

PRODUCTION AND VALUE
OF
MINERAL PRODUCTS IN MICHIGAN
FOR
1924, 1925, 1926 AND PRIOR YEARS
WITH A REPORT ON OIL AND
GAS DEVELOPMENT

STATE OF MICHIGAN
DEPARTMENT OF CONSERVATION
G. R. HOGARTH, DIRECTOR

GEOLOGICAL SURVEY DIVISION
R. A. SMITH, STATE GEOLOGIST

Publication 37
Geological Series 31

MINERAL RESOURCES OF MICHIGAN

WITH

STATISTICAL TABLES OF PRODUCTION
AND VALUE OF MINERAL PRODUCTS

FOR

1924, 1925, 1926, AND PRIOR YEARS
WITH A REPORT ON OIL AND GAS DEVELOPMENT
BY R. B. NEWCOMBE
IN COOPERATION WITH THE UNITED STATES GEOLOGICAL SURVEY

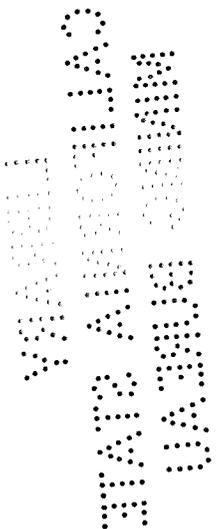


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LETTER OF TRANSMITTAL.

*To the Honorable, the Director and the Board of Commissioners of the
Department of Conservation of the State of Michigan.*

Hon. George R. Hogarth, Director
Hon. Howard B. Bloomer, Chairman
Hon. Wm. H. Loutit, Executive Chairman
Hon. Harry H. Whiteley.
Hon. Norman H. Hill.
Hon. Harold Titus.
Hon. Philip Schumacher.
Hon. Lee J. Smits.

Gentlemen. Under authority of Act No. 7 Public Acts of Michigan, Session of 1911, I have the honor to present herewith Publication 37 Geological Series 31, the thirteenth of a series of annual statements of the production and value of the mineral products of Michigan. This publication is a part of the Annual Report of the Geological Survey Division for 1926, and also includes statistics for the years 1924 and 1925 when no reports were published. A special article by R. B. Newcombe treats of oil and gas developments in Michigan.

Very respectfully,
R. A. Smith,
State Geologist.

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PART I. METALLIC MINERALS

F. G. PARDEE

MINERAL RESOURCES OF MICHIGAN

THE IRON INDUSTRY

STATISTICS OF MICHIGAN IRON ORE PRODUCTION

for the years 1924, 1925 and 1926

Shipments of iron ore from Michigan reached the total of 438,556,220 tons by the end of 1926. This figure represents the total amount of iron ore that has been shipped from Michigan and includes the 73,553 tons which were shipped prior to 1854 from the Marquette Range. At the present rate of shipments the half billion mark should be reached before the end of 1931. The Tables following show the shipments from the individual mines for the years 1924, 1925 and 1926. The complete information on the shipments of iron ore from Michigan from 1880 to date are shown in the accompanying curve.

FIGURE 1.
Curve Showing Shipments of Iron Ore
from Michigan from 1880 up to the Present Time.

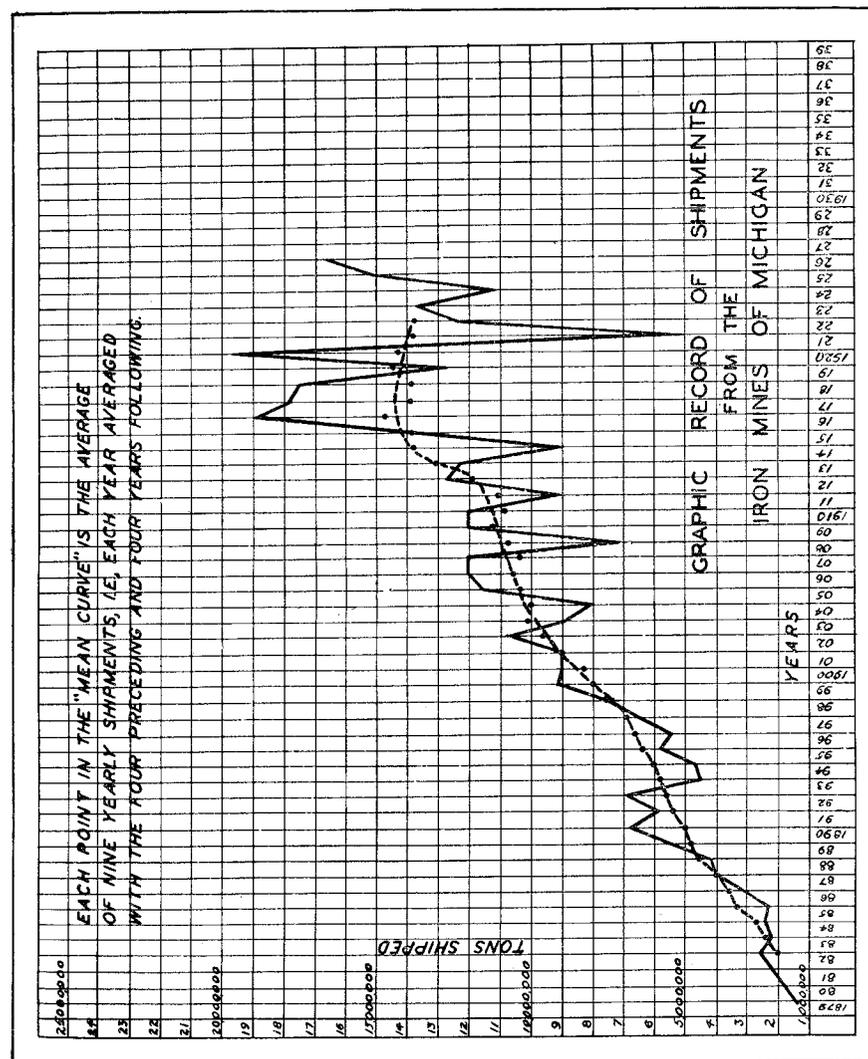


Table VI showing the comparison between the shipments from Michigan and those from Minnesota and Wisconsin indicates that there has been a gain in Michigan's shipments in the past three years. Tables VII and VIII show the relation of Michigan production to that of the other states and indicates the increase or decrease for 1926 over the production for 1925. The per-ton costs and receipts for the years from 1906 to 1926 are shown graphically in Figure 2.

FIGURE 2.
Graph Showing Per-Ton Costs and Receipts from Michigan Iron Mines For the Years from 1906 to 1926.

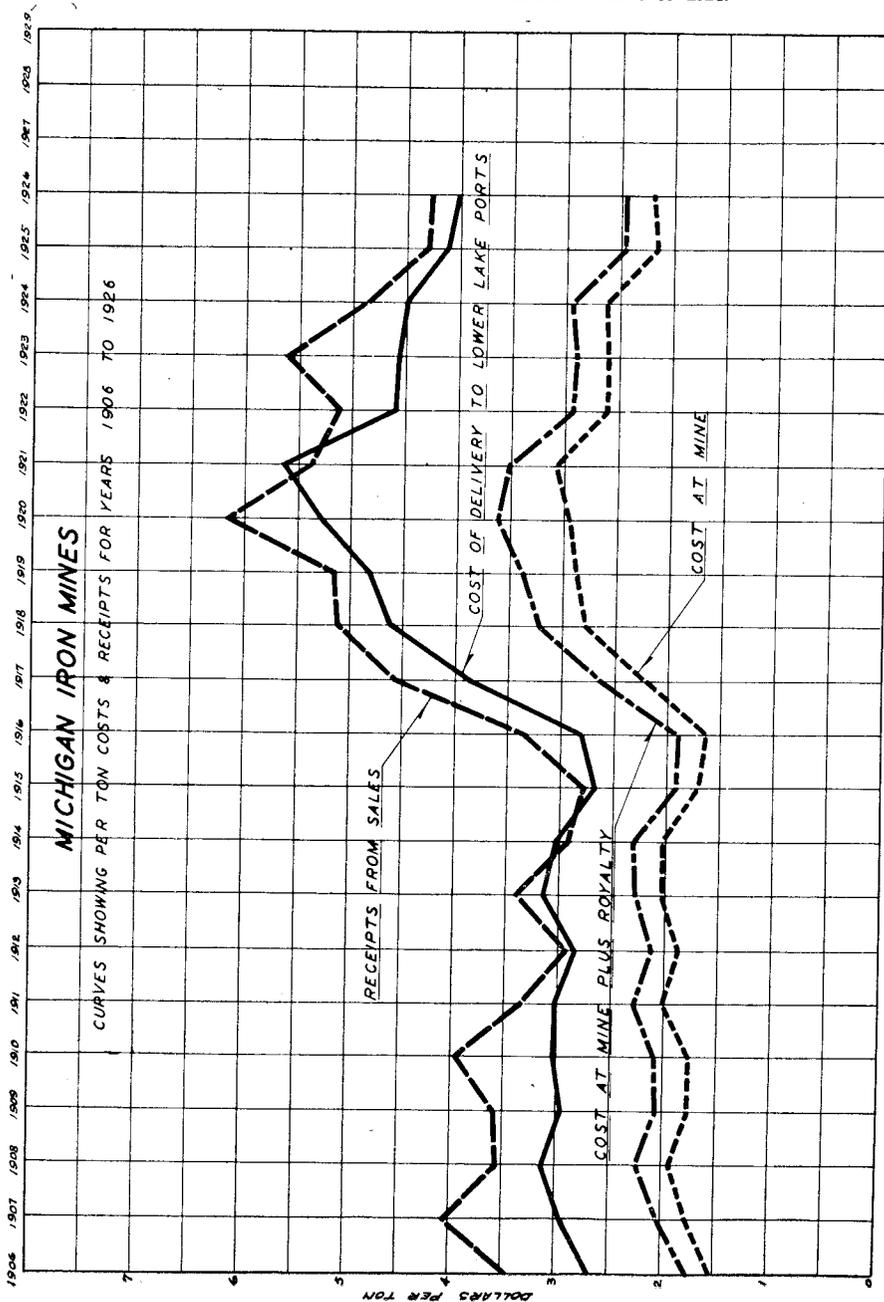


TABLE I.
Production and Shipments of Michigan Iron Mines.
Compiled from information furnished Board of State Tax Commissioners by Mining Companies.
Dickinson County.

Mine.	1924.		1925.		1926.	
	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.
Aragon.....	266,883	266,850	252,828	283,113	276,540	285,964
Chapin.....	445,101	371,365	423,489	439,132	423,631	466,735
Loretto.....	69,216	41,469	58,009	98,482	74,759	94,012
Penn.....	214,965	175,001	357,373	279,955	397,527	613,079
West Chapin.....	1,194	1,194	.....	.....	.....	.....
Total.....	997,359	855,879	1,091,699	1,100,682	1,172,457	1,459,790

TABLE II.
Production and Shipments of Michigan Iron Mines
Compiled from information furnished Board of State Tax Commissioners by Mining Companies.
Gogebic County.

Mine.	1924.		1925.		1926.	
	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.
Anvil Group.....	136,384	132,089	510,727	565,528	584,779	595,295
Ashland.....	97,983	51,003	32,121	119,954	.....	21,087
Asteroid.....	190,250	139,584	203,293	177,308	(included with Eureka)	557,408
Eureka.....	271,701	274,004	346,169	301,752	494,085	631,077
Ironton.....	400,000	324,142	472,800	435,886	540,400	862,858
Newport Group.....	688,236	654,604	800,296	790,744	667,893	1,675,601
Norrie Group.....	1,471,394	1,121,776	1,475,871	1,586,826	1,459,998	.....
Palms.....	264,561	292,513	(included with Anvil)	.....	.....	618,476
Plymouth.....	454,247	454,247	589,706	556,027	607,943	270,438
Puritan Group.....	201,658	77,756	254,718	316,184	306,801	336,544
Sunday Lake.....	109,811	113,332	144,175	107,100	260,488	130,595
Tilden.....	190,209	177,485	148,034	155,219	120,621	121,100
Townsite.....	96,697	75,934	92,070	99,473	110,070	608,275
Wakefield.....	225,698	248,120	603,856	604,761	608,276	.....
Yale.....	62,499	108,779	.....	46,750	.....	.....
Total.....	4,861,328	4,245,368	5,673,836	5,863,512	5,761,354	6,428,754

MINERAL RESOURCES OF MICHIGAN

TABLE III.

Production and Shipments of Michigan Iron Mines

Compiled from information furnished Board of State Tax Commissioners by Mining Companies.
Iron County.

Mine.	1924.		1925.		1926.	
	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.
Balkan Group	197,712	203,243	212,769	217,401	209,708	213,819
Baltic Group	82,672	92,158	197,255	192,548	216,721	210,498
Bates	234,213	100,705	102,341	33,947	119,770	179,396
Bengal	254,591	317,431	245,348	243,098	156,863	181,295
Berkshire	141,817	257,759	301,824	271,076	306,311	338,115
Bristol	128,105	109,955	345,600	270,648	356,133	398,236
Carpenter	216,900	203,474	146,030	155,394	123,870	99,419
Caspian	31,772	181,281	260,685	314,738	304,055	286,293
Davidson No. 1	100,990	43,939	133,932	136,487	137,300	158,261
Davidson No. 2	30,539	13,866	54,481	94,730	22,915	48,221
Davidson No. 3	28,860	18,288	Inactive	Inactive	33,096	43,855
Delta	93,538	84,530	Inactive	Inactive	Inactive	Inactive
Forbes	143,820	196,427	89,442	100,535	160,564	149,768
Hiawatha	137,826	134,876	261,818	263,053	239,251	191,716
Homer	67,512	116,170	221,150	152,258	178,360	134,729
James	156,770	163,526	239,983	227,511	295,333	303,118
Monongahela	120,100	79,221	192,330	204,731	179,465	182,446
Oders	38,091	16,029	70,920	178,342	222,738	272,625
Porter	256,249	111,330	Inactive	Inactive	Inactive	42,378
Richards	153,564	178,759	201,793	344,903	203,726	32,550
Riverton	27,159	8,365	157,487	215,129	353,792	200,994
Rogers	116,400	101,691	62,098	64,294	76,675	254,175
Spies	79,601	64,509	102,680	91,642	66,400	63,640
Tobin	79,601	64,509	176,509	144,543	146,767	67,036
Tully	1,493	Inactive	Inactive	Inactive	48,466	193,935
Warner	31,058	96,114	152,373	132,467	180,968	50,342
Wauseca						189,727
Zimmerman						
Total	2,871,352	2,907,933	3,928,848	4,049,475	4,339,247	4,486,587

IRON ORE PRODUCTION

TABLE IV.

Production and Shipments of Michigan Iron Mines

Compiled from information furnished Board of State Tax Commissioners by Mining Companies.
Marquette Range.

Mine.	1924.		1925.		1926.	
	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.
Athens	247,869	131,912	210,144	209,281	226,415	371,423
Austin	75,857	14,722	138,582	124,497	50,118	26,564
Barnes & Hecker	110,631	101,066	129,198	161,547	163,380	182,038
Cambria					139,591	141,686
Cleveland Lake						9,617
Cliff's Shaft	296,508	337,381	374,356	421,997	340,253	358,022
Empire					26,595	26,595
Francis	39,031					
Gwinn			206	980		
Holmes	154,300	91,103	188,500	145,163	191,358	360,495
Imperial	207,774	194,588	250,783	273,243	105,610	104,870
Isabella	135,469	127,068	161,137	177,236	161,137	202,148
Jackson	33,262	29,048				
Lucky Star						121
Maas	208,539	110,334	144,435	340,999	234,199	262,249
Maitland	98,966	97,806	257,848	257,848	183,907	183,907
Mackinaw		133				
Mary-Charlotte	145,034	158,343	197,583	221,236	174,605	126,745
Morris-Lloyd	246,356	231,505	265,829	236,446	290,162	224,776
Negaunee	318,963	335,768	355,690	395,687	373,694	378,697
Ogden			64,822	64,822	146,501	145,107
Princeton		15,632		13,213		6,540
Republic	75,511	76,152	72,314	74,109	26,629	128,643
Richmond	285,344	245,547	283,002	283,002	312,519	312,519
Rolling Mill	179,573	153,240	125,243	131,535	149,484	192,804
Salisbury	54,943	53,283				
Section 16	313,679	294,160	337,245	353,670	300,275	321,356
Stephenson	249,428	139,555	253,193	216,089	227,576	213,427
Volunteen			206	980		
Total	3,477,037	2,965,480	3,810,110	4,102,600	3,973,874	4,435,029

TABLE V.

Production and Shipments of Michigan Iron Mines

Compiled from information furnished Board of State Tax Commissioners by Mining Companies.

SUMMARY FOR STATE.

County.	1924.		1925.		1926.	
	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.	Tons Mined.	Tons Shipped.
Dickinson	997,359	855,881	1,091,699	1,100,682	1,172,457	1,459,790
Gogebic	4,861,328	4,245,368	5,673,836	5,863,512	5,761,354	6,428,754
Iron	2,871,352	2,907,933	3,928,848	4,049,475	4,339,247	4,486,587
Marquette Range	3,477,037	2,965,480	3,810,110	4,102,600	3,973,874	4,435,029
Grand Total	12,207,076	10,974,662	14,504,493	15,116,269	15,246,932	16,810,160

MINERAL RESOURCES OF MICHIGAN

GRAND TOTAL SHIPMENTS—ALL YEARS.

Dickinson County.....	68,712,900 tons
Gogebic County.....	137,836,053 tons
Iron County.....	76,503,326 tons
Marquette Range.....	155,503,941 tons
Total.....	438,556,220 tons

Michigan Iron Ore Reserves and Assessed Valuation
by Board of State Tax Commissioners

Ore Reserves Estimated by Mine Appraiser for Board of State Tax Commissioners.

	1923.		1924.		1925.	
	Ore Reserves Tons.	Total Value.	Ore Reserves Tons.	Total Value.	Ore Reserves Tons.	Total Value.
Dickinson County.....	9,348,321	\$5,994,000	8,129,803	\$5,507,000	7,990,905	\$5,440,000
Gogebic County.....	58,314,512	46,496,818	54,949,558	45,932,758	51,646,890	44,653,000
Iron County.....	56,065,508	25,624,025	58,425,590	25,945,145	59,193,119	24,622,000
Marquette Range.....	71,914,737	35,560,753	70,384,149	35,987,650	68,978,647	34,609,800
Total.....	195,643,078	\$113,675,596	191,889,100	\$113,372,553	187,809,561	\$109,324,800

	1926.		1927.	
	Ore Reserves Tons.	Total Value.	Ore Reserves Tons.	Total Value.
Dickinson County.....	6,639,462	\$4,821,800	6,441,326	\$4,488,000
Gogebic County.....	52,131,121	40,195,300	53,342,720	40,292,000
Iron County.....	62,548,656	22,879,300	60,198,166	22,279,000
Marquette Range.....	67,160,777	32,376,150	63,612,812	31,972,000
Total.....	188,480,016	\$100,272,550	183,595,024	\$99,031,000

TABLE VI.

