

STATE OF MICHIGAN
DEPARTMENT OF CONSERVATION
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1957
SUMMARY OF OPERATIONS
OIL AND GAS FIELDS

BY
THE STAFF OF THE OIL AND GAS SECTION
AS COMPILED BY

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CONTENTS

Map - Oil and Gas Fields by Districts..... 1
General Activities..... 1
Table I - Exploratory & Development Well Completion Summary 1
Exploration..... 2
Prospects for 1958..... 2
Generalized Columnar Section of Bass Island-Salina Rocks in the Mich. Basin..... 2
Bass Island-Salina Group..... 2
Oil Field Brine..... 3
Table II - Oil Field Brine by Fields 3
Generalized Columnar Sections of Michigan..... 4

GENERAL ACTIVITIES

(Comparative Statistics 1956-57)

Exploratory and development well permits for 1957 declined 6.3% from 1956. In 1957, permits issued totaled 461, classified as 420 for exploratory and development wells and 41 for service wells. For 1956, the total permits issued numbered 476 with 448 for exploratory and development wells and 28 for service wells. These figures represent the actual permits issued and not the cancel and transfers from previous years.

Completions registered a slight decline (2.8%) from the previous year. This percentage decline does not include 38 service well completions for 1957 and 28 service

wells completed in 1956. Table I is a comparative summary of the exploratory and development well completions for the two years.

OIL AND GAS FIELDS
SOUTHERN PENINSULA OF MICHIGAN
BY DISTRICTS

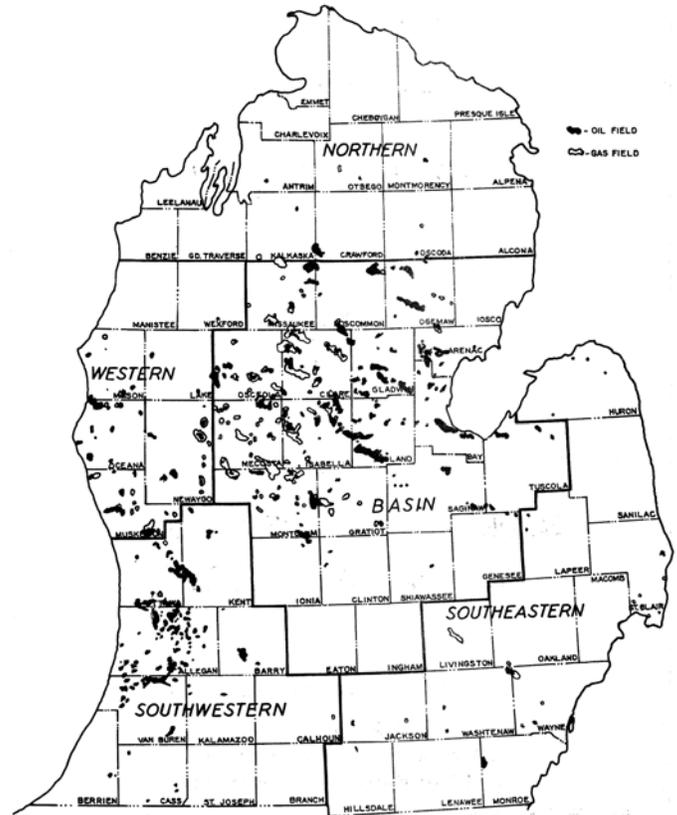


TABLE I
EXPLORATORY & DEVELOPMENT WELL
COMPLETION SUMMARY, 1956-1957 (Inc.)¹

	1956				Per- cent Success	1957				Per- cent Success
	Oil	Gas	Dry	Total		Oil	Gas	Dry	Total	
Exploratory Wells	12	1	152	165	7.9	13	5	132	150	12.0
Development Wells	184	11	75	270	68.1	163	35	75	273	72.5
Totals	196	12	227	435	47.8	176	40	207	423	51.1

¹Does not include rework completions.

