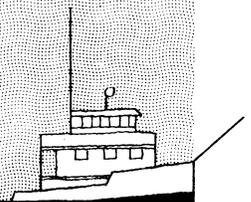
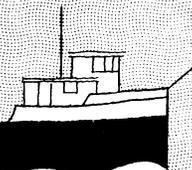
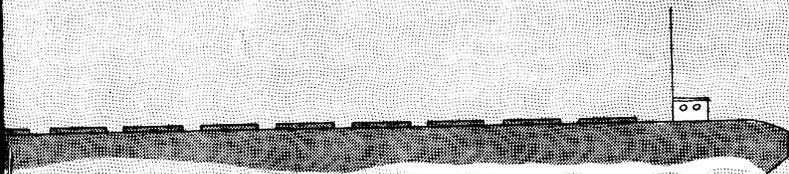
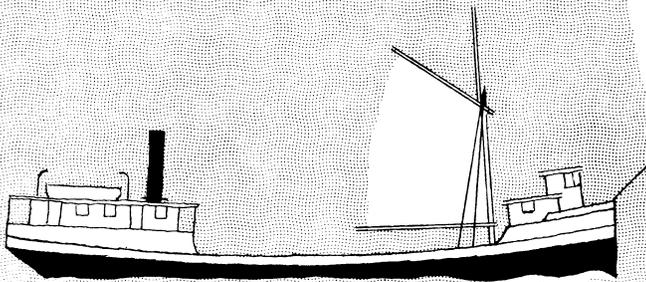
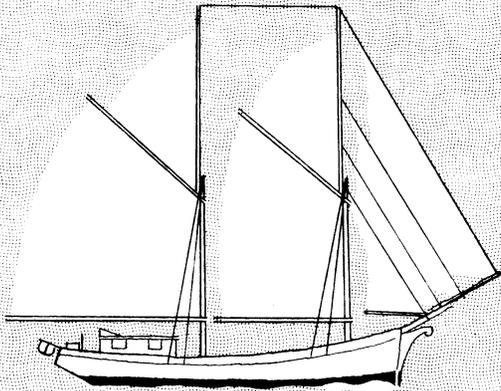


**Department of Natural Resources, Geological Survey Division  
Circular 12  
1975**

**Michigan  
Iron Ore Shipments  
Through 1974**

**One Thousand  
Million  
Tons**





The State Geological Survey collects, interprets, and disseminates basic information on the geology and mineral resources of Michigan.

Its activities are guided by public service available to all who are interested in the use or development of our resources, the protection of our environment, and sound land use management.

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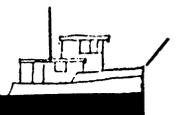
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# **One Thousand Million Tons**

**Michigan  
Iron Ore Shipments  
Through 1974**

*compiled by*  
ROBERT C. REED  
*Mining Geologist*

Lansing, Michigan  
1975



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## ONE THOUSAND MILLION TONS

### MICHIGAN IRON ORE SHIPMENTS THROUGH 1974

#### INTRODUCTION

The succeeding pages of this report present detailed statistical data pertaining to shipments of iron ore from Michigan's mines by range, year, and total tonnage. While this information is informative to interested readers, the real significance is the fact that sometime during 1975 cumulative shipments of iron ore from Michigan mines exceeded 1 billion tons (one thousand million tons).

Almost half of our earth's crust is made up of oxygen with another quarter composed of silicon. Aluminum, at 7.51 percent, is the most abundant metal followed by iron at 4.7 percent. One might assume then that iron is plentiful and its availability to man would present no problem. While it is true that iron is abundant within the earth's crust, the major portion is contained within the silicate lattice of common rock-forming minerals. In this form, there is no current technology to extract iron from such minerals at a price we would be willing to pay for large-scale use. Fortunately, natural processes at work within certain restricted geologic eras and ancient environments have concentrated iron into an economically usable form and extractable grade.