Comparison of Michigan Iron Ore Shipped with Remainder of Lake Superior District.

	1924.		1925.		1926.	
	Tons Shipped.	Per cent of Total.	Tons Shipped.	Per cent of Total.	Tons Shipped.	Per cent of Total.
Michigan.....	10,974,662	25.6	15,065,130	27.9	16,810,160	28.5
Minnesota.....	31,076,114	72.6	38,022,237	70.4	40,961,361	69.4
Wisconsin.....	786,006	1.8	933,214	1.7	1,238,885	2.1
Total.....	42,836,782	100.0	54,020,581	100.0	59,010,406	100.0

Figures for Michigan from reports to State Tax Commission.
Figures for Minnesota and Wisconsin from "Mineral Resources of the United States".

IRON ORE PRODUCTION

Average per ton costs for GOGEBIC COUNTY Underground Iron Mines

Compiled from Reports furnished Michigan State Tax Commission.

Items.	1924.		1925.		1926.	
Cost of Mining:						
Labor.....	1.3874		1.2840		1.1675	
Supplies.....	.5989		.5406		.4955	
Total.....	1.9863	1.9863	1.8246	1.8246	1.6630	1.6630
Deferred Mining Costs.....		.0890		.0890		.0889
Taxes:						
General Property.....	.3511		.2846		.3067	
State Corporation.....	.0083		.0059		.0055	
Federal Corporation.....	.0016		.0009		.0000	
Total.....	.3610	.3610	.2914	.2914	.3122	.3122
General Overhead:						
General office.....	.0449		.0309		.0350	
General superintendence.....	.0330		.0256		.0216	
Fire insurance.....	.0049		.0037		.0037	
Contingent expense.....	.0113		.0092		.0078	
Depreciation.....	.1298		.1467		.1584	
Total.....	.3239	.3239	.2161	.2161	.2265	.2265
Transportation:						
Rail freight.....	.8175		.8274		.8214	
Boat freight.....	.8245		.8332		.8310	
Cargo insurance.....	.0017		.0015		.0015	
Total.....	1.6437	1.6437	1.6621	1.6621	1.6539	1.6539
Marketing:						
Selling cost.....	.0186		.0281		.0220	
Analysis.....	.0017		.0013		.0017	
Total.....	.0203	.0203	.0294	.0294	.0237	.0237
Total Ore Cost.....		4.3242		4.1126		3.9682
Lake Erie Value of Ore.....		5.3150		4.6006		4.5426
Earnings on Mine Operation.....		.8909		.4880		.5744
Royalty.....	.4531		.3575		.3531	
Interest.....	.0806		.0442		.0071	
Total.....	.5337	.5337	.4017	.4017	.3602	.3602
Net Operator's Profit:						
Exclusive of Depletion and Federal Income						
Taxes.....		.3572		.0863		.2144

MINERAL RESOURCES OF MICHIGAN

Average per ton Costs for DICKINSON COUNTY Underground Iron Mines.
Compiled from Reports Furnished the Michigan State Tax Commission.

Items.	1924.		1925.		1926.	
Cost of Mining:						
Labor	1.7824		1.6845		1.5647	
Supplies .....	.5114		.4919		.4276	
Total	2.2938	2.2938	2.1764	2.1764	1.9923	1.9923
Deferred Mining Costs .....		.0145		.0114		.0025
Taxes:						
General property .....	.2475		.2321		.1917	
State Corporation .....	.0059		.0003		.0048	
Federal Corporation .....	.0005		.0053		.0000	
Total .....	.2539	.2539	.2377	.2377	.1965	.1965
General Overhead:						
General office .....	.0469		.0419		.0548	
General superintendence .....	.0376		.0248		.0225	
Fire insurance .....	.0049		.0021		.0015	
Contingent expense .....	.0084		.0061		.0059	
Depreciation .....	.1063		.0870		.0936	
Total .....	.2041	.2041	.1619	.1619	.1783	.1783
Transportation:						
Rail freight .....	.8246		.8368		.8224	
Boat freight .....	.6088		.6020		.6312	
Cargo insurance .....	.0013		.0010		.0014	
Total	1.4347	1.4347	1.4398	1.4398	1.4550	1.4550
Marketing:						
Selling cost .....	.0296		.0295		.0192	
Analysis .....	.0008		.0007		.0001	
Total .....	.0304	.0304	.0302	.0302	.0193	.0193
Total Ore Cost		4.2314		4.0574		3.8439
Receipts from Sale of Ore		4.6480		4.2320		4.1411
Earnings on Mine Operation .....		.4166		.1746		.2972
Royalty .....	.3652		.2848		.2065	
Interest .....	.0502		.0361		.0482	
Total .....	.4154	41.54	.3209	.3209	.2547	.2547
Net Operators Profit Exclusive of Depletion and Federal Income Taxes .....		.0012		-.1463		.0425

IRON ORE PRODUCTION

Average Per Ton Costs for IRON COUNTY Underground Iron Mines.
Compiled from Reports Furnished Michigan State Tax Commission.

Items.	1924.		1925.		1926.	
Cost of Mining:						
Labor	1.1944		.9517		.8750	
Supplies .....	.6215		.5761		.4867	
Total	1.8159	1.8159	1.5278	1.5278	1.3617	1.3617
Deferred Mining Costs .....		.0783		.0877		.0652
Taxes:						
General property .....	.2691		.1745		.1626	
State Corporation .....	.0096		.0025		.0063	
Federal Corporation .....	.0042		.0065		.0002	
Total .....	.2829	.2829	.1835	.1835	.1691	.1691
General Overhead:						
General office .....	.0968		.0518		.0482	
General superintendence .....	.0620		.0308		.0300	
Fire insurance .....	.0079		.0060		.0059	
Contingent expense .....	.0087		.0034		.0054	
Depreciation .....	.1185		.1153		.1169	
Total .....	.2940	.2940	.2073	.2073	.2064	.2064
Transportation:						
Rail freight .....	.8489		.8229		.8245	
Boat freight .....	.6539		.6319		.6466	
Cargo insurance .....	.0012		.0017		.0018	
Total	1.5040	1.5040	1.4565	1.4565	1.4729	1.4729
Marketing:						
Selling Cost .....	.0625		.0583		.0724	
Analysis .....	.0049		.0031		.0036	
Total .....	.0674	.0674	.0614	.0614	.0760	.0760
Total Ore Cost		4.0425		3.5242		3.3513
Lake Erie Value of Ore		4.3055		4.0551		4.0273
Earnings on Mine Operation .....		.2630		.5209		.6760
Royalty .....	.2686		.3167		.3246	
Interest .....	.0668		.0361		.0339	
Total .....	.3354	.3354	.3528	.3528	.3585	.3585
Net Operator's Profit Exclusive of Depletion and Federal Income Taxes		-.0724		.1681		.3175

MINERAL RESOURCES OF MICHIGAN

Average Per Ton Costs for MARQUETTE RANGE Underground Iron Mines.
Compiled from Reports furnished Michigan State Tax Commission.

Items.	1924.		1925.		1926.	
Cost of Mining:						
Labor	1.3633		1.1831		1.2401	
Supplies .....	.6552		.6277		.6219	
Total	2.0185	2.0185	1.8108	1.8108	1.8620	1.8620
Deferred Mining Costs .....		.0933		.0825		.0997
Taxes:						
General property .....	.2599		.2474		.2807	
State Corporation .....	.0336		.0253		.0235	
Federal Corporation .....	.0255		.0234		.0004	
Total .....	.3190	.3190	.2961	.2961	.3046	.3046
General Overhead:						
General office .....	.1084		.0582		.0786	
General superintendence .....	.0983		.0905		.0836	
Fire insurance .....	.0025		.0024		.0023	
Contingent Expense .....	.0140		.0145		.0203	
Depreciation .....	.0598		.0688		.0821	
Total .....	.2830	.2830	.2344	.2344	.2674	.2674
Transportation:						
Rail freight .....	.7230		.6810		.6970	
Boat freight .....	.7725		.7166		.7202	
Cargo insurance .....	.0025		.0023		.0025	
Total	1.4980	1.4980	1.3949	1.3949	1.4197	1.4197
Marketing:						
Selling cost .....	.0744		.0720		.0716	
Analysis .....	.0047		.0049		.0052	
Total .....	.0791	.0791	.0769	.0769	.0768	.0768
Total Ore Cost		4.2909		3.8956		4.0302
Lake Erie Value of Ore		4.9968		4.4390		4.4828
Earnings on Mine Operation .....		.7059		.5434		.4526
Royalty .....	.1716		.1813		.1722	
Interest .....	.0609		.0842		.0520	
Total .....	.2325	.2325	.2655	.2655	.2242	.2242
Net Operator's Profit exclusive of Depletion and Federal Income Taxes .....		.4734		.2779		.2284

IRON ORE PRODUCTION

Average Costs, Silicious Open Pit Iron Mines.

	Five Year Average 1921-1926.		Average Cost 1926.	
Cost of Mining:				
Labor .....	.2711		.2546	
Supplies .....	.2955		.2737	
Total .....	.5666	.5666	.5283	.5283
Deferred Mining Costs .....		.0367		.0479
Taxes:				
General property .....	.0458		.0315	
State Corporation .....	.0057		.0087	
Federal Corporation .....	.0025		.0002	
Total .....	.0540	.0540	.0404	.0404
General Overhead:				
General office .....	.0247		.0259	
General superintendence .....	.0418		.0468	
Fire insurance .....	.0090		.0071	
Contingent .....	.0017		.0000	
Depreciation .....	.0878		.1047	
Total .....	.1650	.1650	.1845	.1845
Transportation:				
Rail freight .....	.6539		.6617	
Boat freight .....	.7665		.7468	
Cargo insurance .....	.0038		.0033	
Total	1.4242	1.4242	1.4118	1.4118
Marketing:				
Selling cost .....	.1092		.1000	
Analysis .....	.0052		.0054	
Total .....	.1144	.1144	.1054	.1054
Total Ore Cost		2.3609		2.3183
Receipts from Sale		2.7293		2.5321
Profit on Ore .....		.3684		.2138
Other Operating Costs:				
Royalty .....	.0623		.0718	
Interest on borrowed money .....	.0140		.0188	
Total .....	.0763	.0763	.0906	.0906
Net Operator's Profit .....		.2921		.1232
Tons shipped	2,456,057		814,044	
Tons mined	2,484,113		819,388	

Average Per Ton Costs for STATE Underground Iron Mines.
Compiled from Reports furnished Michigan State Tax Commission.

Items.	1924.		1925.		1926.	
Cost of Mining:						
Labor.....	1.3633		1.1902		1.1240	
Supplies.....	.6124		.5694		.5168	
Total.....	1.9757	1.9757	1.7596	1.7596	1.6408	1.6408
Deferred Mining Costs.....		.0807		.0803		.0760
Taxes:						
General property.....	.2944		.2367		.2429	
State Corporation.....	.0154		.0075		.0100	
Federal Corporation.....	.0088		.0105		.0001	
Total.....	.3186	.3186	.2547	.2547	.2530	.2530
General Overhead:						
General Office.....	.0760		.0452		.0515	
General superintendence.....	.0589		.0436		.0392	
Fire insurance.....	.0050		.0040		.0039	
Contingent expense.....	.0111		.0085		.0099	
Depreciation.....	.1055		.1122		.1208	
Total.....	.2565	.2565	.2135	.2135	.2253	.2253
Transportation:						
Rail freight.....	.8075		.8193		.7878	
Boat freight.....	.7488		.7532		.7279	
Cargo insurance.....	.0019		.0016		.0018	
Total.....	1.5582	1.5582	1.5743	1.5743	1.5175	1.5175
Marketing:						
Selling cost.....	.0459		.0490		.0490	
Analysis.....	.0033		.0027		.0030	
Total.....	.0492	.0492	.0517	.0517	.0520	.0520
Total Ore Cost.....		4.2419		3.9341		3.7646
Lake Erie Value of Ore.....		4.9334		4.3615		4.3301
Earnings on Mine Operation.....		.6915		.4274		.5655
Royalty.....	.3259		.2961		.2864	
Interest.....	.0623		.0511		.0543	
Total.....	.3882	.3882	.3472	.3472	.3407	.3407
Net Operator's Profit exclusive of Depletion and Federal Income Taxes.....		.3033		.0802		.2248

General Statistics on Mine Operation in Michigan.

	1924.	1925.	1926.
General Property Tax paid by Operating Mines.....	\$3,732,482.24	\$3,601,962.47	\$3,679,316.00
State and Local Taxes per ton mined.....			.2413
Average number of men employed per day.....		11,953	11,302
Average daily wage.....		\$4.80	\$4.856
Average yearly earning.....		\$1,291.20	\$1,350.22
Tons per man per day.....		4.08	4.85

TABLE VII
Iron Ore Mined in United States, by Mining Districts and Varieties, 1925-1926, in gross tons.
(Exclusive of Ore containing 5 per cent or more of Manganese).

District.	Hematite.	Brown Ore.	Magnetite.	Carbonate.	Total.	Percentage of Increase or Decrease in 1926.
1925.						
Lake Superior†.....	52,056,663				52,056,663	
Birmingham.....	6,312,207	323,599			6,635,806	
Chattanooga.....	259,843	96,877			356,720	
Adirondack, Northern New Jersey and Southeastern New York.....			328,745		328,745	
Other districts.....	†917,977	†464,124	1,143,259	4,703	2,530,063	
	†59,546,690	†884,600	1,472,004	4,703	61,907,997	
1926.						
Lake Superior†.....	57,143,407				57,143,407	+10
Birmingham.....	6,114,917	393,300			6,508,217	-2
Chattanooga.....	198,574	68,550			267,124	-25
Adirondack, Northern New Jersey and Southeastern New York.....			*847,966		*847,966	+158
Other districts.....	†*1,177,675	†349,074	1,327,322	2,215	*856,286	+13
	†*64,634,573	†810,924	*2,175,288	2,215	67,623,000	+9

† Includes only those mines in Wisconsin which are in the true Lake Superior district.

‡ Some hematite included with brown ore.

* Some hematite from "Other districts" included with magnetite from Adirondack district.

TABLE VIII.
Iron Ore Shipped from Mines in the United States—1925-1926, by States.
(Exclusive of Ore containing 5 per cent or more of manganese and of ore sold for paint).

State.	1925.		1926.		Percentage of increase or decrease.	
	Gross Tons.	Value.	Gross Tons.	Value.	Quantity.	Value.
Alabama.....	6,891,081	\$14,134,677	6,871,412	\$13,846,656	- 0.3	- 2
California.....	352	†	352	†	- 20	
Colorado.....	8,642	†	35,535	†	+311	
Georgia.....	79,488	231,683	51,642	149,198	- 35	- 36
Michigan.....	15,254,003	40,926,315	16,699,984	43,932,982	+ 9	+ 7
Minnesota.....	38,022,237	96,083,485	40,961,361	103,715,621	+ 8	+ 8
Missouri.....	40,043	†	124,371	532,536	+211	
Montana.....	3,672	10,244	724	1,810	- 80	- 82
New Jersey.....	164,523	678,021	212,152	925,403	+ 29	+ 36
New Mexico.....	172,959	†	216,269	†	+ 25	
New York.....	413,517	1,988,735	659,741	3,015,586	+ 60	+ 52
North Carolina.....	22,011	49,511	14,798	31,645	- 33	- 36
Ohio.....	2,410	†			-100	-100
Pennsylvania.....	917,255	2,149,800	1,088,634	2,483,056	+ 19	+ 16
Tennessee.....	164,073	369,144	138,307	312,109	- 16	+ 15
Utah.....	268,529	361,251	296,943	411,611	+ 11	+ 14
Virginia.....	76,302	174,454	49,703	162,446	- 35	- 7
Washington.....	830	†	1,702	†	+105	
Wisconsin.....	933,214	2,260,388	1,238,885	3,178,156	+ 33	+ 41
Wyoming.....	489,622	†	630,387	†	+ 29	
Undistributed.....		†1,379,178		†1,316,830		
	63,924,763	160,796,886	69,292,832	174,015,645	+ 8	+ 8

† † Included under "Undistributed".

‡ This figure includes value for States entered at † above.

The following tables give the average analyses of the iron ores shipped from the various ranges since 1918. In these tables the Menominee Range embraces the Iron River, Crystal Falls District and the mines of Dickinson County. These figures were compiled by the Lake Superior Iron Ore Association:

Average Analyses of Bessemer Ores
and
Percentage of Bessemer as to the total of all Ores.

Range.	Year.	Tonnage.	Iron.	Phos- phorus.	Silica.	Mang- anese.	Moist- ture.	% of Total.
Gogebic.....	1927	1,780,387	54.35	.040	7.50	.30	10.74	28.2
Gogebic.....	1926	2,495,407	54.83	.041	7.30	.31	10.40	33.5
Gogebic.....	1925	2,905,429	53.65	.042	8.96	.33	10.06	41.7
Gogebic.....	1924	2,421,274	54.08	.042	8.11	.34	10.46	47.4
Gogebic.....	1923	2,692,940	53.51	.042	8.97	.33	10.45	41.3
Gogebic.....	1922	2,625,919	53.71	.042	8.54	.34	10.52	42.6
Gogebic.....	1921	1,189,770	52.51	.043	10.05	.32	10.70	51.4
Gogebic.....	1920	3,195,609	53.60	.045	8.30	.35	11.06	39.5
Gogebic.....	1919	2,626,868	53.62	.042	8.68	.36	10.81	44.9
Gogebic.....	1918	3,103,885	53.40	.042	8.46	.36	10.88	39.4
Marquette....	1927	101,294	58.24	.040	6.36	.12	7.75	2.5
Marquette....	1926	133,068	57.78	.037	7.00	.15	7.14	3.0
Marquette....	1925	129,673	57.46	.040	6.85	.16	7.85	3.1
Marquette....	1924	141,155	55.31	.042	7.40	.20	10.26	4.5
Marquette....	1923	451,983	56.96	.037	7.94	.21	7.06	11.7
Marquette....	1922	279,158	55.54	.038	7.78	.23	9.05	9.8
Marquette....	1921	33,965	54.71	.041	7.95	.25	10.84	3.1
Marquette....	1920	688,532	56.54	.043	8.64	.15	7.20	16.4
Marquette....	1919	313,703	56.56	.035	8.08	.16	7.99	11.9
Marquette....	1918	650,406	56.03	.037	8.03	.14	6.79	15.3
Menominee...	1927	87,666	55.32	.045	4.85	.17	6.19	1.7
Menominee...	1926	80,454	51.85	.043	12.70	.25	5.57	1.4
Menominee...	1925	332,984	52.35	.039	8.20	.22	6.35	6.4
Menominee...	1924	231,378	52.19	.044	7.98	.24	6.22	6.1
Menominee...	1923	341,634	51.55	.042	7.37	.26	6.22	7.1
Menominee...	1922	180,825	49.97	.038	8.08	.31	6.62	4.7
Menominee...	1921	111,058	51.24	.042	6.37	.26	6.85	7.1
Menominee...	1920	534,783	51.30	.043	8.00	.27	6.56	8.3
Menominee...	1919	211,332	51.05	.043	8.40	.25	6.51	4.8
Menominee...	1918	303,265	51.06	.044	7.73	.25	6.64	4.8

Average Analyses of Low Phosphorus Non-Bessemer Ores
(Phosphorus .180 and under)
and
Percentage of same as to the Total of all Grades.