The footage drilled by exploratory and development wells decreased 52,757 feet from last year. Drilled footage totaled 1,228,918 feet for 1957 and 1,281,675 feet for 1956. Of the 1957 total 388,763 feet was attributed to exploratory wells and 840,155 feet to development wells. The average exploratory effort drilled 2,592 feet and average development effort 3,077 feet. In 1956, exploratory footage totaled 461,359 feet and development footage 820,298 feet. For that year the average exploratory effort drilled 2,796 feet and development effort 3,038 feet. The above figures

indicate an increase in exploration activity on the flanks of the Michigan Basin where the producible formations are at a relatively shallower depth. This trend is also indicated in the number of exploratory wells drilled by district (Table V).

Oil production in 1957 declined 5.3% and gas 24.9% from the former year. Figuratively, 10,168,602 barrels of oil and 6,639,813 MCF of gas were produced in 1957. Production reported for 1956 was 10,739,697 barrels of oil and 8,840,933 MCF of gas. All production figures are from the records of the Michigan Department of Revenue.

EXPLORATION

The 150 exploratory wells drilled during the year resulted in nine new oil fields, two new gas fields, four extensions, and three new pools for a 12% success ratio. Additional encouragement for the year was provided by the discovery of one oil pool and two gas pools through the reworking of older completions. Also one new oil pay was discovered by the drilling of a development well.

Thirty-seven important deep tests were drilled in 1957. Of these tests, three reached the Prairie du Chien, one the Glenwood, seven the Trenton-Black River, one the Cincinnati, two the Cataract, one the Clinton, one the Upper Niagaran, eight the Salina, one the Bass Island, three the Bois Blanc, two the Sylvania, and seven the Detroit River. The tests resulted in the discovery of a Detroit River gas pool, a Detroit River oil pool, a Salina gas pool extension, and a new Trenton-Black River oil field. The success ratio for the deep tests was 10.9%.

Only six geological test permits were issued during 1957. Thirteen geological test permits were issued in 1956.

Little geophysical exploration was carried on during the year. Of the two gravity crews reported, one worked in Allegan and Ottawa counties, and the other in Arenac County.

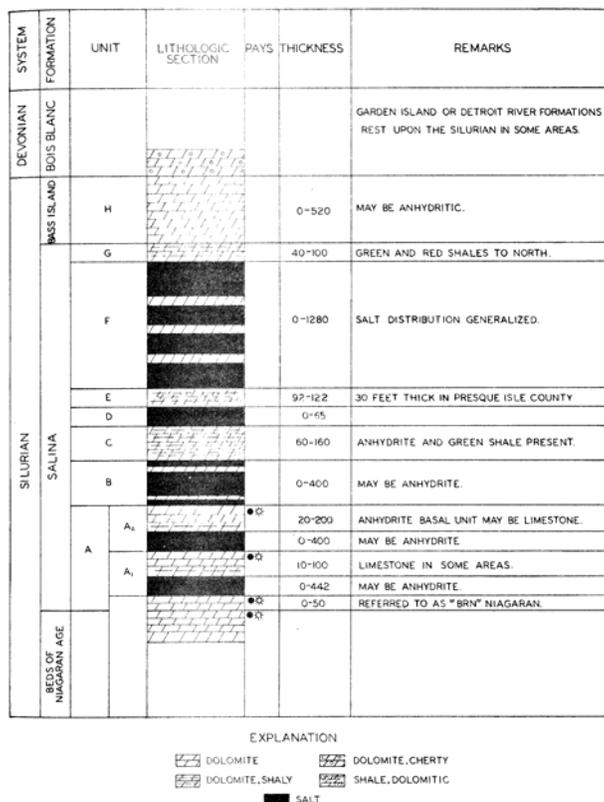
No substantial increase in undeveloped acreage under lease was reported for 1957. Eleven major and two independent companies reported 777,071 acres. At the end of 1956 the same 11 majors and only one independent reported 694,735 acres under lease. State undeveloped acreage under lease at the end of 1957 was 228,000 acres, as against 225,000 acres reported for 1956.

Subsurface geology continued to be the most efficient tool of exploration in Michigan. All but one of the discoveries was the result of this method. The lone exception was the Perry-Houseknecht #1 in Scipio Township, Hillsdale County. This discovery was a nontechnical location.