The major iron formations of the world are found within crystalline shield rocks collectively assigned to the Precambrian Era. Such Precambrian rocks are found exposed in the western portion of the Northern Peninsula of Michigan where they commonly include deposits of banded sedimentary iron formation. This type of rock consists of thin layers of iron minerals alternating with thin layers of silica.

In 1844, when William A. Burt made Michigan's first iron ore discovery on the Marquette Iron Range, this unusual rock formation had been in place for more than 2 billion years. As with other natural resources, it was of little benefit to man until utilized to his advantage. This iron resource was put to use as soon as possible after discovery to supply the steel for the nation's burgeoning industrial revolution. Discovery of iron ore on other iron ranges in Michigan followed with finds on the Menominee Range in 1848 and the Gogebic Range in 1883.

It is difficult to imagine the extent of our economic and technological progress without the availability and use of these vast iron resources. Iron and steel are the most basic and widely used of the metals and will continue to remain in this preeminent position. Precambrian iron formations providing low-cost iron ore in abundance undoubtedly were a major factor in shaping our nation's superior industrial capabilities.

Shipment of one billion tons of iron ore is a significant milestone in Michigan's mineral contribution to the economic well-being of the nation.

Table 1  
IRON ORE SHIPMENTS IN MICHIGAN THROUGH 1974

ANNUAL TONNAGE				
Year	Marquette Range	Menominee Range	Gogebic Range	Total Tons
Unknown	73,553			73,553
1854	3,000			3,000
1855	1,449			1,449
1856	6,790			6,790
1857	25,646			25,646
1858	22,876			22,876
1859	68,832			68,832
1860	114,401			114,401
1861	49,909			49,909
1862	124,169			124,169
1863	203,055			203,055
1864	247,059			247,059
1865	198,758			198,758
1866	296,713			296,713
1867	465,504			465,504
1868	506,505			506,505
1869	649,097			649,097
1870	856,245			856,245
1871	818,966			818,966
1872	949,073			949,073
1873	1,174,972			1,174,972
1874	935,604			935,604
1875	898,974			898,974
1876	995,224			995,224
1877	1,013,144	10,405		1,023,549
1878	1,039,368	82,824		1,122,192
1879	1,135,396	247,135		1,382,531
1880	1,384,010	537,164		1,921,174
1881	1,579,834	541,076		2,120,910
1882	1,829,394	894,802		2,724,196
1883	1,305,425	1,013,688		2,319,113
1884	1,558,034	861,660	1,022	2,420,716
1885	1,430,422	650,003	114,122	2,194,547
1886	1,627,380	832,749	656,041	3,116,170
1887	1,851,417	1,060,035	1,053,305	3,964,757
1888	1,923,733	986,698	1,249,415	4,159,846
1889	2,642,814	1,486,009	1,555,989	5,684,812
1890	3,000,805	1,944,435	2,226,012	7,221,252
1891	2,512,242	1,640,764	1,559,249	5,712,255
1892	2,665,169	1,964,140	2,553,035	7,182,344
1893	1,837,140	1,305,272	1,228,138	4,370,550
1894	2,060,260	960,302	1,668,729	4,689,291
1895	2,093,791	1,692,098	2,126,090	5,911,979
1896	2,606,790	1,431,624	1,434,006	5,472,420
1897	2,712,947	1,801,136	1,865,130	6,379,213
1898	3,119,461	2,177,915	2,072,356	7,369,732
1899	3,738,192	3,109,522	2,444,362	9,292,076
1900	3,479,242	3,172,123	2,444,169	9,095,534
1901	3,246,611	3,525,914	2,419,144	9,191,669
1902	3,865,350	4,369,004	3,022,438	11,256,792
1903	3,040,092	3,648,639	2,465,263	9,153,994
1904	2,851,745	2,919,779	2,042,398	7,813,922
1905	4,235,651	4,253,508	3,215,352	11,704,511
1906	4,057,226	4,934,114	3,113,980	12,105,320
1907	4,388,073	4,785,773	3,093,083	12,266,929
1908	2,413,575	2,538,802	2,348,737	7,301,114
1909	4,252,622	4,593,407	3,402,567	12,248,596
1910	4,392,726	3,909,461	3,663,438	11,965,625
1911	2,835,902	3,815,908	2,258,666	8,910,476
1912	4,202,723	4,561,833	4,103,532	12,868,088

