 0	51.0			17 0 6 6	1	30,694	1,472,562	680	1,963	8 0 0 8	
	WINTERFIELD TWP., 20N-6W, SECTIONS 1, 2, 11, 12														
CRANBERRY LAKE, EAST	CLARE	1963	TRAVERSE	6 L	3057	39.2	DETROIT RIVER	5139	1	ABANDONED 1964		588		PRODUCTION COMBINED WITH DUNDEE AND RICHFIELD	
	1963	DUNDEE	3760	6 L	43.5			4 0 0 4				200		719 0 0 719	
	1964	RICHFIELD	5087	12 0	44.0			2 0 0 2		62,610	487,566	80	1,741	30 0 0 30	
	SUMMERFIELD TWP., 20N-5W, SECTIONS 7, 8, 17														
CROOKED LAKE	ALLEGAN	1949	TRAVERSE	1 L	1278		TRAVERSE	1312	2	ABANDONED 1956		115,452	40	2,886	
	CLYDE TWP., 2N-15W, SECTION 25														
	REFER TO TABLE 5 DEVELOPED GAS STORAGE RESERVOIRS														
CROTON	NEWAYGO	1951	TRAVERSE	2 L	2943		SALINA	3993	10	ABANDONED 1958		91,678	200	458	
	CROTON TWP., 12N-17W, SECTIONS 20, 29														
CRUPE	BAY	1950	DUNDEE	7 L	3594		DUNDEE	3354	1	ABANDONED 1951		1,043	10	104	
	GARFIELD TWP., 16N-2E, SECTION 23														
CRYSTAL	MONTCALM	1954	TRAVERSE	4 L	2769	41.8	DETROIT RIVER	5391	2 0 0 0	1				350 0 0 350	
	1955	DUNDEE	3187	4 0	43.5			193 0 0 7		7,669	7,988,189	2000	3,856	1,000 0 1,000	
	CRYSTAL TWP., 10N-5W, SECTIONS 1, 2, 3, 4, 10, 11, 12, 13						FERRIS TWP., 11N-5W, SECTIONS 26, 34, 35, 36								
CRYSTAL VALLEY	OCEANA	1945	TRAVERSE	3 L	1809	37.0	ST. PETER S8	6062	5 0 0 0	1				175 0 0 175	
	1957	DUNDEE	2375	12 0	42.5			19 0 0 1	1	0	203,747	430	434	0 0 0 0	
	CRYSTAL TWP., 16N-16W, SECTIONS 9, 10, 11, 14, 15, 16														
CRYSTAL VALLEY	OCEANA	1946	DUNDEE	2400	7 L		TRENTON- BLACK RIVER	5985	4	ABANDONED 1966		1162,079	160		
	1961	SALINA	4102	10 0				1	ABANDONED 1966			40			
	CRYSTAL TWP., 16N-16W, SECTIONS 9, 10, 11, 14, 15, 16														
CRYSTAL VALLEY, SOUTH	OCEANA	1969	TRAVERSE	1 L	1729		TRAVERSE	1740	1 1 0 1	1	270	40	7		
	CRYSTAL TWP., 16N-16W, SECTION 20														
CURRIE	ISABELLA	1936	DUNDEE	2 0	3918	45.9	DUNDEE	4042	2 0 0 2	2	911	201,833	40	5,046	
	VERNON TWP., 16N-1W, SECTIONS 5, 8														
DALLAS	CLINTON	1942	TRAVERSE	2 L	2482		DETROIT RIVER	2934	3	ABANDONED 1948		3,685	40	770	
	DALLAS TWP., 7N-1W, SECTION 21														
DALTON	MUSKOGON	1940	TRAVERSE	5 L	1851	40.0	DUNDEE	2515	16 0 1 5	5	662	107,386	300	359	0 1 1 1
	DALTON TWP., 11N-15W, SECTIONS 10, 11, 15														

TABLE 4 MICHIGAN OIL AND GAS FIELDS Continued

FIELD NAME	COUNTY TOWNSHIP PRODUCING SECTIONS	YEAR OF DISC.	PRODUCING FORMATION OR POOL	PAY ZONE THICKNESS IN LITHOLOGY A.P.I.	DEPTH IN FEET	OIL GRAVITY A.P.I.	DEEPEST FORMATION OR POOL TESTED	NUMBER OF OIL OR GAS WELLS TO COMP. PRODUCING END IN 'IN' AT END 1 9 6 9	ABANDONED 1944	CUMULATIVE OIL PRODUCTION - BBL. IN 1969	CUMULATIVE GAS PRODUCTION - Mcf. THROUGH 1969	RECOVERY PER ACRE DRIILLED ACRES (BBL.)	BRINE PRODUCTION		
													DISPOSAL SUBSURFACE	TOTAL SURFACE DAY	
DAY	MONTCALM	1934	MICHIGAN STRAY	4 5	1352		MARSHALL	1395	2	ABANDONED 1944		8,494	80		