PROSPECTS FOR 1958

Oil and gas activity in 1958 is expected to maintain about the same level as 1957. The Basin District will probably have the greater number of completions. However, current successes in the Eastern and Southern, Southwestern, and Western districts have stimulated interest in those areas.

[Generalized Columnar Section of Bass Island-Salina Rocks in the Mich. Basin]



GENERALIZED COLUMNAR SECTION OF BASS ISLAND-SALINA ROCKS IN THE MICHIGAN BASIN

BASS ISLAND -SALINA GROUP

Current and past successes in the basal units of the Salina Group have led to the need for a reviewing of these units. The columnar section on page 5 has been adapted from Landis (1945)¹. A few modifications have been made with respect to the A unit in order to conform with the present field terminology. The units as shown should not be construed as being present throughout the state. The more consistent beds, progressing from younger to older, are the H, G, C, and A carbonates. However, difficulty is encountered correlating these units when the evaporite sections are missing. The principle reason for this is that the units are in part quite similar lithologically. The greatest variance in the section is with the evaporite beds, particularly on the edges of the salt basin. They may differ from one district to the other born in lithology and thickness. An example of this can be

illustrated by the A1 salt. In northern Allegan County all the upper salts are missing or replaced by thin beds of anhydrite. A bed of A1 salt varying from 50 - 180 feet is present in local areas. On the other hand, in Southeastern Michigan, several of the upper salts are present but the A1 salt has been replaced by a thin bed of anhydrite. As with the evaporite beds the production has varied somewhat with respect to the A unit and the district. In the following paragraphs the pools are briefly described by district and an attempt has been made to name the producing unit. The districts are outlined on the inside of the front cover of the summary.

Central Basin District: Very few wells have penetrated the Salina Group in this district. Of those that have, one deeper pool test in the Kawkawlin Field reported a substantial gas show. The Gulf-Bateson #1 in section 2, T.14N., R.4E., Monitor Township, Bay County, encountered gas at a depth of 7,760 feet in the A1 unit. The well, drilled in 1941, gauged in excess of 16,000,000 cubic feet. A blow out, which ended in a fire plus mechanical difficulties and a questionable market resulted in an unsuccessful completion. High cost of drilling and current successes at shallower depths will hinder the development of the Salina Group in this district.

Southeastern District: Until recently, most of the success experienced in drilling rocks of the Salina Group has been confined to this district. The principle producing units have been the A1 and the "Brn" Niagaran. Production has been confined in part to Niagaran and/or Lower Salina reefs in some areas. This is particularly true in St. Clair County. The pools and producing units are as follows:

<u>POOL</u>	<u>PRODUCING UNIT</u>	<u>TYPE OF PRODUCTION</u>
Boyd	A ₁	Gas
Howell	"Brn" Niagaran	Gas
Ira	A ₁ and "Brn" Niagaran	Gas
Marine City	A ₁	Oil
Northville	A ₁ and "Brn" Niagaran	Gas and some Oil
Peters	A ₁ and "Brn" Niagaran	Gas and Oil
Romulus	A ₁	Gas
St. Clair "18"	"Brn" Niagaran	Gas

In 1957 these pools accounted for 23.4% of the gas produced in the state.

Northern District: One near commercial well was drilled in the district in 1951. This well, Brazos - State-Chester #1, section 15, T.29N., R.2W., Otsego County, reported good shows of oil in the A2, A1, "Brn" Niagaran, and Niagaran at depths ranging from 5,918 feet to 6,622 feet. The well produced 2,752 barrels of oil before abandonment.

Southwestern District: This district is currently receiving the major amount of interest with respect to the Salina Group. There are four producing Salina pools in various stages of development. The three most important ones are the Overisel, Dorr, and Salem pools, all of which are located in northern Allegan County. The Overisel Salina Pool was discovered in 1956 and is producing gas from the A2 unit at a depth of 2,625 feet. Thirty-eight gas wells were completed by the end of 1957. They were placed on production early in 1958. Reserves for the field have been estimated in excess of 60,000,000 MCF.