Table 1 - continued

Year	Marquette Range	Menominee Range	Gogebic Range	Total Tons
1913	3,967,918	4,839,140	3,873,517	12,680,575
1914	2,491,857	3,133,672	3,164,420	8,789,949
1915	4,106,202	4,822,157	4,613,190	13,541,549
1916	5,409,582	6,179,920	7,340,582	18,930,084
1917	4,874,150	5,928,141	7,052,579	17,854,870
1918	4,354,297	6,108,886	7,150,636	17,613,819
1919	2,922,245	4,314,536	5,572,484	12,879,265
1920	4,608,323	6,428,149	7,956,459	18,992,931
1921	1,116,560	1,584,466	2,269,827	4,970,853
1922	2,818,374	4,079,444	5,542,571	12,440,389
1923	3,891,801	4,830,222	5,557,508	14,279,531
1924	3,174,835	3,836,826	4,329,803	11,341,464
1925	4,197,846	5,199,031	5,961,215	15,358,092
1926	4,435,029	5,946,377	6,428,754	16,810,160
1927	4,147,777	5,213,256	5,254,037	14,615,070
1928	4,298,717	4,841,637	5,151,465	14,291,819
1929	5,409,712	5,566,305	5,912,431	16,889,448
1930	3,633,968	3,546,544	3,976,968	11,157,480
1931	1,809,445	1,461,443	2,286,362	5,577,250
1932	357,255	307,721	313,388	978,364
1933	2,807,325	1,510,985	1,757,587	6,075,897
1934	2,473,847	1,335,027	1,690,897	5,499,771
1935	3,265,537	1,634,022	2,341,985	7,241,544
1936	4,627,889	2,163,679	3,710,468	10,502,036
1937	5,747,812	2,647,042	4,243,391	12,638,245
1938	1,476,257	978,419	1,652,904	4,107,580
1939	4,907,623	2,157,122	4,175,150	11,239,895
1940	5,920,463	3,101,751	4,749,065	13,771,279
1941	6,254,391	4,127,964	4,818,966	15,201,321
1942	6,540,731	4,927,609	4,691,940	16,160,280
1943	5,601,418	4,880,679	4,094,722	14,576,819
1944	4,790,177	4,876,210	4,067,879	13,734,266
1945	4,585,436	4,240,546	3,007,935	11,833,917
1946	3,270,344	2,590,499	2,619,349	8,480,192
1947	5,543,126	3,667,547	3,709,856	12,920,529
1948	4,898,044	4,085,777	3,914,634	12,898,455
1949	4,253,381	3,587,067	3,156,466	10,996,914
1950	4,055,002	4,144,431	3,827,323	12,926,756
1951	5,647,423	4,707,931	3,318,519	13,673,873
1952	4,516,509	4,277,880	3,003,861	11,798,250
1953	5,571,502	4,620,902	3,188,352	13,380,756
1954	3,675,429	3,669,710	2,377,743	9,722,882
1955	6,639,966	4,325,625	3,182,532	14,148,123
1956	5,689,013	3,889,213	2,958,076	12,536,302
1957	5,992,752	4,296,567	2,837,407	13,126,726
1958	3,722,139	3,095,239	1,393,528	8,210,906
1959	3,529,949	2,477,980	1,250,786	7,258,715
1960	4,944,715	4,121,165	1,889,986	10,955,866
1961	4,182,973	3,885,902	1,361,855	9,430,730
1962	4,500,447	3,462,371	1,480,383	9,443,201
1963	5,850,347	4,304,194	812,630	10,967,171
1964	7,944,840	4,624,274	1,403,137	13,972,251
1965	8,925,165	4,360,694	772,569	14,058,428
1966	9,659,989	4,327,914	364,407	14,352,310
1967	10,164,895	3,630,145	238,851	14,033,891
1968	9,366,744	3,448,687		12,815,431
1969	11,162,671	3,389,741		14,552,412
1970	10,335,545	2,924,875		13,260,420
1971	9,330,521	2,834,443		12,164,964
1972	9,250,747	2,577,402		11,828,149
1973	9,940,525	2,373,631		12,314,156
1974	9,008,916	2,521,880		11,530,796
TOTAL	427,183,498	311,232,305	255,224,103	993,639,906