Range.	Year.	Tonnage.	Iron. (Nat.)	Phos- phorus.	Silica.	Mang- anese.	Moist- ture.	% of Total.
Gogebic.....	1927	3,648,390	52.20	.077	8.12	.59	11.90	57.7
Gogebic.....	1926	4,235,835*	52.48	.080	8.00	.60	11.89	56.8
Gogebic.....	1925	3,018,922*	53.62	.090	6.61	.56	11.82	43.3
Gogebic.....	1924	2,114,709	53.80	.085	6.51	.49	11.81	41.4
Gogebic.....	1923	2,816,428	53.48	.086	5.97	.53	12.23	43.2
Gogebic.....	1922	2,799,365	53.47	.085	6.73	.52	12.02	45.5
Gogebic.....	1921	911,611	52.76	.085	6.71	.60	13.03	39.4
Gogebic.....	1920	4,043,786	53.06	.081	6.60	.55	12.73	49.9
Gogebic.....	1919	2,723,117	53.26	.080	6.55	.46	12.17	46.5
Gogebic.....	1918	3,932,119	52.94	.089	6.80	.50	12.53	49.9
Marquette....	1927	2,595,159	53.83	.100	7.67	.33	9.46	62.9
Marquette....	1926	2,904,112	53.69	.098	8.08	.32	9.36	66.0
Marquette....	1925	2,718,130	53.63	.099	8.09	.33	9.30	65.6
Marquette....	1924	1,668,444	53.76	.093	8.29	.32	8.87	53.1
Marquette....	1923	2,364,671	53.87	.092	8.31	.34	8.88	61.2
Marquette....	1922	1,919,184	53.19	.097	8.50	.34	9.76	67.4
Marquette....	1921	689,721	52.79	.094	8.79	.34	10.06	62.4
Marquette....	1920	2,517,607	52.54	.099	8.82	.35	10.27	59.8
Marquette....	1919	1,629,533	52.30	.098	8.88	.33	10.54	61.8
Marquette....	1918	2,999,819	52.34	.099	8.95	.42	10.08	70.6
Menominee...	1927	1,188,025	50.55	.066	10.54	.25	6.82	23.1
Menominee...	1926	1,473,164	49.91	.063	10.75	.28	7.00	25.0
Menominee...	1925	629,323	49.76	.053	10.51	.27	6.34	12.1
Menominee...	1924	505,264	49.99	.054	9.61	.29	6.87	13.3
Menominee...	1923	878,518	50.04	.077	9.59	.32	7.25	18.4
Menominee...	1922	835,264	49.84	.075	9.56	.26	7.51	21.0
Menominee...	1921	266,125	49.38	.055	10.06	.26	6.71	16.9
Menominee...	1920	1,423,243	50.78	.072	9.34	.23	7.05	22.0
Menominee...	1919	846,857	50.72	.074	9.77	.23	7.17	19.3
Menominee...	1918	1,200,981	51.16	.069	9.71	.23	7.11	19.1

* Includes small tonnage above .80 Phosphorus.

Average Analyses of High Phosphorus Non-Bessemer Ores
(Phosphorus above .180)
and
Percentage of Same as to the Total of all Grades.

Range.	Year.	Tonnage.	Iron. (Nat.)	Phos- phorus.	Silica.	Mang- anese.	Moist- ture.	% of Total.
Marquette....	1927	401,660	49.94	.274	7.91	.40	12.76	9.7
Marquette....	1926	359,043	49.90	.278	7.86	.50	12.91	8.2
Marquette....	1925	471,958	47.09	.265	10.47	.32	12.15	11.4
Marquette....	1924	551,632	49.44	.309	8.34	.52	12.24	17.5
Marquette....	1923	445,804	47.71	.341	9.93	.42	11.80	11.5
Marquette....	1922	402,027	50.38	.358	7.26	.63	11.99	14.1
Marquette....	1921	199,409	51.22	.379	6.53	.69	12.35	18.0
Marquette....	1920	557,111	51.83	.378	5.92	.55	13.27	13.2
Marquette....	1919	318,846	51.89	.628	5.08	.59	11.36	12.1
Marquette....	1918	241,068	51.79	.546	6.14	.54	11.24	5.7
Menominee...	1927	3,430,293	51.19	.486	7.05	.31	8.59	66.7
Menominee...	1926	3,721,641	51.36	.472	7.26	.29	8.50	63.3
Menominee...	1925	3,797,895	51.40	.445	7.51	.32	8.22	72.8
Menominee...	1924	2,750,157	51.24	.449	7.65	.34	8.45	72.4
Menominee...	1923	2,889,670	51.37	.445	7.05	.31	8.55	60.3
Menominee...	1922	2,600,213	51.05	.484	7.43	.39	8.50	65.3
Menominee...	1921	1,101,496	51.27	.465	7.17	.37	8.22	70.1
Menominee...	1920	3,749,069	51.16	.473	7.35	.35	8.32	58.1
Menominee...	1919	3,136,693	51.03	.476	7.50	.34	8.52	71.5
Menominee...	1918	4,179,419	51.02	.464	7.18	.35	8.73	66.4

MINERAL RESOURCES OF MICHIGAN

Average Analyses of Manganiferous Ores (Manganese 2.00 and over) and Percentage of Same as to the Total of all Grades.

Range.	Year.	Tonnage.	Iron. (Nat.)	Phos-phorus.	Silica.	Mang-anese.	Moist-ure.	% of Total.
Gogebic	1927	890,902	48.59	.075	7.10	4.15	12.85	14.1
Gogebic	1926	702,177	49.83	.075	6.41	4.24	11.58	9.4
Gogebic	1925	933,318	49.41	.072	7.00	4.24	11.66	13.4
Gogebic	1924	493,086	49.54	.068	7.31	4.00	11.63	9.6
Gogebic	1923	878,976	48.57	.069	7.29	5.01	11.43	13.5
Gogebic	1922	666,773	49.24	.074	6.86	3.85	12.32	10.8
Gogebic	1921	141,259	49.31	.080	7.95	2.81	13.50	6.1
Gogebic	1920	762,984	48.81	.074	7.86	3.76	11.64	9.4
Gogebic	1919	477,964	48.57	.073	7.44	3.13	13.70	8.10
Gogebic	1918	785,865	48.38	.074	8.73	3.24	12.95	9.9
Menominee	1927	421,828	44.20	.549	7.79	5.39	6.90	8.2
Menominee	1926	450,272	43.42	.537	7.68	6.40	6.60	7.7
Menominee	1925	315,991	43.28	.570	6.98	6.70	7.04	6.1
Menominee	1924	198,963	42.54	.651	6.58	8.07	7.36	5.2
Menominee	1923	526,525	45.24	.627	6.45	4.51	7.39	11.0
Menominee	1922	155,146	44.27	.556	7.07	5.74	7.56	3.9
Menominee	1921	13,476	45.59	.620	7.90	4.00	7.39	0.9
Menominee	1920	388,393	45.08	.604	7.76	4.67	7.34	6.0
Menominee	1919	151,113	42.41	.525	6.46	7.76	7.27	3.4
Menominee	1918	280,502	44.45	.541	7.20	5.35	7.29	4.5

Average Analyses of Silicious Ores (Silica 18.0 and over) and Percentage of same as to the Total of all Grades.

Range.	Year.	Tonnage.	Iron. (Nat.)	Phos-phorus.	Silica.	Mang-anese.	Moist-ure.	% of Total.
Gogebic	1927							
Gogebic	1926	23,551	36.72	.070	33.74	.51	8.76	.3
Gogebic	1925	114,385	30.39	.055	41.88	.71	8.60	1.6
Gogebic	1924	79,025	38.52	.070	28.43	.93	11.16	1.6
Gogebic	1923	126,059	35.97	.061	34.63	1.32	7.89	2.0
Gogebic	1922	69,532	34.31	.039	39.48	.31	7.54	1.1
Gogebic	1921	71,206	42.45	.034	29.17	.30	8.57	3.1
Gogebic	1920	96,058	42.60	.068	26.38	.48	9.38	1.2
Gogebic	1919	28,277	34.09	.045	40.40	.27	6.05	.5
Gogebic	1918	62,656	34.14	.041	36.28	.33	8.97	.8
Marquette	1927	1,028,815	37.16	.054	38.61	.20	4.40	24.9
Marquette	1926	1,005,894	38.65	.056	35.96	.20	4.77	22.8
Marquette	1925	826,434	39.72	.056	34.20	.20	4.66	19.9
Marquette	1924	781,478	40.45	.059	31.96	.31	5.70	24.9
Marquette	1923	604,279	39.76	.059	34.53	.20	5.18	15.6
Marquette	1922	247,109	40.09	.052	34.32	.37	5.28	8.7
Marquette	1921	182,696	43.01	.059	30.04	.25	5.75	16.5
Marquette	1920	444,898	39.30	.059	34.39	.56	5.76	10.6
Marquette	1919	374,104	40.32	.053	33.81	.50	5.59	14.2
Marquette	1918	357,576	46.03	.068	30.43	.28	7.49	8.4
Menominee	1927	16,084	44.91	.317	23.85	.19	5.30	.3
Menominee	1926	157,365	47.77	.145	17.88	.19	7.49	2.6
Menominee	1925	137,859	46.95	.057	19.78	.17	7.64	2.6
Menominee	1924	111,310	48.59	.065	17.10	.19	8.09	3.0
Menominee	1923	152,448	48.70	.059	18.30	.17	7.23	3.2
Menominee	1922	203,322	44.73	.054	24.34	.18	6.11	5.1
Menominee	1921	78,134	49.59	.060	18.10	.18	6.75	5.0
Menominee	1920	364,756	41.76	.038	31.24	.13	4.60	5.6
Menominee	1919	42,736	35.03	.034	37.16	.15	3.34	1.0
Menominee	1918	330,639	36.92	.106	40.14	.10	3.58	5.3

IRON ORE PRODUCTION

Average Analyses of Total Tonnage—All Grades

Range.	Year	Tonnage	Iron.	Phos.	Sili.	Mang.	Moist.
Gogebic	1927	6,319,679	52.30	.066	7.80	1.01	11.71
Gogebic	1926	7,456,970	52.97	.066	7.70	.85	11.36
Gogebic	1925	6,972,054	52.69	.067	8.22	.96	11.01
Gogebic	1924	5,108,094	53.28	.063	7.69	.76	11.15
Gogebic	1923	6,514,403	52.49	.065	7.94	1.07	11.30
Gogebic	1922	6,161,589	52.90	.065	7.89	.80	11.36
Gogebic	1921	2,313,846	52.10	.061	9.20	.58	11.72
Gogebic	1920	8,098,437	52.75	.066	7.63	.77	11.93
Gogebic	1919	5,856,226	52.95	.063	7.74	.63	11.66
Gogebic	1918	7,884,525	52.52	.069	7.88	.72	11.90
Marquette	1927	4,126,928	49.40	.104	15.37	.30	8.47
Marquette	1926	4,402,117	50.07	.101	14.40	.30	8.53
Marquette	1925	4,146,195	50.23	.108	13.53	.30	8.65
Marquette	1924	3,142,709	49.76	.120	14.15	.34	8.74
Marquette	1923	3,866,737	51.31	.109	12.55	.31	8.42
Marquette	1922	2,847,478	51.89	.124	10.50	.37	9.62
Marquette	1921	1,105,791	50.95	.138	11.87	.38	9.78
Marquette	1920	4,208,148	51.70	.122	11.11	.36	9.69
Marquette	1919	2,636,186	51.06	.148	11.87	.37	9.63
Marquette	1918	4,248,869	52.31	.112	10.45	.37	9.42
Menominee	1927	5,143,896	50.52	.386	7.94	.71	7.99
Menominee	1926	5,882,896	50.30	.360	8.52	.75	7.91
Menominee	1925	5,214,052	50.66	.369	8.21	.69	7.79
Menominee	1924	3,797,072	50.60	.371	8.15	.73	8.94
Menominee	1923	4,788,795	50.38	.363	7.83	.77	7.07
Menominee	1922	3,982,770	50.16	.358	8.76	.56	8.94
Menominee	1921	1,570,289	50.82	.347	8.15	.36	7.09
Menominee	1920	6,460,244	50.20	.332	9.22	.57	7.72
Menominee	1919	4,388,731	50.52	.375	8.23	.57	8.67
Menominee	1918	6,294,806	50.02	.353	9.42	.53	7.09

IRON ORE RESERVES IN MICHIGAN. Jan. 1, 1924-1928, in Gross Tons.

Range.	1924	1925	1926	1927	1928
Gogebic	54,949,558	51,646,890	52,131,121	53,342,720	48,681,075
Marquette	70,384,149	68,978,647	67,160,777	63,612,812	60,219,781
Menominee (including Iron River & Crystal Falls Dist.)	66,555,393	67,184,024	69,188,118	67,103,492	64,752,677
Total	191,889,100	187,809,561	188,480,016	184,059,024	173,653,533

THE MICHIGAN COPPER INDUSTRY 1924-1926

COPPER PRODUCTION IN MICHIGAN

1924-1926

The amount of copper produced in Michigan has gradually increased from the low point of production experienced by this industry in 1921. The number of pounds produced has been below any of the years immediately before or during the war and it was only in 1926 that production has been comparable with the years prior to 1919. Table number one (page 30) shows the production from individual mines from 1911 to 1926 inclusive and this same information with the years 1906-1911 added is presented graphically in Figure 3.

The slump in production after the war was accompanied by a decrease in the price of copper and the mining companies have been able to exist only through their economies, their changes and improvements in methods, reduction of overhead, and lowering of treatment costs. In spite of these lowered costs, in 1924 the average for all operating companies showed a loss of .276 cents per pound of copper produced. Only three operations were conducted at a profit in 1924, but in 1925 and 1926 this number was increased to six. If the reclamation plants are not considered it means that only four mines were able to operate at a profit in 1925 and 1926.

The economics of the copper situation at the mines was discussed in the Mineral Resources Publication for 1923 (Publication 35 Mich. Geological Survey).

In 1912 Michigan had 20 operating companies which produced a total of 216,000,000 lbs. of copper. Of this, only 5,800,000 lbs. or 2.7% was produced at a loss. In 1923 there were ten mines and the production was 138,000,000 lbs. of which 71,000,000 lbs. was produced at a loss. The conditions which were operative in 1923 have been equally effective in the three years 1923-1926. Michigan, with its deep mines, has had to face the competition of the porphyry coppers where production costs per pound are lower because of the use of steam shovel methods, and because of appreciable amounts of gold and silver found with these deposits. These porphyry coppers have been able to produce copper from two to three cents a pound less than it can be made in Michigan. The Panama Canal has opened the eastern United States markets to copper produced in South American and western United States. The development during the past few years of important low cost copper mines in Africa has added to the oversupply of this metal. The average selling price of copper in Michigan was 19.36 cents per pound in 1919 which was decreased to 17.80 cents in 1920 and dropped sharply to 12.89 cents per pound in 1921. Since then the average price has varied from around 13 cents a pound to slightly more than 14 cents a pound.

In 1924 the mines produced rock which ran 25.36 lbs. per ton. This was lowered to 22.06 in 1925 and 22.96 in 1926.

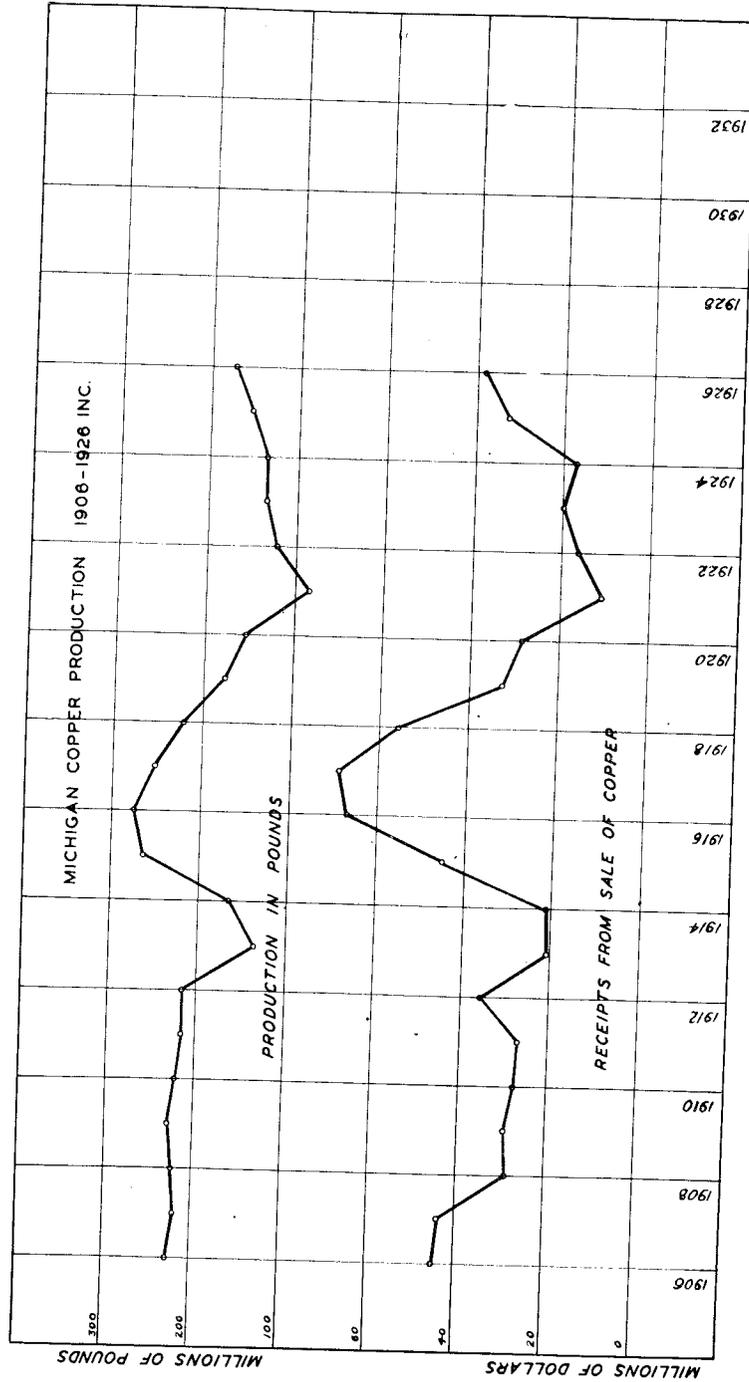


FIGURE 3.
Production of Copper and Receipts from Sale of Copper.
Michigan Mines from 1906-1926.