Other pools in Allegan County are listed below:

<u>POOL</u>	<u>PRODUCING UNIT</u>	<u>TYPE OF PRODUCTION</u>
Dorr	A ₂ , (A ₁ unit produced some oil)	Gas & Oil
Hopkins, West	A ₁	Oil
Salem	A ₂	Gas

Western District: Several Salina and deeper formational tests have been drilled in this district. Only one of these tests was successful. This well, Dow et al-Unit #1, section 27, T.19N., R.18W., Hamlin Township, Mason County, is producing oil from a depth of about 4,212 feet in the Niagaran. Good shows of gas and oil were recorded in the A1 and "Brn" Niagaran, but they have been cased off. The test was drilled in 1952 and has produced to the end of 1957 an accumulative total of 59,579 barrels of oil. Production is apparently from a Niagaran reef.

¹K. K. Landis, "The Salina and Bass Island Rocks of the Michigan Basin", Oil and Gas Investigation, Preliminary Map 40, United States Department of Interior, Geological Survey, 1945.

OIL FIELD BRINE

Michigan oil fields were producing a total of 195,630 barrels of brine per day at the end of 1957. This is a decrease of 933 barrels per day as compared with a total of 196,563 barrels per day at the end of 1956.

Table II is a record of all Michigan oil fields which were producing in excess of 2,000 barrels of brine per day and the percentage factor of the total produced from these fields in relation to the total daily brine produced in the state.

TABLE II

<u>Field</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Coldwater	21,287	22,601	26,751	29,799	33,256	33,704
Reed City	34,859	30,498	28,105	24,907	23,822	22,385
Deep River	3,898	4,368	5,174	10,538	11,729	13,020
Freeman-Redding	18,885	17,485	14,501	12,734	11,930	12,612
Porter	11,606	11,966	12,528	12,604	12,292	11,963
Kimball Lake	16,532	11,543	12,859	12,276	10,040	10,004
Pentwater	7,233	7,473	6,997	8,196	8,129	8,725
Stony Lake	4,814	4,466	5,142	7,139	7,062	8,561
Fork	20,695	19,109	18,632	16,475	12,115	7,758
Sylvan	3,250	3,780	3,960	4,830	6,407	6,950
Adams, North	5,476	4,972	5,278	5,387	5,449	5,759
Ewart	9,000	6,692	6,035	5,590	4,610	4,685
Clayton	2,268	2,453	2,517	2,390	2,477	4,456
Winterfield	4,641	4,416	3,205	3,624	4,612	4,327
Prosper	3,060	3,060	3,012	3,544	3,644	3,513
Vernon	2,335	2,335	2,300	2,825	2,825	2,910
Total (16 fields)	169,839	157,217	156,996	162,858	160,399	161,332
State total	207,288	190,817	194,078	202,361	196,563	195,630
Per cent state total	81.93	82.39	80.89	80.47	81.60	82.46

Of the sixteen fields tabulated, ten had an increase in the daily amount of brine produced and six a decrease. The most significant increases were in the Clayton, Deep River, and Stony Lake fields. Fields having a continuous rise over a six-year period, were Coldwater, Deep River, Pentwater, Stony Lake and Sylvan. The substantial decrease in brine produced in the Fork Field was due to abandonment of wells producing a large volume of brine. The decrease in Reed City Field was due to the shut down status of several nonproductive

wells.

Operators in Michigan oil fields were returning 193,223 barrels of brine per day to approved subsurface formations. This was 98.77 per cent of the total brine produced. Of the remaining 1.23 per cent (4,207 barrels), .59 per cent (1,162 barrels) was being used in

lease operations and by county road commissions for road maintenance and .64 per cent (1,245 barrels) was being disposed of on the surface and released in small widely scattered amounts in accordance with temporary arrangements with the operators.