Table 2

IRON ORE SHIPMENTS IN MICHIGAN THROUGH 1974  
GOGEBIC IRON RANGE

GOGEBIC DISTRICT, Gogebic County		
Mine	Gross Tons	Years of Shipments
Anvil-Palms-Keweenaw	21,976,031	1887-1957
Ashland	6,885,461	1885-1926
Chicago	104,556	1892-1896, 1900-1903
Eureka-Asteroid	14,484,717	1890-1896, 1906-1950
Geneva-Davis <sup>1</sup>	16,276,410	1887-1905, 1913-1961
Geneva-Newport	2,489,722	1962-1966
Loomis	416,628	1953-1955
Newport-Bonnie <sup>1</sup>	36,706,484	1886-1961
Penokee Group <sup>2</sup>	64,598,321	1885-1962
Peterson Group <sup>3</sup>	36,112,908	1884-1967
Plymouth <sup>4</sup>	18,095,660	1895-1952
Sunday Lake <sup>5</sup>	21,258,126	1885-1961
Townsite	1,551,536	1917-1936
Vicar	113,938	1950-1951
Wakefield <sup>6</sup>	13,876,126	1913-1944, 1956-1958
Wakefield-Morgan	58,400	1923-1925
Zontelli Concentrator <sup>7</sup>	<u>217,795</u>	1950-1956
TOTAL	255,224,103 <sup>8</sup>	

<sup>1</sup> Geneva and Newport combined shipments after 1961.

<sup>2</sup> Includes Norrie, Aurora, and Pabst.

<sup>3</sup> Includes Iron-ton, Puritan, Tilden, Colby, Jackpot, and Yale.

<sup>4</sup> Includes Mikado.

<sup>5</sup> Includes Castile and Meteor.

<sup>6</sup> Includes 577,273 tons of lean ores.

<sup>7</sup> Heavy media separation of Penokee rock piles.

<sup>8</sup> Plus 1,274 tons from the South Chicago mine in 1915.

Table 3

IRON ORE SHIPMENTS IN MICHIGAN THROUGH 1974  
MARQUETTE IRON RANGE

MARQUETTE DISTRICT, Marquette County		
Mine	Gross Tons	Years of Shipments
Adams	242,348	1913-1924
American-Boston	1,846,643	1880-1896, 1906-1922
Athens-Bunker Hill	16,527,250	1918-1966
Barasa	8,768	1903
Barnes-Hecker	419,433	1923-1927
Beaufort	354,654	1882-1887, 1900-1905
Bessie	59,097	1891, 1902-1906
Blueberry	6,077,871	1929-1955
Cambria-Jackson <sup>9</sup>	16,165,154	1874-1959
Champion	7,012,911	1868-1910, 1949-1967
Chase Group <sup>10</sup>	305,263	1883-1897, 1913-1916
Cleveland Lake	16,315,316	1854-1927
Cliffs Shaft <sup>11</sup>	28,960,406	1868-1972
Curry	16,671	1889
Detroit	140,841	1882-1890
East Champion	76,002	1873-1883
Edison (Concentration)	893	1889
Empire	768,474	1907-1928
Empire (Concentration)	32,968,452	1964-1974
Excelsior	17,939	1872-1879
Fitch	40,263	1890-1892
Foster	351,713	1868-1903
Foxdale	31,447	1901-1905
Gibson	16,357	1885-1887
Goodrich	49,754	1873-1882
Greenwood	2,365,816	1932-1963
Hortense	30,574	1887-1890
Howell-Hoppock	2,206	1873-1874
Humboldt <sup>12</sup>	1,368,546	1865-1892, 1908-1917