MINERAL RESOURCES OF MICHIGAN

COPPER PRODUCTION
TABLE I

A
Production of Principal Michigan Copper Companies.

	1911	1912	1913*	1914*	1915	1916
Almeek.....	15,196,127	16,455,769	9,220,874	13,684,605	21,800,492	24,142,158
Alouez.....	4,780,494	5,525,455	4,091,129	6,056,548	10,043,459	10,219,290
Calmnet and Hecla:						
Conglomerate.....	58,469,394	51,935,245	32,731,768	37,996,045	51,738,588	51,785,016
Amygdaloid.....	15,661,578	15,692,199	12,051,238	15,695,517	19,291,930	19,564,575
Reclamation.....					1,582,302	5,412,649
Centennial.....					2,347,500	2,367,400
Copper Range:						
Baltic.....	1,493,834	1,742,338	1,612,262	2,287,130	12,028,947	12,425,804
Champion.....	15,370,449	13,373,961	7,736,126	7,001,945	33,417,599	33,601,136
Trimountain.....	15,639,426	17,225,508	12,060,594	15,807,206	8,302,896	8,720,558
Franklyn.....	6,420,147	6,980,713	4,590,938	5,048,306		
Hancock.....	820,203	1,710,651	1,021,440	93,283	1,314,969	3,116,566
Isle Royale.....	754,729	8,186,957	4,158,548	488,678	871,124	2,824,934
Lake.....	7,490,120		287,200	6,601,235	9,342,106	12,412,111
La Salle.....		Idle	43,906	540,731	1,581,071	1,489,247
Maas.....					782,493	1,380,352
Michigan.....	1,326,998	2,045,006	1,213,545	2,944,952	4,638,452	4,752,588
Mohawk.....	327,773	162,950	5,778,235	11,094,859	15,882,914	13,834,034
Osceola.....	12,091,056	11,995,598	11,323,010	14,970,737	19,731,472	19,586,501
Quincy.....	18,388,193	18,413,387	12,184,123	15,356,380	22,054,813	21,065,612
Superior.....	22,252,943	20,634,800				
Tamarack.....	3,236,233	3,921,974	2,992,765	3,217,635	3,866,484	3,034,656
Victoria.....	7,494,077	7,908,745	4,168,743	1,074,808	3,888,150	See B
White Pine.....	1,303,331	1,224,911	1,428,693	1,486,242	1,499,695	1,661,832
Winona.....					2,624,145†	4,207,449
Wolverine†.....	1,275,765	2,307,337	1,448,737	1,352,085	1,722,638	2,167,255
Development Projects.....	9,630,639	9,120,485	8,350,312	3,435,459	7,250,866	6,641,492
	648,053	228,985	233,915		297,612	426,260
Total.....	219,771,477	216,792,974	139,650,044	166,184,386	258,103,217	266,839,475

*Strike year. †Initial production. ‡Production of fiscal year ending July 1st.

COPPER PRODUCTION 1924-1926

TABLE I—Continued.
B

	1917	1918	1919	1920	1921	1922
Almeek.....	27,919,812	24,851,235	17,223,111	20,489,438	6,255,200	14,885,081
Alouez.....	8,992,915	7,071,218	3,749,984	2,499,239	Idle	Idle
Calmnet and Hecla:						
Conglomerate.....	50,415,860	43,329,816	32,895,816	34,324,660	9,865,400	29,130,500
Amygdaloid.....	18,003,966	15,393,153	10,880,378	9,164,983	5,301,736	Idle
Reclamation.....	9,075,457	9,245,388	9,089,952	14,138,240	Idle	11,362,500
Centennial.....					Idle	Idle
Copper Range:						
Baltic.....	2,062,857	2,492,857	1,365,148	561,284	Idle	Idle
Champion.....	11,214,861	10,406,097	7,864,653	6,813,918	7,608,847	5,239,586
Trimountain.....	27,550,343	21,748,514	19,886,917	13,610,324	20,719,307	19,583,806
Franklyn.....	6,278,097	5,343,586	5,274,387	3,532,025	4,341,584	4,116,100
Hancock.....	3,155,574	2,827,313	1,062,879	Idle	Idle	Idle
Isle Royale.....	4,047,053	3,041,514	Idle	10,621,801	2,491,000	6,639,970
Lake.....	13,480,921	15,442,508	13,007,647	Idle	Idle	Idle
La Salle.....	1,461,893	717,403	Idle	59,713	Idle	Idle
Maas.....	1,919,775	1,832,665	340,719	Idle	Idle	Idle
Michigan.....	3,984,616	3,403,827	1,963,178	Idle	Idle	Idle
Mohawk.....	4,047,053	1,177,176	1,697,107	1,075,492	Idle	Idle
Osceola.....	12,313,887	10,781,041	12,857,392	10,269,824	14,054,235	11,209,396
Quincy.....	16,084,958	15,919,647	10,824,231	7,465,773	Idle	Idle
Superior.....	22,195,577	19,948,965	19,476,320	19,219,070	16,960,265	15,402,726
Tamarack.....	2,201,672	1,676,446	563,935	322,871	Idle	Idle
Victoria.....	1,612,640	1,533,536	1,245,590	1,060,829	273,916	Idle
White Pine.....	4,067,529	3,273,680	1,979,268	1,850,787	Idle	Idle
Winona.....	1,494,472	1,576,683	561,238	Idle	Idle	Idle
Wolverine†.....	5,856,889	4,608,865	4,562,617	3,932,225	3,924,270	3,544,879
Development Projects.....	745,381	530,730	.....	531,384	466,323	272,182
Total.....	256,057,005	228,173,863	178,365,567	161,343,880	92,262,083	121,386,726

*Strike year. †Initial production. ‡Production of fiscal year ending July 1st.

MINERAL RESOURCES OF MICHIGAN

TABLE I—Continued.

C

	1923	1924	1925	1926
Ahmeek.....	a17,811,031	c	c	c
***Calumet & Hecla (Old Co.).....	a35,047,800			
Calumet & Hecla (Consol.).....	b27,526,000	73,137,000	91,207,000	104,286,000
Conglomerate.....				
Amygdaloid.....				
Reclamation.....				
Centennial.....				
Copper Range:				
Baltic.....	4,877,248	4,769,286	4,255,069	3,690,041
Champion.....	18,412,630	20,061,630	17,957,605	17,658,820
Trimountain.....	281,482	278,259	1,065,044	2,177,416
Franklyn.....				
Hancock.....				
Isle Royale.....	8,002,244	8,103,000	9,543,000	11,017,000
Lake.....				
La Salle.....				
Maas.....				
Michigan.....				
Mohawk.....	9,452,539	11,949,841	15,819,922	18,340,712
Oseola.....				
Quincy.....	13,000,733	14,838,633	14,357,523	13,290,052
***Sececa.....		766,242		4,981,524
Tamarack.....				
Victoria.....				
White Pine.....				
Winona.....				
Wolverine.....	3,544,879	3,265,356	574,084	d
Development Projects.....				
Total.....	137,956,586	138,159,553	154,799,247	175,441,565

a Seven months production prior to consolidation.
 b Five months production of Consolidated Company.
 c Part of the Calumet & Hecla Consolidated Company.
 d. Exhausted.

COPPER PRODUCTION 1924-1926

TABLE II
 Average Cost per pound of Producing Copper in Michigan, 1919 to 1926 inclusive. Exclusive of Depletion and Federal Income and Excess Profits Tax.

Items	1919	1920	1921	1922	1923	1924	1925	1926
General Expense.....	.5937	.6768	.4933	.5866	.6893	.7174	.604	.6888
State Taxes.....	.8302	.9321	.6196	.7351	.8030	.8071	.656	.7096
Cost of Mining.....	9.5757	9.4815	7.1913	6.1938	6.6624	7.2465	6.910	6.0395
Milling Smelting.....	3.2912	4.4098	4.1016	3.3347	3.1596	2.7967	2.400	3.3975
Marketing Expense.....	.3846	.6321	.5757	.5180	.5365	.4783	.433	.4691
Depreciation.....	1.8672	1.8452	1.3284	1.8009	1.5278	1.5723	1.553	1.5347
Total Gross Cost.....	17.1208	17.9775	14.3099	13.1691	13.3786	13.6183	12.556	12.8392
Silver Credit.....	.2975	.2980	.2822	.2694	.1061	.0327	.034	.0752
Net Cost.....	16.8233	17.6795	14.0277	12.8997	13.2725	13.5856	12.522	12.7640
Receipts per lb.....	19.3605	17.8023	12.8881	13.5463	14.9543	13.3096	14.280	14.0413
Net Cost.....	16.8233	17.6795	14.0277	12.8997	13.2724	13.5856	12.522	12.7640
Profit (+) or (-) loss.....	+2.5372	+1.1228	-1.1396	+6.6465	+1.6818	-2.2760	+1.758	+1.2773

DETAILS OF COMPANY REPORTS

Calumet & Hecla Consolidated Copper Co.

The Calumet & Hecla Consolidated Copper Company operates the Calumet & Hecla Conglomerate Mine, the Ahmeek, Allouez, Centennial and North Kearsarge mines on the Kearsarge Lode, the Osceola Mine and the Reclamation plants treating the Calumet & Hecla and Tamarack sands in Lake Linden. This company also controls the Isle Royale Copper Company, the LaSalle Copper Company, the Superior Copper Company, the White Pine Copper Company and the Cliff Mining Company.

The following is the production data from the active mines:

Production	1924	1925	1926
Mines.....	54,510,000 lbs.	64,250,000 lbs.	73,297,924 lbs.
Reclamations.....	18,627,000 lbs.	26,957,000 lbs.	30,988,076 lbs.
Total.....	73,137,000 lbs.	91,207,000 lbs.	104,286,000 lbs.

Average Cost of Copper Production:			
From Mines.....	12.48c per lb.	11.26c per lb.	10.59c per lb.
From Reclamations.....	7.83c per lb.	7.06c per lb.	7.10c per lb.
Average price received for Copper.....	13.05c per lb.	14.23c per lb.	14.23c per lb.

	Calumet & Hecla Reclamation Plant		Tamarack Reclamation Plant 1925	Both Reclamation Plants 1926	Since Starting
	1924	1925			
Tons Treated.....	1,687,700	2,125,000	606,605	2,756,177	15,131,000
Assay Headings.....	.683%	.600%	.676%	.694%	.688%
Assay Tailings.....	.138%	.120%	.109%	.124%	.166%
Pounds Refined Copper.....	18,627,000	20,278,000	6,679,000	30,988,076	158,675,000
Pounds Refined Copper Per Ton Treated.....	11.04	9.54	11.01	11.24	10.49

CALUMET & HECLA CONSOLIDATED COPPER COMPANY EARNINGS STATEMENT.

Receipts.

	1924	1925	1926
Copper Sales.....	\$9,229,251.41	\$14,027,580.49	\$14,334,980.60
Custom Milling and Smelting.....	100,498.38	89,466.89	82,375.02
Dividends.....	19,106.29	67,813.10	36,669.83
Interest.....	192,697.64	207,918.38	263,657.43
Miscellaneous.....	39,187.19	58,051.02	23,805.91
Total.....	\$9,580,740.91	\$14,450,829.88	\$14,741,488.81

Disbursements.

Copper on Hand Jan. 1.....	\$4,816,494.63	\$4,243,036.27	\$3,182,379.25
Production, selling administration and taxes.....	8,251,970.37	9,291,390.70	9,975,182.08
Depreciation and Depletion.....	3,693,191.73	81,937.79	44,612.11
Miscellaneous.....	320,432.54		
Total.....	\$17,082,089.27	\$13,616,364.76	\$13,202,173.44
Less Copper on Hand December 31.....	5,866,908.75	3,182,379.25	3,372,632.17
Operating Profit.....	\$11,215,180.52	\$10,433,985.51	\$9,829,541.27
Depreciation.....		\$4,016,844.37	\$4,911,947.54
Depletion.....		\$1,769,762.49	\$1,518,825.07
		2,683,757.98	1,892,803.82
		\$4,453,520.47	\$3,411,628.89
Net Profit to Surplus.....	\$1,634,439.61	\$496,676.10	\$1,500,318.65
	(Loss for Year)	(Surplus)	(Net Profit to Surplus)

*Not including depreciation or depletion.

MINERAL RESOURCES OF MICHIGAN

CALUMET & HECLA CONSOLIDATED COPPER COMPANY BALANCE SHEET.

December 31, 1924

Assets

Current Assets:

Cash	\$1,744,998.49	
Liberty Loan Bonds at par	850,000.00	
Notes Receivable	312,245.06	
Accounts Receivable	2,549,399.33	
Copper on Hand	5,866,908.75	
Deferred Charges	67,782.22	
Supplies at Mine (book value)	3,096,005.87	
Total	\$14,487,339.72	\$14,487,339.72
Investments in Other Companies (book value)		\$1,901,796.57
Capital Assets (book value):		
Real Estate, Stumpage and Timber	\$4,729,393.93	
Mine Lands	\$52,742,942.07	
Plant	29,476,650.25	
	\$82,219,592.32	
Less Reserves for Depreciation and Depletion	\$16,633,676.49	
	\$65,585,915.83	\$65,585,915.83
Stamp Mill Patents		35,480.97
	\$70,350,790.73	\$70,350,790.73
Total Assets		\$86,739,927.02

Liabilities

Current Liabilities:

Accounts Payable		\$1,167,798.18
Capital Stock:		
Authorized, 2,500,000 shares, par value \$25.00 per share	\$62,500,000.00	
Less not Issued, 494,498 shares par value \$25.00 per share	12,362,450.00	
Issued, 2,005,502 shares par value \$25.00 per share, full paid		\$50,137,550.00
Surplus:		
Paid in Surplus January 1, 1924	\$38,071,769.45	
Loss by 1924 operations	\$1,634,439.61	
Dividend Paid	1,002,751.00	
	\$2,637,190.61	\$2,637,190.61
	\$35,434,578.84	\$35,434,578.84
Total Liabilities, Capital and Surplus		\$86,739,927.02

Investments in Other Companies as shown in Balance Sheet include stock holdings of Copper Companies located in Michigan as follows:

28,885 shares Cliff Mining Company of a total issue of	60,000 shares
35,000 shares Isle Royale Copper Company of a total issue of	150,000 shares.
152,977 shares La Salle Copper Company of a total issue of	302,977 shares.
50,100 shares Superior Copper Company, of a total issue of	100,000 shares.
10,000 shares White Pine Copper Company, Preferred, of a total issue of	10,000 shares.
42,602 shares White Pine Copper Company, Preferred, of a total issue of	85,320 shares.

COPPER PRODUCTION 1924-1926

CALUMET & HECLA CONSOLIDATED COPPER COMPANY BALANCE SHEET

December 31, 1925

Assets.

Current Assets:

Cash	\$2,616,384.27	
Liberty Loan bonds at par	850,000.00	
Notes Receivable	472,245.06	
Accounts Receivable	3,799,038.67	
Copper on hand, including Depreciation and Depletion	4,694,745.11	
Deferred Charges	86,297.26	
Supplies at Mine	2,316,312.15	
Total	\$14,835,022.52	\$14,835,022.52
Investments in Other Companies		\$1,816,671.28
Capital Assets:		
Real Estate, Stumpage and Timber	\$4,744,283.85	
Mine Lands	\$52,742,942.07	
Plant	30,099,703.92	
	\$82,842,645.99	
Less Reserves for Depreciation and Depletion	20,673,591.02	
	\$62,169,054.97	\$62,169,054.97
Stamp Mill Patents		30,558.75
	\$66,943,897.57	\$66,943,897.57
Total Assets		\$83,595,591.97

Liabilities.

Current Liabilities:

Accounts Payable		\$1,468,392.23
Capital Stock:		
Authorized 2,500,000 shares, par value \$25.00 per share	\$62,500,000.00	
Less not Issued, 494,498 shares, par value \$25.00 per share	12,362,450.00	
Issued, 2,005,502 shares par value \$25.00 per share, full paid		50,137,550.00
Surplus:		
Paid in Surplus Jan. 1, 1925	\$35,434,578.84	
Deficit for year	\$436,676.10	
Dividends paid	3,008,253.00	
	\$3,444,929.10	\$3,444,929.10
	\$31,989,649.74	\$31,989,649.74
Total Liabilities, Capital and Surplus		\$83,595,591.97

Investments in Other Companies as shown in Balance Sheet include stock holdings of Copper Companies located in Michigan as follows:

28,885 shares Cliff Mining Company of a total issue of	60,000 shares
35,000 shares Isle Royale Copper Company, of a total issue of	150,000 shares
152,977 shares La Salle Copper Company, of a total issue of	302,977 shares
10,000 shares White Pine Copper Company, Preferred, of a total issue of	10,000 shares
42,602 shares White Pine Copper Company, Common, of a total issue of	85,320 shares

CALUMET & HECLA CONSOLIDATED COPPER COMPANY BALANCE SHEET

December 31, 1926

Current Assets:			
Cash	\$4,242,379.01		
Liberty Loan Bonds at Par	850,000.00		
Notes Receivable	432,545.06		
Accounts Receivable	3,090,580.64		
Copper on hand, including Depreciation and Depletion	4,519,197.86		
Deferred Charges	80,306.26		
Supplies at Mine (book value)	2,366,902.45		
	\$15,581,911.28	\$15,581,911.28	
Investment in Other Companies (book value)			1,793,969.32
Capital Assets (book value):			
Real Estate, Stumpage and Timber	\$4,741,844.06		
Mine Lands	*\$33,432,671.70		
Plant	30,693,963.92		
	\$64,126,635.62		
Less Reserves for Depreciation and Depletion	*21,746,118.70		
	\$42,380,516.92	42,380,516.92	
Stamp Mill Patents		25,636.53	
	\$47,147,997.51	47,147,997.51	
Total Assets			\$64,523,878.11
Liabilities			
Current Liabilities:			
Accounts Payable			\$1,416,857.68
Capital Stock:			
Authorized, 2,500,000 shares, par value \$25.00 per share	\$62,500,000.00		
Less not Issued 494,498 shares, par value \$25.00 per share	12,362,450.00		
Issued, 2,005,502 shares, par value \$25.00 per share	full paid	50,137,550.00	
Surplus:			
Paid in Surplus		*\$20,259,779.65	
Deficit January 1, 1926	\$5,782,374.87		
Dividends paid	\$3,008,253.00		
Gain by 1926 operations	1,500,318.65		
	\$1,507,934.35	\$1,507,934.35	
	\$7,290,309.22	\$7,290,309.22	
	\$12,969,470.43	\$12,969,470.43	
Total Liabilities, Capital and Surplus			\$64,523,878.11

Investments in Other Companies as shown in Balance Sheet include stock holdings of Copper companies located in Michigan, as follows:

23,885 shares Cliff Mining Company of a total issue of	60,000 shares
35,000 shares Isle Royale Copper Company, of a total issue of	150,000 shares
152,977 shares La Salle Copper Company, of a total issue of	302,977 shares
10,000 shares White Pine Copper Company, Preferred, of a total issue of	10,000 shares
42,602 shares White Pine Copper Company, Common, of a total issue of	85,320 shares

*Corrected to agree with Federal adjustments.