GENERALIZED COLUMNAR SECTION OF MICHIGAN MICHIGAN GEOLOGICAL SURVEY DIVISION

SYSTEM, SERIES	FORMATION, GROUP	LITHOLOGY	THICKNESS	ECONOMIC PRODUCTS
RECENT				
PLEISTOCENE	GLACIAL DRIFT	SAND, GRAVEL, CLAY, boulders, marl	0-1000	SAND, GRAVEL, PEAT, MARL, FRESH WATER
"PERMO-CARBONIFEROUS"	"RED-BEDS"	SHALE, CLAY, SANDY SHALE, gypsum		
PENNSYLVANIAN	GRAND RIVER	SANDSTONE, sandy shale	80-95	BUILDING STONE, FRESH WATER
	SAGINAW	SHALE, SANDSTONE, limestone, coal	20-535	SHALE, COAL, FRESH WATER, BRINE, GAS
MISSISSIPPIAN	BAY PORT	LIMESTONE, SANDY OR CHERTY LIMESTONE, SANDSTONE	2-100	LIMESTONE, FRESH WATER
	MICHIGAN	SHALE, gypsum, anhydrite, sandstone	0-500	GYPSUM
	"MICHIGAN STRAY"	SANDSTONE	0-80	GAS
	MARSHALL	SANDSTONE, sandy shale	100-400	FRESH WATER, BRINE BUILDING STONE
	COLDWATER	SHALE, sandstone, limestone	500-1100	SHALE, FRESH WATER
	SUNBURY	SHALE	0-140	
	BEREA-BEDFORD	SANDSTONE, SHALE	0-325	GAS, OIL
	ELLSWORTH-ANTRIM	SHALE, limestone	100-950	SHALE, GAS
DEVONIAN	TRAVERSE	LIMESTONE, SHALE	100-800	LIMESTONE, OIL, GAS, FRESH WATER
	BELL	SHALE, Limestone	0-80	SHALE
	ROGERS CITY-DUNDEE	LIMESTONE	0-475	LIMESTONE, OIL, GAS, FRESH WATER
	DETROIT RIVER	DOLOMITE, limestone, salt anhydrite	150-1400	LIMESTONE, DOLOMITE, OIL, GAS, SALT, BRINE, FRESH WATER
	SYLVANIA	SANDSTONE, SANDY DOLOMITE	0-550	GLASS SAND, FRESH WATER
	BOIS BLANC	DOLOMITE, CHERTY DOLOMITE	0-1000	
SILURIAN	BASS ISLAND	DOLOMITE	50-570	DOLOMITE, FRESH WATER
	SALINA	SALT, DOLOMITE, Shale, anhydrite	50-4000	SALT, GAS, OIL
	NIAGARAN (Guelph-Lockport-Engadine) (Manistique-Burnt Bluff) (Cataract)	DOLOMITE, Limestone, shale	150-800	LIMESTONE, DOLOMITE, OIL, GAS, FRESH WATER
	ORDOVICIAN	CINCINNATIAN (Richmond) (Maysville-Eden)	SHALE, LIMESTONE	250-800
TRENTON-BLACK RIVER		LIMESTONE, DOLOMITE	200-1000	OIL, GAS, LIMESTONE, FRESH WATER
ST PETER		SANDSTONE	0-150	FRESH WATER
OZARKIAN OR CANADIAN	PRAIRIE DU CHIEN	DOLOMITE, Shale	0-410	
	HERMANVILLE	DOLOMITE, SANDY DOLOMITE, sandstone	15-500	
CAMBRIAN	LAKE SUPERIOR (Munising) (Jacobsville)	SANDSTONE	500-2000	BUILDING STONE FRESH WATER
ALGONKIAN	KEWEENAW (Copper formations)	LAVA FLOWS, conglomerate, shale, sandstone	9800-35000	COPPER, SILVER, ROAD METAL, SEMI-PRECIOUS GEM STONES
	KILLARNEY GRANITE	GRANITE, GNEISS, diorite, syenite		
	HURONIAN (Iron formations)	SLATES, HEMATITE, SCHIST, QUARTZITE, GRANITE, marble, dolomite	2000+	IRON ORE, ROOFING SLATE, ROAD METAL, GRAPHITE MARBLE
ARCHEAN	LAURENTIAN	SCHIST, GNEISS, GRANITE		ROAD METAL, BUILDING STONE, VERDE ANTIQUE, TALC, GOLD
	KEEWATIN	SCHIST, GREENSTONE, SLATE		ROAD METAL