Table 3 - continued

Mine	Gross Tons	Years of Shipments
Humboldt (Concentration)	9,433,305	1954-1972
Imperial	2,057,781	1882-1892, 1899-1913, & 1922-1933
Jackson	4,357,256	1846-1924
Lackawawanna	17,780	1886-1888
Lake Angeline	9,319,679	1864-1922
Lake Sally	35,434	1865-1916
Lake Superior Group	25,103,189	1858-1937
Lloyd	9,650,958	1911-1957
Lucy	622,797	1870-1913
Maas	21,281,386	1907-1967
Marquette	268,071	1860-1892
Mary Charlotte <sup>13</sup>	6,918,663	1872-1948
Mather <sup>14</sup>	47,437,707	1888-1905, 1943-1974
Michigamme	935,880	1872-1905
Michigan	4,439	1872-1873
Milwaukee-Davis	533,022	1879-1915
Mitchell	233,750	1872-1913
Morris	11,013,916	1912-1961
National	155,884	1878-1884
Negaunee	22,735,479	1887-1949
Negaunee Construction Works (Concentration)	12,708	1882-1886
New England	110,506	1866-1873
New York	1,124,182	1864-1919
Nonpareil	23,395	1882-1887
Norwood	5,753	1887-1888
Ogden	657,024	1897-1928
Ohio	477,803	1907-1920
Ohio (Concentration)	745,620	1952-1962
Pascoe	59,806	1882-1886
Pendill	45,993	1878-1884
Phoenix	59,114	1881-1887
Pioneer	15,409	1886-1888
Portland	272,036	1909-1915

Table 3 - continued

Mine	Gross Tons	Years of Shipments
Quartz	491	1889
Rolling Mill <sup>15</sup>	2,997,802	1871-1935
Queen Group	8,195,123	1886-1917
Saginaw	451,424	1872-1891
Salisbury	4,489,102	1872-1924
Section 12	21,887	1879-1882
Spurr	164,244	1873-1886
Steward	2,987	1874-1878
Taylor	32,970	1880-1883
Tilden	6,510,080	1929-1972
Tilden (Concentration)	50,812	1974
Titan	90,371	1882-1888
Tracy Group <sup>16</sup>	9,700,926	1870-1937, 1955-1971
Webster	34,999	1882-1900
Winthrop	<u>2,590,560</u>	1870-1903
TOTAL	343,640,569	
***** GWINN DISTRICT, Marquette County *****		
Archibald	1,881,606	1911-1937
Austin	1,589,156	1905-1929
Francis	503,818	1918-1939
Gardner-Mackinaw	1,326,440	1919-1941
Princeton	3,221,588	1872-1947
Stegmiller	418,417	1909-1917
Stephenson	<u>3,844,233</u>	1907-1941
TOTAL	12,785,258	
***** REPUBLIC DISTRICT, Marquette County *****		
Columbia	98,813	1873-1883
Erie	9,194	1876-1883
Magnetic	292	1906
Republic	8,563,170	1872-1937
Republic (Concentration)	43,739,508	1956-1974
Republic Reduction Company	47,174	1887-1890

Table 3 - continued

Mine	Gross Tons	Years of Shipments
Riverside	16,160	1888-1893
North Republic	<u>289</u>	1888
TOTAL	52,470,600	