Copper Range Company

The Copper Range Company which operates the Champion, Baltic and Tri-mountain Mines operated all three units during the period of 1924-5-6. A heavy water flow in the Champion that came in the fall of 1924 was the cause for a reduction in the output from this mine. This heavy water flow has been cut down materially since the time of peak load that was placed on the pumps in 1924 but it still continues to require the pumping of over 1500 gallons per minute.

The statistics of production for this group follow:

	1924	1925	1926	Average past ten years
Tons of rock stamped	386,840	383,746	417,321	559,240
Pounds of refined copper produced	15,073,360	14,298,916	14,696,867	19,791,251
Cost of copper per ton including depreciation and depletion	41.56	37.26	35.21	35.39
Price received per pound	\$1.789	\$1.984	\$1.697	\$1.844
Profits per pound	.1376	.1425	.1394	.1852
Mining expense, including freight, marketing copper, etc.	0.413 (loss)	.0559 (loss)	.0303	.0008 (loss)
Operating profit before including depreciation and depletion	\$1,874,969.38	\$1,999,585.22	\$1,912,914.17	\$2,870,735.44
Net earnings	264,792.21	178,811.16	385,103.19	1,020,094.83
Dividends	476,101.17 (loss)	541,131.86 (loss)	206,810.27	256,115.22
	394,727.00	394,727.00	394,755.00	1,360,265.15

MINERAL RESOURCES OF MICHIGAN

COPPER RANGE COMPANY
1924

Gross Income

25,109,175 lbs. of copper produced and sold at average of 13.76 cents per pound	\$3,455,575.21	
Copper Range Railroad operating revenues	920,745.21	
Interest	190,723.45	
Atlantic Mining Company	6,186.39	
Total	\$4,573,230.26	

Deductions

Mining expense, smelting, freight, taxes, selling and general expenses	\$3,078,005.23	
Copper Range Railroad operating charges, taxes and other debits	761,794.56	
One-half Champion profits belonging to St. Mary's Mineral Land Company	354,638.26	
Total	4,194,438.05	4,194,438.05

Operating Profits	\$378,792.21	
Interest on Copper Range Railroad First Mortgage Bonds	114,000.00	
Net Income	\$264,792.21	
Depletion and Depreciation for 2½ mines	740,893.38	
Deficit	\$476,101.17	

Assets

Cash		
United States Bonds	\$1,288,204.71	
Miscellaneous Bonds	920,500.00	
Copper delivered and not paid for	597,171.23	
Copper on hand	421,623.69	
Copper Range Railroad Company bonds	1,056,230.61	
Supplies at Mines	870,000.00	
Cash at Mines	\$389,808.70	
	36,325.66	
Total	\$4,266,438.01	

Notes Receivable	426,134.36	426,134.36
Accounts Receivable	535,000.00	535,000.00
Accrued Income and Deferred Charges	203,898.45	203,898.45
	22,902.50	22,902.50
Total	\$1,187,935.31	\$1,187,935.31

Liabilities

Current indebtedness at mines	\$6,341,665.55	
Accounts payable	\$119,152.78	
	44,559.69	
Total	\$6,505,377.92	\$6,505,377.92

Less one-half Champion	\$6,177,953.08	
Total	\$1,327,424.84	\$1,327,424.84

Net excess of assets	\$4,904,947.40	
The Copper Range Company holds in its treasury the following:		
97,303 shares Atlantic Mining Company stock		
50,000 shares Champion Copper Company stock		
42,443 shares Copper Range R. R. Co., entire stock issued		
9,200 shares Michigan Smelting Company's stock		

COPPER RANGE COMPANY
1925

Gross Income

23,277,718 lbs. of copper produced and sold at average of 14.258 cents per lb.	\$3,318,967.95	
Copper Range Railroad operating revenues	903,013.59	
Interest	183,117.48	
Total	\$4,405,099.02	

Deductions

Mining expense, smelting, freight, taxes, and general expenses	\$3,127,966.93	
Copper Range Railroad operating charges, taxes and other debits	735,438.72	
One-half Champion profits belonging to St. Mary's Mineral Land Company	248,882.21	
Total	4,112,287.86	4,112,287.86

Operating Profits	\$292,811.16	
Interest on Copper Range Railroad First Mortgage Bonds	114,000.00	
Net Income	\$178,811.16	

Depletion and Depreciation	719,943.02	
Deficit	\$541,131.86	

COPPER PRODUCTION 1924-1926

COPPER RANGE COMPANY
1925

Current Assets and Total Liabilities

	Assets		
	Dec. 31, 1925	Dec. 31, 1924	
Cash	\$1,265,051.33	\$1,288,204.71	\$23,153.38-Decrease
United States Bonds	920,500.00	920,500.00	
Miscellaneous Bonds	756,837.75	597,171.23	159,666.52-Increase
Copper delivered and not paid for	221,658.69	421,623.69	199,965.00-Decrease
Copper on hand	421,509.42	1,056,230.61	634,721.19-Decrease
Copper Range Railroad Company bonds	870,000.00	870,000.00	
Supplies at Mines	382,482.35	389,808.70	7,326.35-Decrease
Cash at Mines	26,417.18	36,325.66	9,908.48-Decrease
Notes Receivable	635,000.00	535,000.00	100,000.00-Increase
Accounts Receivable	137,976.69	203,898.45	65,921.76-Decrease
Accrued Income and Deferred Charges	30,111.03	22,902.50	7,208.53-Increase
	\$5,667,544.44	\$6,341,665.55	\$674,121.11-Decrease
Liabilities			
Current indebtedness at mines	\$122,872.99	\$119,152.78	\$3,720.21-Increase
Accounts payable	39,171.29	44,559.69	5,388.40-Decrease
	\$162,044.28	\$163,712.47	\$1,668.19-Decrease
Net excess of assets	\$5,505,500.16	\$6,177,953.08	\$672,452.92-Decrease
Less one-half Champion net assets	946,138.00	1,273,005.68	326,867.68-Decrease
Net excess of assets	\$4,559,362.16	\$4,904,947.40	\$345,585.24-Decrease
Net excess of assets Dec. 31, 1924			\$4,904,947.40
Income for year 1925			178,811.16
			\$5,083,758.56
Deduct:			
Distribution to Stockholders		\$394,727.00	
Construction charges at mines		80,001.25	
Liquidating Dividend to Atlantic Mining Company minority stockholders, and Miscellaneous Adjustments		49,668.15	524,396.40
Net excess of assets, Dec. 31, 1925			\$4,559,362.16

COPPER RANGE COMPANY
1926

Gross Income.

17,570,967 lbs. of copper sold and delivered at average of 14.161 cents per lb.	\$2,488,223.96
5,955,310 lbs. of copper on hand at average sales price of 13.322 cents per lb.	793,364.17
Total	\$3,281,588.13
23,526,277 lbs. of copper produced at average of 13.949 cents per lb.	\$3,281,588.13
Copper Range Railroad Operating Revenue	960,154.93
Interest	191,439.61
Total	\$4,433,182.67

Deductions

Mining expense, smelting, freight, taxes, selling and general expenses	\$2,869,515.96	
Copper Range Railroad operating charges, taxes and other debits	766,042.39	
One-half Champion profits belonging to St. Mary's Mineral Land Company	298,521.13	
Total	\$3,934,079.48	3,934,079.48
Operating Profits	\$499,103.19	
Interest on Copper Range Railroad First Mortgage Bonds	114,000.00	
Net Income	\$385,103.19	
Depletion and Depreciation	591,913.46	
Deficit	\$206,810.27	

Current Assets and Total Liabilities

	Assets		
	Dec. 31, 1926	Dec. 31, 1925	Increase
Cash	\$1,280,077.25	\$1,265,051.33	\$15,025.92
United States	920,500.00	920,500.00	
Miscellaneous Securities	605,283.19	756,837.75	151,554.56*
Loans and Collateral	485,000.00	635,000.00	150,000.00*
Copper delivered and not paid for	186,226.99	221,658.69	35,431.70*
Copper on hand	793,364.17	421,509.42	371,854.75
Copper Range Railroad Company bonds	870,000.00	870,000.00	
Supplies at Mines	390,396.26	382,482.35	7,913.91
Cash at Mines	15,660.54	26,417.18	10,756.64*
Accounts Receivable	158,137.61	137,976.69	20,160.92
Accrued Income and Deferred Charges	39,920.27	30,111.03	9,809.24
	\$5,744,566.28	\$5,667,544.44	\$77,021.84

MINERAL RESOURCES OF MICHIGAN

COPPER RANGE COMPANY

1926

Liabilities

Current indebtedness at mines.....	\$121,420.82	\$122,872.99	\$1,452.17*
Accounts payable.....	74,441.25	39,171.29	35,269.96
	195,862.07	162,044.28	33,817.79
Less one-half Champion net assets.....	\$5,548,704.21	\$5,505,500.16	\$43,204.05
	982,809.51	946,138.00	36,671.51
Net excess of assets.....	\$4,565,894.70	\$4,559,362.16	\$6,532.54
*Decrease.			
Net excess of assets, Dec. 31, 1925.....			\$4,559,362.16
Income for year 1926.....			385,103.19
			\$4,944,465.35
Deduct:			
Distributions to Stockholders.....		\$394,755.00	
Construction Charges at Mines.....		69,229.32	
		\$463,984.32	
Increase in Subsidiary Co. Deposit Account, and Miscellaneous—net..		85,413.67	378,570.65
Net excess of assets, Dec. 31, 1926.....			\$4,565,894.70

COPPER PRODUCTION 1924-1926

Isle Royale Copper Company

1924

The following figures copied from the reports of the Isle Royale Copper Company show the operations at this mine in 1924, 1925 and 1926:

Copper product for the year 1924.....		8,103,000 lbs.	
PRODUCTION COSTS			
Mining.....	10.25 c. per lb.		\$830,294.77
Smelting.....	1.13 c. per lb.		91,230.00
Boston office and mine and corporation taxes.....	1.25 c. per lb.		101,488.57
Depreciation and Depletion.....	3.78 c. per lb.		306,406.46
Production cost of.....	8,103,000 lbs. at 16.41 c. per lb.		\$1,329,419.80
On hand January 1, 1924.....	3,025,042 lbs. at 13.125 c. per lb.		397,036.76
	11,128,042 lbs.		1,726,456.56
Sold in year.....	7,877,134 lbs.		1,193,095.90
			\$533,360.66
Less to reduce to market value.....			45,724.44
On hand December 31, 1924.....	3,250,908 lbs. at 15.00 c. per lb.		\$487,636.22
EARNINGS STATEMENT			
Received for copper sold.....	7,877,134 lbs. at 13.16 c. per lb.		\$1,036,876.44
Cost of Copper Sold:			
Production cost at 15.15 c.....	1,193,095.90		
Selling and delivery at .46 c.....	36,385.46 lbs. at 15.61 c. per lb.		1,229,481.36
Loss on copper sold.....	2.45 c. per lb.		\$192,604.92
Loss by reduction to market value.....			45,724.44
			\$238,329.36
Miscellaneous Expenses:			
Loss on L. S. S. Co. Stock.....		\$32,000.00	
Sundries.....		5,244.52	
		\$37,244.52	
Miscellaneous Receipts:			
Interest, etc.....		17,312.60	
		19,931.92	19,931.92
Loss for year.....			\$258,261.28
CHANGES IN NET CURRENT ASSETS			
Balance of current assets January 1, 1924.....			\$1,148,427.32
Loss for year.....		\$258,261.28	
Less depreciation and depletion reserves.....		306,406.46	
		\$48,145.18	
Capital Assets decreased, L. S. S. Co. Stock.....		32,000.00	
Net increase in current assets.....		80,145.18	80,145.18
Balance of current assets December 31, 1924.....			\$1,228,572.50
BALANCE SHEET			
December 31, 1924.			
Assets.			
Current Assets:			
Cash.....		\$367,037.02	
Accounts Receivable.....		378,471.12	
Copper not sold.....		487,636.22	
Deferred Charges.....		5,573.03	
Supplies at mine (book value).....		116,002.59	
Total.....		\$1,354,719.98	\$1,354,719.98
Investments in Other Companies (book value).....			354,549.51
Capital Assets (book value):			
Real Estate.....		\$16,059.15	
Mine Lands.....		6,522,868.34	
Underground Development.....		1,293,660.94	
Plant.....		1,890,821.26	
Total.....		\$9,723,409.69	
Less Reserves for Depreciation and Depletion.....		4,496,742.51	
		5,226,667.18	5,226,667.18
Total Assets.....			\$6,935,936.67

MINERAL RESOURCES OF MICHIGAN

Isle Royale Copper Company
1924

Current Liabilities:			
Accounts payable.....			\$126,147.48
Capital Stock, Authorized and Issued.....			3,750,000.00
Surplus:			
Paid-in Surplus.....	\$4,250,000.00		
Deficit, January 1, 1924.....	\$931,949.53		
Loss by 1924 operations.....	258,261.28		
	\$1,190,210.81	\$1,190,210.81	3,059,789.19
Total Liabilities, Capital and Surplus.....			\$6,935,936.67

Isle Royale Copper Company
1925

Copper product for the year 1925.....			9,543,000 lbs
PRODUCTION COSTS			
Mining.....	9.63 c. per lb.	\$919,329.78	
Smelting.....	1.05 c. per lb.	100,095.00	
Boston office and mine and corporation taxes.....	1.06 c. per lb.	101,223.68	
Selling and delivery.....	1.40 c. per lb.	38,236.48	
Depreciation and Depletion.....	3.51 c. per lb.	334,760.08	
Production cost of.....	9,543,000 lbs. at 15.65 c. per lb.	\$1,493,645.02	
On hand January 1, 1925.....	3,250,908 lbs. at 15.00 c. per lb.	487,636.22	
Selling and delivery of same.....		13,025.60	
Sold in year.....	12,793,908 lbs.	\$1,994,306.84	
On hand December 31, 1925.....	11,000,954 lbs.	1,713,678.40	
	1,792,954 lbs. at 15.65 c. per lb.	\$280,628.44	

EARNINGS STATEMENT

Received for copper sold.....	11,000,954 lbs. at 14.22 c. per lb.	\$1,564,466.96	
Cost of same at.....	15.58 c. per lb.	1,713,678.40	
Loss.....			
Miscellaneous Receipts, Interest, etc.....	1.36 c. per lb.	\$149,211.44	
Miscellaneous Expenses.....	\$20,607.09		
	4,278.03		
	\$16,329.06	16,329.06	
Loss for year.....		\$132,882.38	

CHANGES IN NET CURRENT ASSETS

Balance of current assets January 1, 1925.....		\$1,228,572.50	
Loss for year.....	\$132,882.38		
Less depreciation and depletion reserves.....	334,760.08		
	\$201,877.70		
Capital Assets:			
Plant increased, new construction.....	\$9,541.07		
Dividend paid December 15, 1925.....	150,000.00		
	\$159,541.07	159,541.07	
Net increase in current assets.....	\$42,336.63	42,336.63	
Balance of current assets December 31, 1925.....		\$1,270,909.13	

BALANCE SHEET
December 31, 1925

Assets			
Current Assets:			
Cash.....	\$402,393.12		
Accounts Receivable.....	596,309.61		
Copper not sold.....	280,628.44		
Deferred Charges.....	2,936.34		
Supplies at Mine.....	122,974.09		
Total.....	\$1,405,241.60	\$1,405,241.60	
Investments in Other Companies.....		\$354,549.51	
Capital Assets:			
Real Estate.....	\$16,059.15		
Mine Lands.....	6,522,868.34		
Underground Development.....	1,293,660.94		
Plant.....	1,900,362.33		
Total.....	\$9,732,950.76		
Less Reserve for Depreciation and Depletion.....	4,831,502.59		
Total Assets.....	\$4,901,448.17	4,901,448.17	
		\$6,661,239.28	

Isle Royale Copper Company
1925

Current Liabilities:			
Accounts Payable.....			\$134,332.47
Capital Stock.....			3,750,000.00
Surplus:			
Paid-in Surplus.....	\$4,250,000.00		
Deficit January 1, 1925.....	\$1,190,210.81		
Loss by 1925 operations.....	\$132,882.38		
Dividend Paid.....	150,000.00		
	\$282,882.38	282,882.38	
	\$1,473,093.19	1,473,093.19	
		\$2,776,906.81	2,776,906.81
Total Liabilities, Capital and Surplus.....			\$6,661,239.28

Isle Royale Copper Company
1926

During 1926 there was produced from the mine of the company 11,017,000 pounds of copper at an average cost sold, but not including depreciation or depletion of 11.46c per pound.

The average price received for copper sold during the year was 14.10c per pound.