	DAY TWP., 11N-6W, SECTION 1														
DAY	MONTCALM	1946	TRAVERSE	2 L	2900	43.0	DUNDEE	2387	1	ABANDONED 1967					
	1946	DUNDEE	3337	2 L				2	ABANDONED 1954		16,239	20	812		
	DAY TWP., 11N-6W, SECTION 25 (TRAVERSE); DAY TWP., 11N-6W, SECTION 36 (DUNDEE)														
DEEP RIVER	AREMAC	1956	BEREA	10 5	1490		SYLVANIA	4311	12 0 0 3	0	1,609,812	1320		DOMESTIC USE	
	DEEP RIVER TWP., 19N-4E, SECTIONS 7, 8, 16, 17, 18, 20														
DEEP RIVER	AREMAC	1944	DUNDEE	145 0	2795	35.8	RICHFIELD	4288	106 0 0 41	13	75,076	26,328,507	1060	24,838	7,065 0 7,065
	1953	RICHFIELD	CONSOLIDATED WITH STERLING DETROIT RIVER-RICHFIELD IN 1954												
DEERFIELD	MORNOE	1920	TRENTON	10 L	2115	42.7	CAMBRIAN	3250	47 0 0 20	12	3,171	709,646	450	1,577	0 0 0 0
	DUNDEE TWP., 6S-6E, SECTIONS 19, 29, 30						SUMMERFIELD TWP., 6S-6E, SECTION 31								
DEMINGS LAKE	LEMASEE	1968	TRAVERSE	2 L	734		TRAVERSE	741	1 0 0 1	1	0	0			
	DOVER TWP., 7S-2E, SECTION 27														
DEMUNSON	OTTAWA	1963	TRAVERSE	4 L	1874	38.0	SALINA	3202	15 0 3 6	4	2,164	315,717	300	1,042	100 0 100
	ROLAND TWP., 8N-1W, SECTIONS 21, 27, 28														
DIAMOND CRYSTAL SALT	ST. CLAIR	1927	NIAGARAN	17 0	2483		NIAGARAN	2500	1	ABANDONED 1931		136,445	40		
	ST. CLAIR TWP., 5N-17E, SECTION 31														
DIAMOND SPRINGS	ALLEGAN	1938	TRAVERSE	3 L	1461	41.0	SALINA	2651	26 0 1 7	7	3,760	1,006,321	420	2,396	165 0 165
	1958	SALINA-E ZONE	2389	21 0	25.5			3 0 0 3	1	2,043	54,708	30	1,824	0 0 0 0	
DORR	ALLEGAN	1938	TRAVERSE	4 L	1617	41.0	NIAGARAN	3319	41 0 0 4	1	1,089	418,846	410	1,022	0 0 0 0
	OVERSEL TWP., 4N-1W, SECTION 36						HEATH TWP., 3N-1W, SECTION 1								
	1955	DETROIT RIVER	2082	6 0	36.0			14 0 0 4	4	1,135	72,640	280	259	26 2 28	
	1956	SALINA	2922	7 0	17.0			18 0 0 12	2	4,885	292,284	540	541	32 16 48	
	DORR TWP., 4N-12W, SECTIONS 19, 29, 30, 31, 32, 33						SALEM TWP., 4N-13W, SECTION 25								
DORR	ALLEGAN	1937	DETROIT RIVER	1 0	1918		NIAGARAN	3319	1 0 0 1	1	0	4,710	160		
	DORR TWP., 4N-12W, SECTION 33														
DORR, SEC. 17	ALLEGAN	1951	"BEREA"	8 0	953		TRAVERSE	1642	1	ABANDONED 1967		0	40		
	DORR TWP., 4N-12W, SECTION 17														
DORR, SEC. 21	ALLEGAN	1940	"BEREA"	1 0	957		TRAVERSE	1687	1 0 0 1	1	0	0	40		DOMESTIC USE
	DORR TWP., 4N-12W, SECTION 21														
DOUGLASS	MONTCALM	1945	DUNDEE	2 L	3400	47.1	DUNDEE	3458	6 0 0 1	1	708	246,770	120	2,056	175 0 175
	DOUGLASS TWP., 11N-7W, SECTION 1														
DOUGLASS	MONTCALM	1943	MICHIGAN STRAY	5 5	1190		DUNDEE	3423	4	ABANDONED 1951		184,806	640		
	DOUGLASS TWP., 11N-7W, SECTIONS 27, 28														
DOUGLASS, SEC. 3	MONTCALM	1954	TRAVERSE	8 L	3025		DUNDEE	3666	1	ABANDONED 1956		3,155	20	158	
	DOUGLASS TWP., 11N-7W, SECTION 3														
DUNNINGVILLE	ALLEGAN	1950	TRAVERSE	3 L	1435	38.0	TRAVERSE	1438	5 0 0 1	1	452	119,422	50	2,388	30 0 30
	HEATH TWP., 3N-1W, SECTIONS 22, 27, 23														