\*\*\*\*\* PALMER DISTRICT, Marquette County \*\*\*\*\*

Carr	2,380	1873-1874
Isabella	1,965,929	1916-1934
Maitland	1,021,189	1918-1928
Moore	87,769	1873-1904
Platt	73,844	1892-1896
Primrose	6,040	1896
Richards	8,261	1887-1897
Richmond, New	4,224,437	1927-1955
Richmond, Old	3,604,913	1896-1926
Star West	209,115	1873-1911
Volunteer, New	5,377,223	1926-1960
Volunteer, Old	<u>1,705,971</u>	1871-1916
TOTAL	18,287,071	

\*\*\*\*\* SUMMARY OF MARQUETTE IRON RANGE \*\*\*\*\*

Marquette District	343,640,569
Gwinn District	12,785,258
Republic District	52,470,600
Palmer District	<u>18,287,071</u>
TOTAL MARQUETTE IRON RANGE	427,183,498

- 9 Includes Lillie and Hartford.  
10 Includes Dey and Dexter.  
11 Includes Barnum, Moro, and Bancroft.  
12 Includes Sampson and Washington.  
13 Includes Allen, Chicago, East Chicago, Himrod, and Bay State.  
14 Includes Ames and East New York.  
15 Includes Kruse.  
16 Includes Breitung-Hematite, Lucky Star, and Manganese.

Table 4

IRON ORE SHIPMENTS IN MICHIGAN THROUGH 1974  
MENOMINEE IRON RANGE

IRON RIVER DISTRICT, Iron County		
Mine	Gross Tons	Years of Shipments
Baker	267,107	1909-1915
Bates	4,054,666	1915-1947
Beta	27,156	1886-1891
Brule	4,200	1936
Buck Group	21,653,499	1901-1962
Cannon	12,033,884	1910-1963
Caspian	6,623,320	1903-1937
Chicagon	1,234,339	1911-1922
Cortland	52,148	1912-1914
Cottrell	75,134	1915-1916
Davidson Group	8,197,014	1911-1953
Davidson No. 4	128,599	1913-1921
Delta	95,759	1920-1925
Forbes	2,283,822	1913-1939
Hiawatha No. 1 and No. 2	22,162,905	1893-1967
Homer-Cardiff-Minckler	17,493,590	1915-1971
James	8,326,342	1907-1954
Nanaimo	373,765	1882-1908
Riverton Group	5,881,550	1882-1937
Rogers	2,907,375	1914-1942
Sheridan	116,299	1879-1909
Sherwood	12,536,031	1931-1974
Spies-Virgil	4,195,111	1912-1956
Wauseca-Aronson	15,364,448	1926-1929, 1940-1972
Wickwire	128,869	1911-1917
Youngs	<u>802,751</u>	1905-1928
TOTAL	147,019,683	

Table 4 - continued

\*\*\*\*\* FELCH DISTRICT, Dickinson County \*\*\*\*\*

Mine	Gross Tons	Years of Shipments
Calumet	175,917	1882-1913
Groveland	156,032	1891-1913
Groveland (Concentration)	23,280,471	1952-1959-1974
Metropolitan	107,027	1882-1888
Northwestern	<u>35,810</u>	1883-1903
TOTAL	23,755,257	

\*\*\*\*\* CRYSTAL FALLS DISTRICT, Iron County \*\*\*\*\*

Alpha	1,370	1903
Armenia	713,395	1889-1914
Balkan-Judson	4,441,799	1882-1935
Book	2,317,523	1943-1958
Bristol-Youngstown	14,804,805	1890-1934, 1950-1969
Carpenter	2,735,452	1914-1928
Cayia	44,492	1954
Crystal Falls	1,744,015	1882-1913
Delphic	33,770	1883-1896
Dunn	2,208,511	1887-1915
Fortune Lake	1,316,905	1953-1958
Great Western	2,296,739	1882-1925
Hemlock	2,125,756	1891-1919
Hilltop	98,202	1899-1919
Hollister	143,117	1890-1914
Hope	28,530	1892-1903
Kimball	35,757	1907-1915
Lamont	558,524	1889-1910
Lawrence	6,963	1920-1956
Lee Peck	2,844	1892
Lincoln	241,627	1891-1909
Mansfield	1,462,504	1890-1913
McDonald	30,289	1909-1913
Odgers	2,101,381	1916-1935