COMPARATIVE RESULTS FOR THE PAST FOUR YEARS

	1923	1924	1925	1926
Tons of rock treated.....	308,940	315,507	378,459	447,747
Cost of mining, transportation, stamping and taxes per ton of rock.....	\$2.88	\$2.87	\$2.62	\$2.39
Pounds of refined copper produced.....	8,002,244	8,103,000	9,543,000	11,017,000
Pounds of refined copper per ton of rock treated.....	25.90	25.68	25.22	24.61

UNDERGROUND WORK OF THE PAST FOUR YEARS

	1923	1924	1925	1926
Sinking No. 1 Shaft.....	0.0 ft.	0.0 ft.	0.0 ft.	0.0 ft.
Sinking No. 2 Shaft.....	0.0 ft.	0.0 ft.	0.0 ft.	0.0 ft.
Sinking No. 4 Shaft.....	72.0 ft.	242.0 ft.	277.0 ft.	194.0 ft.
Sinking No. 5 Shaft.....	191.0 ft.	262.0 ft.	277.0 ft.	237.0 ft.
Sinking No. 6 Shaft.....	0.0 ft.	0.0 ft.	0.0 ft.	0.0 ft.
Sinking No. 7 Shaft.....	0.0 ft.	0.0 ft.	0.0 ft.	0.0 ft.
TOTAL.....	263.0 ft.	504.0 ft.	554.0 ft.	431.0 ft.
Openings No. 4 shaft.....	ft.	ft.	ft.	ft.
Drifting.....	1,892.0	2,325.0	2,711.0	3,226.0
Drift-stopping.....	1,839.0	1,023.0	2,763.0	2,320.0
Crosscutting.....	98.0	20.0	26.0	263.0
Openings No. 5 shaft.....				
Drifting.....	751.0	2,562.0	2,893.0	2,955.0
Drift-stopping.....	1,548.0	2,136.0	3,223.0	2,969.0
Crosscutting.....	155.0	169.0	51.0	59.0

Total Depth of Shafts:

- No. 1 shaft 79 feet below the 16th level or 1,614 feet from surface.
- No. 2 shaft 62 feet below the 33rd level or 3,650 feet from surface.
- No. 4 shaft 67 feet below the 29th level or 3,762 feet from surface.
- No. 5 shaft 64 feet below the 29th level, or 3,758 feet from surface.
- No. 6 shaft 106 feet below the 22nd level or 2,733 feet from surface.
- No. 7 shaft 113 feet below the 9th level, or 1,248.5 feet from surface.
- No. "A" shaft 18 feet below the 5th level, or 972 feet from surface.

Isle Royale Copper Company

1926

SUMMARY OF RESULTS

	1923	1924	1925	1926
Rock hoisted.....	406,258 tons	425,221 tons	497,124 tons	564,692 tons
Rock house discard.....	97,318 tons	109,714 tons	118,665 tons	116,945 tons
Percentage of discard.....	23.95	25.8	23.87	20.72

EARNINGS STATEMENT

Receipts		Disbursements	
Copper Sales.....		\$1,448,709.14	\$1,448,709.14
Interest.....	\$1,431,210.77		
Miscellaneous.....	17,475.83		
	22.54		
Copper on hand January 1, 1926.....		\$217,756.82	
Production, selling, administration and taxes.....		1,263,000.07	
Less Copper on hand December 31, 1926.....		\$1,480,756.89	
		305,018.79	
		\$1,175,738.10	1,175,738.10
Operating Profit.....			\$272,971.04
Depreciation.....		83,769.59	
Depletion.....		139,746.87	
		\$223,516.46	223,516.46
Net Profit carried to surplus.....			\$49,454.58

BALANCE SHEET

December 31, 1926

Assets		Liabilities.	
Current Assets:			
Cash.....	\$404,347.98		
Accounts Receivable.....	608,957.72		
Copper not sold, including Depreciation and Depletion.....	360,116.64		
Deferred Charges.....	2,251.25		
Supplies at Mine.....	131,251.96		
	\$1,506,925.55	1,506,925.55	
Investments in Other Companies.....		\$354,549.51	
Capital Assets.....			
Real Estate.....	\$21,059.15		
Mine Lands.....	21,059.15		
Underground Development.....	6,522,868.34		
Plant.....	1,293,660.94		
	1,931,673.17		
	\$9,769,261.60		
*Less Reserves for Depreciation and Depletion.....	4,241,989.68		
	\$5,527,271.92	5,527,271.92	
Total Assets.....		\$7,388,746.98	
Current Liabilities:			
Accounts Payable.....		\$162,608.02	
Capital Stock Authorized and issued.....		3,750,000.00	
Surplus:			
Paid-in Surplus.....	\$4,250,000.00		
*Deficit Jan. 1, 1926.....	\$673,315.62		
Dividends paid.....	\$150,000.00		
Gain by 1926 operations.....	49,454.58		
	\$100,545.42	\$100,545.42	
	\$773,861.04	\$773,861.04	
	\$3,476,138.96	\$3,476,138.96	
Total Liabilities, Capital and Surplus.....		\$7,388,746.98	

*Corrected to agree with Federal adjustments.

Mohawk Mining Company

The Mohawk Mining Company operates the Mohawk and Wolverine Mines. The Wolverine Mine was closed on April 1st, 1925. A short historical statement on the operations at the Wolverine are given in a report by Mr. Theodore Dengler, General Manager of the Mohawk Mining Company:

HISTORICAL

This mine was operated from January, 1882, to November, 1884, and laid idle until August, 1890, having produced up to this time 1,979,378 pounds of copper. From August 1, 1890, to April 1, 1925, there were stamped 8,468,263 tons of rock from which 186,817,719 pounds of copper were recovered, which amounts to 22.06 pounds of copper per ton rock stamped.

The area of the mining property is 320 acres of which 205 acres carry the lode, having a dip of 40° from horizontal.

1924

Assets.

Current Assets:		
Cash in Bank and on Hand.....	\$912,622.66	
Accounts Receivable—less reserve of \$10,000 for doubtful accounts.....	80,563.20	
Notes Receivable—Timber Account.....	20,000.00	
Copper on Hand—at cost.....	204,842.52	
Supplies at Mines.....	272,792.12	
Interest Accrued on Securities Owned.....	2,240.04	
Unexpired Insurance.....	2,435.75	
Total.....	\$1,495,496.29	\$1,495,496.29
Investment in Smelting Company and Miscellaneous Securities.....		204,340.10
Capital Assets:		
Mines and Mine Development:		
Mining properties.....	\$1,080,644.00	
Development of Mines.....	2,050,575.26	
Ore body enhancement as of March 1, 1913.....	9,468,508.35	
	\$12,599,727.61	
Other Real Estate and Undeveloped Mineral Lands.....	459,466.03	
Buildings, Machinery and Equipment.....	3,526,472.07	
	\$16,585,665.71	\$16,585,665.71
		\$18,285,502.10

Liabilities.

Current Liabilities:		
Accounts Payable.....	\$133,646.10	
Unclaimed Dividends.....	8,070.50	
	\$141,716.60	\$141,716.60
Reserves for Depletion and Depreciation:		
Depletion of Ore Bodies and Timber.....	\$7,328,586.09	
Depreciation of Buildings, Machinery and Equipment.....	2,578,747.43	
	\$9,907,333.52	\$9,907,333.52
Unrealized Appreciation of Ore Bodies at December 31, 1924.....		4,099,773.57
Capital Stock:		
Authorized—115,000 shares at \$25.00 each.....	\$2,875,000.00	
Issued—115,000 shares at \$18.00 per share paid.....		2,070,000.00
Surplus, per annexed statement:		
General.....	\$1,486,680.44	
Capital.....	579,997.97	
	\$2,066,678.41	\$2,066,678.41
		\$18,285,502.10

MINERAL RESOURCES OF MICHIGAN

MOHAWK MINING COMPANY

1924

SURPLUS ACCOUNT, DECEMBER 31, 1924

Balance, December 31, 1923.....		\$1,952,332.99	
Profit for the year 1924 before depletion and depreciation.....		341,854.56	
Appreciation Realized during year 1924.....		501,386.96	
Collections of Old Accounts.....		13,983.13	
			\$2,809,557.64
Less:			
Depletion during year 1924.....			
Depreciation for the year 1924.....	\$633,780.91		
Tax adjustments for periods prior to 1924.....	94,997.12		
Reserve for Doubtful Accounts.....	4,101.20		
		10,000.00	
		\$742,879.23	742,879.23
Balance, December 31, 1924.....			\$2,066,678.41

STATEMENT OF INCOME AND PROFIT AND LOSS FOR THE YEAR ENDED
DECEMBER 31, 1924.

Sales:			
17,908,506 pounds of copper at 13.5147 cents per pound.....			\$2,420,275.35
Cost of Sales:			
Copper on hand January 1, 1924.....	\$572,139.18		
Operating Expenses at Mines.....	1,403,403.06		
Smelting, Freight and New York Expenses.....	281,221.68		
Taxes.....	61,271.16		
		\$2,318,035.08	
Less—Copper on hand December 31, 1924, at Cost.....		\$204,842.52	
		\$2,113,192.56	\$2,113,192.56
Net Cost of Copper Sold:			
Profits on Sales of Copper.....			\$307,082.79
Miscellaneous Income:			
Interest and Dividends.....	\$21,284.09		
Rents Received, etc.....	32,817.69		
			\$54,101.78
Less Interest paid.....		\$19,330.01	
		\$34,771.77	34,771.77
Profit for the year before providing for Depreciation and Depletion.....			\$341,854.56

SUMMARY OF RESULTS FOR THE YEAR.

Rock hoisted.....	734,060 tons	
Rock stamped.....	702,534 tons	
Product of mineral.....	21,484,645 pounds	
Product of refined copper.....	15,215,197 pounds	
Yield of rock treated per ton.....	21.657 pounds	
Cost per ton of rock hoisted.....	\$1.898	
Cost per ton of rock stamped.....	\$1.983	
Total operating cost per pound of refined copper.....		9.158 cents
Cost of Taxes (exclusive of Income and Profit Taxes).....		.403 cents
Cost of smelting, freight and marketing product, including Eastern Offices' expense.....		1.848 cents
		11.409 cents

1925

Assets.

Current Assets:			
Cash in Banks and on Hand.....	\$1,105,399.37		
United States Treasury Certificates.....	275,000.00		
Accounts Receivable.....	15,335.54		
Notes Receivable—Timber Account.....	20,000.00		
Copper on Hand at Cost.....	110,805.15		
Supplies at Mines.....	224,919.48		
Interest Accrued on Securities Owned.....	4,918.72		
Unexpired Insurance.....	1,688.53		
	\$1,758,567.79	\$1,758,567.79	
Investment in Smelting Company and Miscellaneous Securities—Less Reserve.....		185,428.91	

COPPER PRODUCTION 1924-1926

MOHAWK MINING COMPANY

1925

Capital Assets:			
Mines and Mine Development:			
Mining Properties.....	\$553,145.45		
Development of Mines.....	1,547,478.89		
Ore Body Enhancement, as of March 1, 1913.....	7,768,895.62		
	\$9,869,519.96		
Other Real Estate and Undeveloped Mineral Lands.....	459,466.03		
Buildings, Machinery and Equipment.....	3,594,141.55		
	\$13,923,127.54	\$13,923,127.54	
			\$15,867,124.24

Liabilities.

Current Liabilities:			
Accounts Payable.....	\$110,859.99		
Unclaimed Dividends.....	8,040.50		
	\$118,900.49	\$118,900.49	
Reserve for Depletion and Depreciation:			
Depletion of Ore Bodies and Timber.....	\$5,176,387.99		
Depreciation of Buildings, Machinery and Equipment.....	2,668,967.33		
	\$7,845,355.32	7,845,355.32	
Unrealized Appreciation of Ore Bodies, at December 31, 1925.....			3,630,361.35
Capital Stock:			
Authorized—115,000 shares at \$25.00 each.....	\$2,875,000.00		
Issued—115,000 shares at \$18.00 per share paid.....			2,070,000.00
Surplus, Balance January 1, 1925.....	\$2,066,678.41		
Deduct:			
Dividends paid during 1925.....	\$460,000.00		
Additional Reserve for Contingencies.....	10,000.00		
	\$470,000.00	470,000.00	
	\$1,596,678.41		
Add:			
Profit, per Annexed Statement.....	\$605,828.67		
	\$2,202,507.08	2,202,507.08	
			\$15,867,124.24

STATEMENT OF INCOME AND PROFIT AND LOSS FOR THE YEAR ENDING
DECEMBER 31, 1925

Sales:			
17,143,512 pounds of copper at 14.56935 cents per pound.....			\$2,497,698.30
Cost of Sales:			
Copper on hand January 1, 1925.....	\$204,842.52		
Operating Expenses at Mines.....	1,335,057.78		
Smelting, Freight and New York Expenses.....	278,316.21		
Taxes.....	54,673.80		
	\$1,872,890.31		
Less—Copper on Hand December 31, 1925, at cost.....		\$110,805.15	
		\$1,762,085.16	1,762,085.16
Net Cost of Copper Sold.....			\$735,613.14
Profit on Sales of Copper.....			
Miscellaneous Income:			
Interest and Dividends.....	\$26,150.92		
Rents, etc.....	42,381.84		
	\$69,032.76	69,032.76	
Profit for the year before providing for Depreciation and Depletion.....			\$804,645.90
Add—Appreciation realized during the year.....			469,412.22
			\$1,274,058.12
Deduct:			
Depletion.....	\$578,009.55		
Depreciation.....	90,219.90		
	\$668,229.45	668,229.45	
Net Profit.....			\$605,828.67

MINERAL RESOURCES OF MICHIGAN

MOHAWK MINING COMPANY

1925

SUMMARY OF RESULTS FOR THE YEAR.

Rock hoisted.....	701,335 tons	
Rock stamped.....	683,732 tons	
Product of mineral.....	23,495,000 pounds	
Product of refined copper.....	16,394,006 pounds	
Yield of rock treated per ton.....	23,977 pounds	
Cost per ton of rock hoisted.....	\$1.904	
Cost per ton of rock stamped.....	\$1.953	
Total operating cost per pound of refined copper.....		8.147 cents
Cost of Taxes.....		.333 cents
Cost of smelting, freight and marketing product, including Eastern Offices' expenses.....		1.698 cents
		10.178 cents
1926		
Assets.		
Current Assets:		
Cash in Banks and on Hand.....	\$506,069.89	
United States Liberty Loan Bonds.....	1,025,593.75	
Accounts Receivable.....	46,084.50	
Notes Receivable—Timber Account.....	20,000.00	
Copper on Hand, at Cost.....	243,948.53	
Supplies at Mines.....	174,682.89	
Interest Accrued on Securities Owned.....	8,071.25	
Unexpired Insurance.....	998.51	
Total.....	\$2,025,449.32	\$2,025,449.32
Investment in Smelting Company and Miscellaneous Securities—Less Reserve.....		178,871.25
Capital Assets:		
Mines and Mine Development:		
Mine Properties.....	\$553,145.45	
Development of Mines.....	1,547,478.89	
Ore Body Enhancement, as of March 1, 1913.....	7,768,895.62	
Other Real Estate and Undeveloped Mineral Lands.....	\$9,869,519.96	
Buildings, Machinery and Equipment.....	459,466.03	
	3,604,600.62	
	\$13,933,586.61	13,933,586.61
		\$16,137,907.18
Liabilities		
Current Liabilities:		
Accounts Payable.....	96,234.62	
Unclaimed Dividends.....	4,941.50	
	\$101,176.12	101,176.12
Reserve for Federal Income Tax.....		29,385.73
Reserve for Depletion and Depreciation:		
Depletion of Ore Bodies and Timber.....	\$5,732,262.95	
Depreciation of Buildings, Machinery and Equipment.....	2,741,244.04	
Total.....	\$8,473,506.99	8,473,506.99
Unrealized Appreciation on Ore Bodies at December 31, 1926.....		3,175,155.35
Capital Stock:		
Authorized—115,000 shares at \$25.00 each.....	\$2,875,000.00	
Issued—115,000 shares at \$18.00 per share paid.....		2,070,000.00
Surplus:		
Balance January 1, 1926.....	\$2,202,507.08	
Deduct:		
Dividends paid during 1926.....	\$575,000.00	
Additional Income Tax in respect of years 1919-20.....	38,425.07	
	\$613,425.07	613,425.07
Add:		
Profit, per annexed statement.....	\$1,589,082.01	
	\$2,288,682.99	2,288,682.
		\$16,137,907.18

MOHAWK MINING COMPANY

1926

STATEMENT OF INCOME AND PROFIT AND LOSS FOR THE YEAR ENDED
DECEMBER 31, 1926

Sales:		
16,738,684 pounds of copper at 14.25536 cents per pound.....		\$2,386,159.30
Cost of Sales:		
Copper on Hand January 1, 1926.....	\$110,805.15	
Operating Expenses at Mines.....	1,349,417.23	
Smelting, Freight and New York Expenses.....	283,571.53	
Taxes.....	49,245.55	
	\$1,793,039.46	
Less—Copper on Hand December 31, 1926, at cost.....	243,948.53	
Net Cost of Copper sold.....	\$1,549,090.93	1,549,090.93
Profit on Sales of Copper.....		837,068.37
Miscellaneous Income:		
Interest and Dividends.....	\$40,924.41	
Rents, etc.....	36,588.70	
	\$77,513.11	77,513.11
Profit for the year before providing for depreciation, depletion and Income Tax.....		\$914,581.48
Deduct:		
Depletion.....	\$555,874.96	
Less—Appreciation realized during the year.....	455,206.00	
	\$100,668.96	
Depreciation.....	84,925.81	
	\$185,594.77	185,594.77
Reserve for Federal Income Tax.....		\$728,986.71
		29,385.73
Net Profit.....		\$699,600.98

SUMMARY OF RESULTS FOR THE YEAR.

Rock hoisted.....	734,879 tons	
Rock stamped.....	721,066 tons	
Product of Mineral.....	26,747,400 pounds	
Product of Refined Copper.....	18,340,712 pounds	
Yield of rock treated per ton.....	25,435 pounds	
Cost per Ton of Rock Hoisted.....	\$1.836	
Cost per Ton of Rock Stamped.....	\$1.871	
Total operating cost per pound of Refined Copper.....		7.357 cents
Cost of Taxes.....		.269 cents
Cost of smelting, freight and marketing product, including Eastern Offices' expense.....		1.546 cents
		9.172 cents

Shaft Data Mohawk Mine

Sunk during 1926	Total Depth	Present Bottom of Shaft
No. 1 Shaft—127 feet.....	3,017 feet	173 feet below 27th level
No. 4 Shaft—0.....	2,832 feet	23th level
No. 6 Shaft—75 feet.....	2,504 feet	123 feet below 24th level

Quincy Mining Company

The Quincy Mining Company, operating the Quincy Mine at Hancock, shows the following results for the years 1924, 1925 and 1926:

1924			
The product of the mine was 24,489,920 pounds of mineral, yielding 14,838,633 pounds of refined copper, for which has been realized.			
Profit on Silver		\$2,029,032.66	
		43,074.65	
		\$2,072,107.31	
Mining Expense	\$1,642,757.27		
Opening Mine Expense	121,700.57		
Taxes paid in Michigan	61,955.83		
Capital Stock Tax	2,362.00		
Smelting, transportation, etc.	237,920.19		
	\$2,066,695.86	2,066,695.86	
Interest Receipts		\$5,411.45	
Sales of real estate, Hancock, Michigan	\$5,049.58		
	130.00		
	\$5,179.58	5,179.58	
Construction	\$66,080.04	\$10,591.03	
Accident account	24,000.00		
	\$90,080.04	90,080.04	
Deficit		\$79,489.01	
1924			
Assets.			
Cash, copper and investments		\$703,684.60	
Accounts Receivable, New York	\$72,708.31		
Accounts Receivable at Mine	22,960.72		
Accounts Receivable at smelting works	143.52		
	\$95,812.55	95,812.55	
At Mine and smelting works:			
Supplies	\$299,535.24		
Timber lands	9,100.42		
Teams and auto trucks	5,310.00		
Construction account	357,181.18		
	\$671,126.84	671,126.84	
		\$1,470,623.99	
Liabilities.			
Accounts payable in New York	\$176,168.59		
Accounts payable at Mine	69,421.62		
Accounts payable at Smelting works	2,599.46		
Michigan taxes payable January, 1925	55,607.08		
Accident reserve	60,633.20		
	\$364,429.95	364,429.95	
Receipts.			
From Capital Stock paid in	\$200,000.00		
From Capital Stock (Scrip)	1,250,000.00		
From Capital Stock, 10,000 shares increase	700,000.00		
	\$2,150,000.00	\$2,150,000.00	
From Proceeds of Copper and Silver (712,491,369 pounds copper)		114,629,786.40	
From Interest		743,869.98	
From Profit on Sale—P. L. & R. Impr. Co. Stock, etc.		88,216.58	
From Sales of Real Estate, Hancock, Michigan		305,052.69	
		\$117,916,925.65	

QUINCY MINING COMPANY

1925

Expenditures

For Expenditure on Location previous to 1856	\$42,097.98		
For Expenditure on Quincy vein—1858, not now worked	55,000.00		
For Openings on 3,800 feet Pewabic vein extending to Portage Lake, preparatory to future work	11,500.00		
For Real Estate and permanent improvement	9,751,372.18		
For Mining, smelting and marketing copper, and all incidental costs	79,948,261.45		
	\$89,808,231.61	89,808,231.61	
Balance		\$28,108,694.04	
Deduct dividends declared Nos. 1-127		27,002,500.00	
		\$1,106,194.04	

1925

The product of the mine was 22,721,380 pounds of mineral, yielding 14,357,523 pounds of refined copper, for which has been realized.			
Profit on Silver		\$2,057,689.02	
		53,600.38	
		\$2,111,289.40	
Mining expense	\$1,612,619.97		
Opening mine expense	172,755.80		
Taxes paid in Michigan	64,168.76		
Capital Stock Tax	1,735.00		
Smelting, transportation, etc.	209,375.22		
	\$2,060,654.75	\$2,060,654.75	
Interest receipts		\$7,536.06	
Sales of real estate, Hancock, Michigan	50.00		
		\$50,634.65	
Construction	\$60,978.65	\$58,220.71	
Accident account	29,000.00		
	\$89,978.65	\$89,978.65	
Deficit		\$31,757.94	

Assets.

Cash, copper and investments		\$796,860.48	
Accounts receivable, New York	\$23,228.24		
Accounts receivable, at mine	15,936.03		
Accounts receivable at smelting works	399.13		
	\$39,563.40	39,563.40	
At Mine and Smelting Works:			
Supplies	\$331,614.23		
Timber Lands	4,530.39		
Teams and auto trucks	4,651.50		
Construction account	355,049.30		
	\$695,845.42	695,845.42	

Liabilities.

Accounts payable in New York	\$263,010.51		
Accounts payable at Mine	73,426.80		
Accounts payable at Smelting Works	2,327.31		
Michigan taxes payable January, 1926	56,769.65		
Accident reserve	62,298.93		
	\$457,833.20	\$457,833.20	

1925

Receipts.

From Capital Stock paid in	\$200,000.00		
From Capital Stock (Scrip)	1,250,000.00		
From Capital Stock, 10,000 shares increase	700,000.00		
	\$2,150,000.00	\$2,150,000.00	
From proceeds of copper and silver (726,848,892 pounds copper)		116,741,075.80	
From Interest		751,406.04	
From Profit on sale P. L. & R. Impr. Co. Stock, etc.		88,216.58	
From Sales of Real Estate, Hancock, Mich.		305,102.69	
		\$120,035,801.11	

MINERAL RESOURCES OF MICHIGAN

QUINCY MINING COMPANY

1925

Expenditures.

For Expenditure on Location previous to 1856.....	\$42,097.98	
For Expenditure on Quincy vein, 1858, not now worked.....	55,000.00	
For Openings on 3,800 feet Pewabic vein, extending to Portage Lake, preparatory to future work.....	11,500.00	
For Real Estate and permanent improvements.....	9,812,350.83	
For Mining, smelting and marketing copper, and all incidental costs.....	\$82,037,916.20	
	\$91,958,865.01	\$91,958,865.01
Balance.....		\$28,076,936.10
Deduct dividends declared, Nos. 1 to 127.....		\$27,002,500.00
Balance as per statement.....		\$1,074,436.10

1926

The product of the mine was 20,220,795 pounds of mineral, yielding 13,290,052 pounds of refined copper, for which has been realized.....		\$1,887,113.24
Profit on Silver.....		34,960.73
		\$1,922,073.97
Mining expense.....	\$1,499,046.17	
Opening mine expense.....	244,821.14	
Taxes paid in Michigan.....	61,619.73	
Smelting, transportation, etc.....	170,522.28	
	\$1,976,009.32	\$1,976,009.32
		\$53,935.35
Interest receipts.....	\$5,107.64	
Sales of Real Estate, Hancock, Michigan.....	1,090.00	
	\$6,197.64	\$6,197.64
		\$47,737.71
Construction.....	\$93,490.52	
Accident account.....	\$30,000.00	
	\$123,490.52	\$123,490.52
Deficit.....		\$171,228.23
Assets		
Cash, copper and investments.....		\$586,091.78
Accounts receivable in New York.....	\$97,775.98	
Accounts receivable at mine.....	20,046.01	
Accounts receivable at smelting works.....	321.43	
	\$118,143.42	\$118,143.42
At mine and smelting works:		
Supplies.....	\$246,060.66	
Timber lands.....	4,218.39	
Teams and auto trucks.....	4,007.85	
Construction account.....	357,165.66	
	\$611,452.56	\$611,452.56
		\$1,315,687.76
Liabilities.		
Accounts payable in New York.....	\$170,936.19	
Accounts payable at mine.....	116,803.59	
Accounts payable at smelting works.....	4,378.08	
Michigan taxes payable January, 1927.....	55,517.60	
Accident reserve.....	64,844.43	
	\$412,479.89	\$412,479.89
		\$903,207.87
From Capital Stock paid in.....	\$200,000.00	
From Capital Stock (Serip).....	1,250,000.00	
From Capital Stock, 10,000 shares increase.....	700,000.00	
	\$2,150,000.00	\$2,150,000.00
From proceeds of copper and silver (740,138,944 pounds copper).....		118,663,149.77
From interest.....		756,513.68
From profit on sale P. L. & R. Impr. Co. stock, etc.....		88,216.58
From Sales of real estate, Hancock, Michigan.....		306,192.69
		\$121,964,072.72

COPPER PRODUCTION 1924-1926

QUINCY MINING COMPANY

1926

Expenditures.

For expenditure on Location previous to 1856.....	\$42,097.98	
For expenditure on Quincy vein, 1858, not now worked.....	55,000.00	
For openings on 3,800 feet Pewabic vein extending to Portage Lake, preparatory to future work.....	11,500.00	
For real estate and permanent improvements.....	9,905,841.35	
For mining, smelting and marketing copper, and all incidental costs.....	84,043,925.52	
	\$94,058,364.85	\$94,058,364.85
Balance.....		\$27,905,707.87
Deduct dividends declared, Nos. 1 to 127.....		27,002,500.00
Balance as per statement.....		\$903,207.87

Seneca Copper Mining Company

The Seneca Copper Mining Company is a reorganization of the Seneca Copper Corporation. The Seneca Copper Mining Company was organized in Feb. 27, 1925. The property owned by the Seneca Copper Mining Company consists of 2464.6 acres in Keweenaw County, under which is said to lie the Kearsarge, Osceola, Calumet, and Pewabic lodes. Prior to the reorganization the following production came from this property:

PRODUCTION				
1920.....	21,395 tons		497,680 lbs.	
1921.....	14,397		466,323	
1922.....	8,617		272,182	
1923.....	21,644		529,189	
Total.....	66,053 tons	66,053 tons	1,765,374 lbs.	1,765,374 lbs.
1924—				
January.....	10,795 tons		247,488	
February.....	22,418		368,419	
March.....	20,617		440,623	
April.....	28,647		740,018	
Total.....	82,477 tons	82,477	1,796,548 lbs.	1,796,548
Total tons rock stamped.....		148,530 tons		3,561,922 lbs.

The production was again started on December 1st, 1925 with the following result for the month:

Copper stamped—17,313 tons

Copper (metallic) reported by smelter—284,241 lbs.

Copper (metallic) per ton reported by smelter—16.4 lbs.

The results of the 1926 operations were reported as follows:

The amount of rock hoisted during the year was 291,675 tons, of which 24,148 tons were discarded, equal to 8.27%, rock transported to the mill and stamped was 267,527 tons, yielding 7,150,201 pounds of mineral, which at 69.669% gave us 4,981,524 pounds of refined copper.

The average return of refined copper per ton of rock stamped was 18.62 pounds.

MINERAL RESOURCES OF MICHIGAN

SENECA COPPER MINING COMPANY

1926

BALANCE SHEET—DECEMBER 31, 1926

Capital:	Assets		
Mining Property.....		\$4,846,505.38	
Mill Site and Right of Way.....		36,040.00	
Dwellings at Copper City, Michigan.....		22,500.00	
Construction, Machinery and Equipment.....		722,684.43	
Lake Milling, Smelting and Refining Co. Stock.....		350,000.00	
		\$5,977,729.81	\$5,977,729.81
Current:			
Cash.....		\$125,692.60	
Accounts Receivable.....		20,256.84	
Copper on Hand (at market price).....		180,731.55	
Supplies at Mine.....		96,638.89	
Deferred Insurance.....		2,189.46	
		\$425,509.34	425,509.34
Reserve:			
Conversion and unissued stock reserved for Seneca Copper Corporation			
10 Year 7% First Mortgage Bonds.....		\$1,500,000.00	
Unissued Stock.....		750,000.00	
		\$2,250,000.00	2,250,000.00
Profit and Loss.....			320,798.76
			\$8,974,037.91
Capital:	Liabilities		
Stated Capital Authorized 500,000 shares (no par value).....		\$2,500,000.00	
Issued and Outstanding.....	350,000 shares		
Reserved for Conversion Seneca Copper Corporation 10			
Year 7% First Mortgage Bonds.....	100,000 shares		
Unissued Stock.....	50,000 shares		
	500,000 shares		
Capital Surplus.....		5,000,000.00	
		\$7,500,000.00	\$7,500,000.00
Bonded:			
Seneca Copper Corporation 10 Year 7% First Mortgage Bonds			
Authorized.....		\$1,500,000.00	1,413,600.00
Issued.....		1,413,600.00	
In Treasury.....		86,400.00	
Current:			
Accounts Payable.....			60,437.91
			\$8,974,037.91

INCOME AND EXPENDITURES—YEAR ENDED DECEMBER 31, 1926

Income			
Received from Copper sales.....		\$637,252.85	
Inventory of Copper:			
On hand December 31, 1926.....	\$180,731.55		
On hand January 1, 1926.....	150,808.92		
	\$64,922.63	64,922.63	
Received from Miscellaneous Sources.....	\$702,175.48	\$702,175.48	
	1,933.23		
	\$704,108.71	\$704,108.71	
Expenditures			
Operating Expense.....	\$748,730.26		
Freight on Copper and Selling Expense.....	22,009.96		
Taxes.....	24,062.18		
General Expense.....	45,778.02		
Bond Interest.....	95,000.00		
	\$935,580.42	935,580.42	
Excess of Expenditures over Income.....			\$231,471.71
Depletion.....	\$174,353.34		
Depreciation.....	24,000.00		
	\$198,353.34		\$198,353.34

Mayflower-Old Colony Copper Company

The Mayflower-Old Colony Copper Company has been exploring the lodes on their property. A long cross cut has been driven in order to determine the productive lodes and when they are located additional explorations will be conducted by drifting along these favorable horizons.

The following is the Treasurer's statement for December 31, 1925

Balance—January 1, 1925:			
Cash.....	\$17,447.99		
Accounts Receivable.....	1,949.35		
Supplies.....	9,920.87		
	\$29,318.21	\$29,318.21	
Less Accounts Payable.....			1,463.77
			\$27,854.44
			\$27,854.44
Receipts			
Balance of Assessment due April 22, 1924.....	\$34,445.50		
On Account of Assessment due December 8, 1925.....	39,024.50		
From Interest.....	2,291.08		
	\$75,761.08		75,761.08
			\$103,615.52
Payments			
For Mining Expense.....	\$51,910.71		
For Construction.....	49.05		
For Equipment.....	173.61		
For Taxes—Michigan.....	\$3,971.79		
For Taxes—Massachusetts.....	1.05		
For Taxes—Federal.....	505.50		
For Taxes—Michigan Excise.....	1,070.00		
	\$5,548.34	5,548.34	
For General Expense.....	6,913.00		
	\$64,594.71		64,594.71
Leaving balance on hand January 1, 1926			\$39,020.81
which is made up of Cash.....	\$30,884.38		
Accounts Receivable.....	2,113.35		
Supplies.....	7,650.01		
	\$40,647.74	\$40,647.74	
Less Accounts Payable.....			1,626.93
			\$39,020.81
			\$39,020.81

To the above cash balance should be added the sum of \$60,975.50 due from sundry stockholders on account of assessment.

The Arcadian Consolidated Mining Company

The operations of the Arcadian Consolidated Mining Company has been devoted to exploration in the years 1924-1925 and 6. In 1926 the work of exploration was transferred from the New Arcadian Shaft to the New Baltic property.

The following financial report covers the operations up through 1926:

Amount Authorized.....		250,000 shares
Stock Outstanding.....	194,300	
Unissued Stock.....	13,000	
Treasury Stock.....	42,700	
	<u>55,700</u>	<u>55,700</u>

Par Value.....	250,000	250,000 shares
Paid in.....	\$25.00 per share	\$15.50 per share

CURRENT ASSETS AND LIABILITIES

December 31st, 1926

Assets		
Real Estate.....		\$1,808,326.13
Treasury Stock.....		661,850.00
Supplies.....		10,000.00
Due on Assessment No. One.....	\$1,786.50	
Due on Assessment No. Two.....	1,951.50	
Due on Assessment No. Three.....	1,976.50	
Due on Assessment No. Four.....	40,246.50	
Cash on Hand.....	13,831.24	
	<u>\$59,792.24</u>	<u>59,792.24</u>
Profit and Loss Account.....		1,133,623.30
		<u>\$3,673,591.67</u>
Liabilities		
Capital Stock Paid in.....		\$3,673,500.00
Accounts Payable.....		91.67
		<u>\$3,673,591.67</u>

STATEMENT OF RECEIPTS AND DISBURSEMENTS

December 31, 1926

Receipts		
Cash on hand December 31st, 1925.....		\$15,747.75
Received from Assessment No. One.....		10.50
Received from Assessment No. Two.....		141.00
Received from Assessment No. Three.....		2,592.00
Received from Assessment No. Four.....		56,853.50
Bills Payable.....		6,000.00
Received from Interest.....		518.60
Received from Rents.....		807.00
		<u>\$82,670.35</u>
Disbursements		
Labor and Explorations at Mine.....	\$33,296.72	
Fuel and Supplies.....	16,236.13	
Officers' Salaries.....	1,025.00	
	<u>\$50,557.85</u>	<u>\$50,557.85</u>
Taxes.....	8,371.38	
Insurance, including Employees Liability.....	1,307.04	
Transfer Expense.....	708.91	
General Expense including Delinquent stock sale, etc.....	1,821.93	
Interest.....	72.00	
Bills Payable Paid.....	6,000.00	
	<u>\$18,281.26</u>	<u>18,281.26</u>
Cash on hand December 31, 1926.....		\$68,839.11
		<u>13,831.24</u>
		<u>\$82,670.35</u>

PART II. NON-METALLIC MINERALS

O. F. POINDEXTER

R. B. NEWCOMBE

BROMINE

Bromine is produced from the brines of the Marshall formation in which it occurs in considerable quantities as magnesium bromide. The bromine content, as well as the percentage of chlorides relative to the sodium chloride, appears to increase toward the center of the Michigan basin, consequently, the industry has developed especially at Midland where the Dow Chemical Company has produced large quantities of bromine and other chemicals from the brines.

Bromine was first produced in Michigan in the Midland district in 1885 as a by-product of the salt industry and a production of 40,000 pounds was reported for that year. The production in the Midland district increased rapidly and by 1904 Michigan's production was far ahead of that of any other state. The pre-war peak was in 1907, after which production fell off abruptly until 1910. This was due to over production, dullness of trade and competition with the German product, which forced the price of bromine so low that its recovery was abandoned by all of the salt manufacturing concerns. The price fell as low as ten cents a pound during those years. The Dow Chemical Company, however, continued to produce large quantities of bromine, along with the other chemicals derived from the brines. Imports from Germany ceased in 1910, and in 1911 price and quantity began to return to normal.

The advent of the World War caused a "boom" in American bromides. France, England and Italy became largely dependent upon the United States for their supplies of bromine and bromides. This increased demand caused the average price to advance at an astonishing rate. It rose from thirty-five cents per pound in 1914 to \$1.00 per pound in 1915 and \$1.31 per pound in 1916, the highest since 1865. As a result of the high price, bromine ceased to be a by-product in many plants and became the only product used or sold. In 1917 there were five producers in the Saginaw Valley. The same year the new brom benzyl cyanide gas, for use in the trenches, was devised and from that time until the end of the war the demand was as great as the supply. In 1918, the government ordered new wells drilled at Midland to increase the production of bromine.

The price did not remain long at the high level attained in 1916, but in 1917 it had dropped to fifty-five cents a pound. This, however, was twice as high as the pre-war normal.