Table 4 - continued

Mine	Gross Tons	Years of Shipments
Paint River	382,078	1882-1913
Porter	733,327	1916-1927
Ravenna-Prickett	635,227	1911-1917, 1940-1943
Richards	534,448	1913-1927
South Mastodon	8,203	1887-1890
Tobin-Columbia-Monongahela-Genesee	13,523,289	1882-1963
Warner	<u>3,417,030</u>	1915-1934, 1951-1958
TOTAL	58,727,872	
: : : : : IRON MOUNTAIN DISTRICT, Dickinson County : : : : :		
Antonie	2,269,444	1895-1925
Aragon	11,160,975	1889-1931
Bradley	730,044	1937-1958
Breen	75,425	1877-1907
Chapin	27,506,868	1880-1934
Cuff	83,306	1899-1900, 1941-1942
Cundy	846,078	1896-1913
Emmett	66,585	1882-1884
Forest	11,988	1904
Globe-Cornell	1,014,884	1880-1887, 1935-1959
Indiana	244,527	1882-1920
Loretto	3,729,581	1893-1940
Millie	503,934	1881-1925
Munro	576,254	1903-1921
Penn Mines	21,644,135	1877-1945
Pewabic	9,452,440	1880-1918
Quinnesec	512,235	1878-1935
Saginaw	502,985	1879-1909
Stephenson	39,350	1879-1887
Sturgeon	533	1925
Verona	130,975	1900-1904
Vivian	482,187	1902-1913
West Chapin	<u>144,760</u>	1922-1936
TOTAL	81,729,493	

SUMMARY OF MENOMINEE IRON RANGE	
Iron River District	147,019,686
Felch District	23,755,257
Crystal Falls District	58,727,872
Iron Mountain District	<u>81,729,493</u>
TOTAL MENOMINEE IRON RANGE	311,232,305

Table 5

IRON ORE SHIPMENTS IN MICHIGAN THROUGH 1974  
SUMMARY OF MICHIGAN IRON RANGES

Gogebic Range	255,224,103
Menominee Range	311,232,305
Marquette Range	<u>427,183,498</u>
GRAND TOTAL, MICHIGAN	993,639,906

NOTE: Data on iron ore shipments were compiled from *Lake Superior Iron Ores, 1938 through 1952*, published by the Lake Superior Iron Ore Association. Data from 1952 to present were taken from annual reports on the Lake Superior Iron Ore Association and Annual Statistical Summaries issued by the Michigan Department of Natural Resources, Geological Survey Division.

AVAILABLE PUBLICATIONS ON THE GEOLOGY AND MINERAL RESOURCES OF MICHIGAN FROM THE  
GEOLOGICAL SURVEY DIVISION

Publication

- #36 CLAYS AND SHALES OF MICHIGAN AND THEIR USES, by G. S. Brown, 1924. *Origin, characteristics, distribution, and economic potential of clay resources*; 444 pages, 41 plates, and 69 figures.
- #46 MIDDLE AND UPPER ORDOVICIAN ROCKS OF MICHIGAN, by R. C. Hussey, 1952. *Description of outcrops in eastern Northern Peninsula with list of fossils fauna*; 90 pages, 10 plates, and 11 figures.
- #51 CAMBRIAN SANDSTONES OF NORTHERN MICHIGAN, by W. K. Hamblin, 1958. *Geologic history, distribution and extent of early Paleozoic sandstones on the southern shore of Lake Superior*; 157 pages, 89 figures, 3 tables, and 5 plates.