Immediately after the war the production in the United States fell off one-third from the high peak in production, 1,854,971 pounds, reached in 1919, but an increased demand for bromides in the photographic trade, especially for moving picture films and for the treatment of nervous diseases caused a good price to be maintained. This, however, had dropped to seventeen cents and the production to 842,352 pounds by 1923.

Nineteen twenty-four saw a better price and the largest production on record for the United States, 2,033,804 pounds, valued at \$594,685. This was an increase in production of 141 per cent over 1923. The large increase in 1924 was partly due to the demand for bromine for making organic bromine compounds to be used in the manufacture of tetraethyl lead for use in gasoline. Production declined about 25 per cent in 1925 due to objections to tetraethyl lead on account of alleged hazards of poisoning. This product was however returned to the market later.

In 1926, 1,245,760 pounds of bromine valued at \$426,837 were marketed in the United States. Michigan was by far the largest producer. The larger part of the bromine output as reported is not sold as bromine but as potassium and sodium bromide and other salts. Figures given include the bromine content of these salts.

CALCIUM CHLORIDE

Calcium chloride is one of the principal products recovered from the Marshall brines in connection with the manufacture of salt or salt and bromine. There is a large output of calcium chloride made by manufacturing processes in chemical industries. Since this is not a natural product, however, its value is included in the tables for limestone and salt.

Calcium chloride is used in steadily increasing amounts for the prevention of dust on roads and playgrounds, for curing of cement mixtures, in refrigerating plants, in fire buckets, because of its lower freezing point and ability to keep the buckets full by extracting moisture from the air. It is also used as a drying agent in chemical processes and for fruits and vegetables as a bleaching agent, as a preservative for wood, and for many other purposes.

Large quantities of calcium chloride are used in Michigan for laying dust on gravel roads. A threefold advantage is gained from the use of this material, at a moderate cost per mile. First, a fairly heavy application will keep the road dust free for a period of several weeks. Secondly, the road can be kept in much smoother condition because the moisture extracted from the air keeps the road bed soft and more easily worked. Third, maintenance costs are reduced due to the fact that the moisture produced prevents the clay, which acts a binder from being blown away.

For curing cement mixtures calcium chloride is spread on the surface of the road or pavement, or may be included in the mix.

In 1926 a total of 82,340 short tons of calcium magnesium chloride valued at \$1,710,405 was produced from natural brines in the United States. This is an increase of 21 per cent over 1925 and 40 per cent over 1924. Michigan produced approximately 90 per cent of the United States total for 1926.

MAGNESIUM

The Marshall brines also contain magnesium in the form of magnesium chloride. Metallic magnesium has been produced by the Dow Chemical Company at Midland for about 12 years. Production began during the war when the German supply, the chief source before the war, was cut off.

Metallic magnesium is obtained by passing a heavy direct current through a bath of molten magnesium chloride. The metal, being extremely light, collects on the surface and is skimmed off from time to time. The recovery method is expensive and accounts for the high price of the metal.

The production of magnesium in the United States fell off immediately after the war but since has steadily increased until now the production exceeds the war time figures. Increased knowledge of the properties of aluminum-magnesium alloys and improvement in their fabrication, heat treatment and cold working, has resulted in constantly increasing demands for castings, wire and tubing, sheet and plate, and powder.

Castings made from magnesium alloys include the following: aircraft parts, microscope parts, lens holders, field glasses, parts for moving picture machines and surveying instruments, golf club heads, artificial limbs.

Magnesium also has important uses as a dioxidizer and desulphurizer and as a flash light powder for military and photographic purposes. The price per pound in 1926 ranged from eighty cents for ingot to \$2.90 for sheet, wire and castings. The gradually expanding market, however, should result in reductions in costs and sales prices.

Magnesium chloride and magnesium sulphate (Epsom Salts) are also produced from the brines, and there are approximately one hundred manufactured products.

Wells that have penetrated the Marshall formation at various places in the central part of the state show that there is a large area west and southwest of Saginaw Bay in which the underlying Marshall brines should be of sufficient concentration for indefinite production of bromine, calcium chloride and magnesium.

There are several other formations which produce brines, namely, the Parma, Berea, Dundee and Upper Monroe. Bromine has been produced from the Richmondville at East Tawas and the Dundee and Upper Monroe formations are known to contain bromine as well as calcium and magnesium chloride. It is unlikely, however, that any of these formations will become of importance in the near future.

The Dundee and Upper Monroe waters are of value for medicinal purposes.

POTASH

Analyses of artificial brines produced by solution of deposits of rock salt in Michigan show small amounts of potash salts. These, however, do not occur in commercial quantities. The natural brines of the Napoleon or Upper Marshall, Dundee and Upper Monroe formations, especially the two latter, contain slightly larger amounts in some places, which may in time be found profitable to extract as a by-product.

Michigan has produced potash in the past, from industrial wastes and wood ashes. In 1918, the peak year of the industry, this amounted to 404 tons valued at \$100,647. In 1920, however, the production had dropped to fifty-six tons. There has been no production since 1920.

Agitation in the United States for development of domestic potash deposits has continued since 1910 when the German monopoly was created. There is a large demand for potash for agricultural and chemical purposes. Over 80 per cent of the potash consumed in the United States is imported.

IODINE

Analyses of certain brines from the Upper Monroe and Traverse formations show appreciable amounts of iodine to be present. This may at some future date be found profitable to extract as a by-product.

CLAY*

Clay is an extremely fine material originally derived from the weathering of crystalline rocks. When pure, it is composed chiefly of various hydrous aluminum silicates and quartz, is white in color and is known

*For a complete report on the clays and shales of Michigan, see Pub. 36, Geol. Series 30, Michigan Geol. and Biol. Survey.

as kaolin. Pure kaolin, however, is rare. The only known deposits in Michigan are adjacent to the feldspar dikes in Marquette County, where some material was taken out forty years ago. The extent of the kaolin is unknown.

Common clay, composed chiefly of kaolin, iron oxides, quartz, feldspar, mica, with a variety of other minerals is widespread and practically every county in the state has at least one deposit of possible suitability for making common brick or tile. Many of the counties have clay suitable for making vitrified products and the better grades of brick, and a few counties have clay suitable for low grade pottery purposes. In addition, there are some clays that have properties which result in special uses for the material. Near Rockland, in Ontonagon County, there is a deposit of nearly white clay known as "slip clay" which is easily fusible and is used for glazing stoneware and for binder in artificial abrasives. Michigan is the only state aside from New York that produced slip clay in 1926, but the quantity was small compared to that of the latter state.

Another type of clay having a special use is found in Wexford and Emmet counties. This is Fuller's earth, the chief use of which is for oil filtration. There is no reported production of this material in Michigan but tests show it to be of good quality and probably capable of competing with the Florida product.

No true fire clays have been found in Michigan. The most refractory are those of the Coal Measures, but these soften at 1470° C.

From a geological standpoint clays are of two general types as regards origin, residual clays, and transported clays. The residual clays comprise those which were formed by the weathering of the underlying rocks and have not been removed from the place of origin. There are great thicknesses of this type of clay in the southern states. In Michigan, however, very little clay is of the residual type.

The products of weathering in Michigan were swept away by the great ice sheets which advanced over the state in Pleistocene time, and, in their place, when the ice retreated, were spread great quantities of sand, gravel, boulders, and clay.

When the edge of the ice became stationary these materials were heaped up in ridges or *moraines*. When the ice retreated rapidly the material was spread out in broad level *till plains*. The *boulder clay* of the moraines or till plains, while it is utilized in places for common brick or tile and in a few places for the higher grade products, is generally too stony to be of value. This is true for both the Southern and Northern Peninsulas. A further objection to the morainic clays in Michigan is that limestone pebbles and lime dust are present in considerable quantities as a result of the ice passing over limestone formations. Lime produces a slagging action by combining with the silicates present and causes the clay to soften at a temperature below that of hard burned brick.

Lime also tends to destroy the red color of the brick and produce a buff color. The color of both burned and unburned clay is always due to the iron compounds present, but may be modified by other compounds, temperature of burning, or conditions in the kiln.

The most valuable clay deposits in Michigan are those which have been deposited in lakes formed by the ponding of waters in front of the retreating ice border. Under such conditions the coarser material will be deposited near the shore while the fine mud and silt will be carried out

and deposited further off shore forming broad sheets of clay free from sand or pebbles. The upper portions of the lake clays are also comparatively free from organic material and lime carbonate due to the removal of these materials by leaching. The lime dissolved is, however, usually deposited in the form of concretions at depths varying from 3 to 12 feet, rendering the clay of no value below the concretions.

The lake clays of the Southern Peninsula are mainly confined to a belt varying from a few miles to more than forty miles wide, extending from the Ohio State Line along the borders of Lake Erie, St. Clair, and Huron and around Saginaw Bay, where it has its maximum breadth, to the east central part of Alcona County. There is a small area in Alpena County and a narrow belt in Presque Isle and Cheboygan Counties.

The areas of lake clay along the west side of the State are few and small. This is due to the fact that Lake Michigan never overlapped more than a mile or two of the present shore except from Holland to Whitehall where it extended back from 10 to 25 miles. As a result, the area uncovered by Lake Michigan is with few exceptions sandy. It should not be understood that the belt described on the east side of the State is composed entirely of clay. There are large sand areas and areas where sand and clay are interbedded. These variations are due to changing conditions of deposition and varying shore line. It should also be pointed out that much of the lake clay is of little economic value.

In the Northern Peninsula, Ontonagon and Chippewa Counties have the largest deposits of lake clay. Mackinac, Houghton, Gogebic and Baraga also have deposits of fair size. The lake deposits of the Northern Peninsula are more uniform and of much better quality than those of the Southern Peninsula.

Because of the generally calcareous nature of Michigan clays which cannot be determined from a visual inspection of a deposit, it is important that a clay deposit should be carefully sampled and chemical and burning tests made by a competent engineer before any development is started.

The figures for clay given in the following table refer only to the clay marketed in the raw state. Clay produced and used by the same company is expressed in terms of production and value of brick and tile and pottery. Reference to the production tables for these products will give an idea of the magnitude of clay production in Michigan, although it should be borne in mind that much of the raw material is shale.

CLAY SOLD BY PRODUCERS IN MICHIGAN, 1910-1926.

Year.	Slip clay.		Brick clay.		Miscellaneous clay.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons		Tons		Tons		Tons	
1910.....	1,363	\$3,889	60	\$105	1	\$400	1,424	\$4,394
1911.....	1,744	5,090	18	32	2	150	1,764	5,272
1912.....	2,034	6,164			9	9	2,043	6,173
1913.....	1,710	6,504					1,710	6,504
1914.....	1,463	4,572					1,463	4,572
1915.....	1,198	3,805	†	†	†	†	3,142	5,605
1916.....	2,810	10,509					3,454	11,153
1917.....	2,153	8,824					5,746	13,627
1918.....	1,236	4,639	†	†	†	†	2,359	6,373
1919.....	568	2,123					568	2,123
1920.....	505	2,249			4,561	9,046	5,066	11,295
1921.....	484	2,047			208	308	692	2,355
1922.....	†	†	†	†			1,653	4,852
1923.....	†	†	†	†			3,617	11,903
1924.....	†	†	†	†			9,332	14,041
1925.....	†	†	†	†			3,953	7,405
1926.....	†	†	†	†			4,287	9,349
Total.....							52,273	\$126,976

†Included in total.

SHALE*

Shale is a consolidated clay. It results from the deep burial of deposits of clay beneath later sediments. Fresh water and glacial clays are, however, not important in the formation of shales. The extensive shale beds of Michigan represent muds which were laid down in seas, spread over broad areas, and which have been under water for enormously longer periods of time than any of the present lake clays. As a result, leaching is more complete, the deposits are far thicker and more uniform and of greater extent than the deposits of lake clays. The shales of the Southern Peninsula when finely ground and mixed with the right proportions of water will develop as much plasticity as most clays. The burning qualities of the lower Michigan shales are superior to those of the lake clays. The Upper Peninsula shales however are of a calcareous and dolomitic nature and are generally unsuitable for either ceramics or cement manufacture.

The shales quarried in Michigan for the several uses are those of the Coal Measures, the Coldwater, Bedford, Antrim and Bell. The Coal Measures shales come near to the surface and are utilized at Grand Ledge, Eaton County, for the manufacture of face brick, tile, and sewer pipe, at Jackson for tile and sewer pipe, at Corunna, Shiawassee County, for face brick and tile, and at Williamston, Ingham County, for face brick. Coal Measures shales were formerly utilized at Flushing, Genesee County, and at Bay City from an abandoned coal mine, for the manufacture of vitrified brick.

The Coldwater shale is at a lower geologic horizon than the shales of the Coal Measures but comes to the surface at Richmondville, Sanilac County, and between Forestville and White Rock, along the lake shore in Huron County. It is also exposed or at shallow depths near Coldwater,

*See Clay.

Union City, Quincy, and Bronson, all in Branch County. There are quarries at Coldwater and Union City where the shale is utilized in the manufacture of Portland Cement. The Coldwater shale is also excellent material for face brick, tile or almost any vitrified product and is probably the most important from an economic standpoint of any shale in the State. The Coldwater is, however, heavily covered with drift in the northern part of the State; hence is not available in that section.

The Petoskey Portland Cement Company obtains its shale from a quarry in the Bedford formation near Ellsworth, Antrim County. The Bedford formation consists of a soft, blue gray shale which is at or near the surface in several places in the northwestern part of the county. This shale is also shipped to Newaygo and used by the Newaygo Portland Cement Company. The Antrim is a black shale underlying a broad belt in the northern half of the Southern Peninsula. It is exposed or is at shallow depths in northwestern Antrim County, in most of Charlevoix, and outcrops in Emmet, Cheboygan, and Alpena counties. The Antrim shale is quarried at Paxton in Alpena County by the Huron Portland Cement Company. Tests show the Antrim shale to be good material for common brick, face brick and tile if treated to develop plasticity and carefully burned. It has been contemplated for some time to construct a plant at East Jordan to utilize the shale beds in that vicinity. There are many other areas in the counties mentioned where the Antrim shale is of commercial importance. At the base of the Traverse formation lies the Bell shale, a soft, bluish shale which outcrops in Presque Isle and Alpena counties. This shale forms the floor of the limestone quarry at Rockport. The Bell shale is not utilized at present but was formerly used by the Huron Portland Cement Company. The company, however, now prefers the Antrim. The Bell shale is very plastic, but in places is highly calcareous and not suitable for brick and tile, but where free from this objectionable feature it is probably as suitable for common brick, face brick, and tile, as the Antrim. The Bell shale is not suitable for vitrified products so far as known.

Michigan shale resources, while not as great as those of Ohio, Pennsylvania, and other states, are adequate to supply the State with cement material, face brick, tile, sewer pipe and similar products for an indefinite period. Brick manufacturers, however, have not fully realized the possibilities of Michigan's shale resources. The more extensive shale deposits, however, have the disadvantage of occurring in the northern part of the Southern Peninsula relatively distant from large markets or from means of cheap transportation.

POTTERY AND PORCELAIN WARE

The value of pottery products in Michigan has increased steadily with but few interruptions since 1899. In 1899 the total value was \$29,741; in 1908, \$62,409; in 1920 it had mounted to \$2,592,625. There was a decline in 1921 and 1922 to \$1,781,923 and \$1,337,000 respectively. In 1923, however, an increase was again noted, the total value for that year being \$1,810,619, and in 1924 the maximum value for pottery products in Michigan was attained, the value for that year being \$3,334,818 or an increase of 85 per cent over the previous year. The total value for 1925 and 1926 was slightly under the figure for 1924, but was still well over the \$3,000,000 mark for each year.

The large increase in the value of pottery products in Michigan is due chiefly to the larger markets and increased production capacities for spark plugs and other porcelain electrical supplies and sanitary ware.

It should be pointed out that only a small amount of the pottery made in Michigan is produced from clay mined in Michigan. The only pottery products for which Michigan clay is suitable, are flower pots and similar red earthenware. There were three producers of this ware in Michigan in 1926 and the products were valued at \$182,435. Clays used for the higher grades of pottery and porcelain products are imported from other states and foreign countries.

LIME

The lime burning industry in Michigan began in Monroe County very soon after the occupation of that region by the first white settlers. Kilns are reported as early as 1838 along Plum Creek, the Macon River and at Ottawa Lake. By 1850 lime burning had become an important industry in Monroe County, Raisinville being the chief center for burning. Aside from Monroe County, lime burning had an early development on a small scale in Eaton and Jackson Counties. The lime industry did not become of early importance in the northern part of the State, except for local use, because of lack of transportation facilities and great distance from markets. Until recently wood has been the chief fuel for burning lime. This accounts for the gradual dying out of the industry in the southern part of the State. The kilns depended for their fuel upon wastes from the lumber industry and when this cheap fuel became exhausted the operators were unable to purchase high priced fuel and compete with the northern Ohio product.

With the extension of railroads to the northern portions of the State and the development of lake transportation, the lime industry in Michigan was transferred to those sections where enormous deposits of pure limestone are present and where lumbering wastes could still be procured. At the present time all lime produced in Michigan is burned in the northern part of the Lower Peninsula and the southern part of the Upper Peninsula and with one exception, all plants are located on the lake shores. Even in these portions of the State wood is becoming less and less available and is being gradually replaced by other fuels which can be cheaply obtained by water transportation. Of a total of twenty-five active kilns reporting in 1926, thirteen burned coal, eight burned wood, and four used producer gas.

Inspection of the production tables given below, shows that the lime industry in Michigan has not maintained a steady growth. From 1904 to 1916 there was considerable fluctuation, the production for 1909 was 20,000 tons greater than for 1904, but in 1914 it was but little greater than for 1904. In 1915, 81,359 tons were produced, but this was still less than the 1909 total. The war stimulated the lime industry, as a large amount of lime is required for chemicals used in modern warfare, and yearly production from 1917 to 1920 was practically double that of the pre-war average. War restrictions in 1918 on building did not materially affect the lime industry in Michigan since very little lime is sold for use in the building trades. The value of the product was far greater because of a considerable advance in price to meet increased costs resulting from shortage of labor and scarcity of fuel and other supplies. The lack of growth from 1904 to 1914 was due to a number of causes, chief among which were the growing scarcity of wood for fuel, the substitution of concrete and gypsum for many uses in the building trades, and the relatively great distance of suitable limestone deposits from markets.

The lime industry in Michigan suffered more than in any other state as a result of the industrial depression in 1921. Less lime was sold in 1921 than for any year since collection of statistics was begun except 1905, and Michigan dropped from eighth place to fifteenth in rank. This was due to the fact that most of Michigan's lime is used for chemical purposes. In 1926 this amounted to eighty-six per cent of the total production. Very little lime other than for chemical and building purposes is sold in