Report of Investigation

- #4 GEOLOGIC AND MAGNETIC DATA FOR NORTHERN IRON RIVER AREA, MICHIGAN, by H. L. James, 1967. *Detailed geologic and geophysical data supplemental to U. S. Geological Survey Professional Paper 570*; 49 pages, 9 figures, 1 table, and 2 plates in pocket.
- #6 GEOLOGY AND MAGNETIC DATA FOR SOUTHEASTERN IRON RIVER AREA, MICHIGAN, by H. L. James and K. L. Weir, 1969. *Detailed geologic and geophysical data supplemental to U. S. Geological Survey Professional Paper 570*; 36 pages, 9 figures, 1 table, and 3 plates in pocket.
- #7 GEOLOGY AND MAGNETIC DATA BETWEEN IRON RIVER AND CRYSTAL FALLS, MICHIGAN, by H. L. James, F. J. Pettijohn, and L. D. Clark, 1970. *Detailed geologic and geophysical data supplemental to U. S. Geological Survey Professional Paper 570*; 23 pages, 6 figures, 1 table, and 4 plates in pocket.
- #8 GEOLOGY AND MAGNETIC DATA FOR THE NORTHERN CRYSTAL FALLS AREA, MICHIGAN, by F. J. Pettijohn, 1970. *Detailed geologic and geophysical data supplemental to U. S. Geological Survey Professional Paper 570*; 29 pages, 6 figures, 2 tables, and 3 plates in pocket.
- #9 GEOLOGY AND MAGNETIC DATA FOR SOUTHERN CRYSTAL FALLS AREA, MICHIGAN, by F. J. Pettijohn, 1972. *Detailed geologic and geophysical data supplemental to U. S. Geological Survey Professional Paper 570*; 39 pages, 8 figures, 2 tables, and 3 plates in pocket.
- #10 GEOLOGY AND MAGNETIC DATA FOR ALPHA-BRULE RIVER AND PANOLA PLAINS AREAS, MICHIGAN, by F. J. Pettijohn, V. E. Gair, K. L. Weir, and W. C. Prinz, 1969. *Detailed geologic and geophysical data supplemental to U. S. Geological Survey Professional Paper 570*; 17 pages, 1 figure, 2 tables, and 3 plates in pocket.
- #11 GEOLOGY AND MAGNETIC DATA FOR NORTHEASTERN CRYSTAL FALLS AREA, MICHIGAN, by K. L. Weir, 1971. *Detailed geologic and geophysical data supplemental to U. S. Geological Survey Professional Paper 570*; 19 pages, 1 figure, 1 table, and 2 plates in pocket.
- #12 GEOLOGIC INTERPRETATION OF AEROMAGNETIC DATA IN WESTERN UPPER PENINSULA OF MICHIGAN, by W. M. Meshref and W. J. Hinze, 1960. *Regional interpretation of structure and lithology of Precambrian formations from geophysical data*; 31 pages, 7 figures, 4 tables, and 3 plates in pocket.
- #14 GRAVITY AND AEROMAGNETIC ANOMALY MAPS OF THE SOUTHERN PENINSULA OF MICHIGAN, by W. J. Hinze, R. L. Kellogg, and D. W. Merritt, 1971. *Bouguer gravity and total magnetic intensity anomaly maps of the Southern Peninsula with interpretations*; 20 pages, 5 figures, and 2 plates in pocket.

ANNUAL STATISTICAL SUMMARY

- #19 MINERAL INDUSTRY OF MICHIGAN, 1972, by Grace N. Broderick, 1974. *Statistics on the production of metals, nonmetals, and fuels, with a discussion of the Fiborn Limestone*; 21 pages, 2 figures, and 16 tables.

The design and capacity of ships carrying iron ore has kept pace with production increases. The representative ships are:

TYPE	NAME	DATE LAUNCHED	LENGTH
schooner	PRIDE	1849	87'
steam barge	EDWIN S. TICE	1887	160'
whaleback	JOHN B. TREVOR	1895	308'
ore carrier	SPARTA	1902	380'
self-unloader	TADOUSSAC	1969	730'

