



U.S. Department of the Interior • Bureau of Mines

## MINERAL INDUSTRY SURVEYS

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Iron Ore, Monthly

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### IRON ORE IN MARCH 1990

U.S. mine production of iron ore in March was virtually the same as that in February, according to the Bureau of Mines, U.S. Department of the Interior. Mine stocks rose from 10.3 million metric tons to 12.8 million during the month. The 1990 shipping season on the Great Lakes began on March 20 with the shipment of 51,965 tons of Minntac pellets from the Duluth Missabe and Iron Range Railway Co. terminal at Two Harbors, MN. The pellets were loaded into Transtar Inc.'s Edwin H. Gott for delivery to the USX Corp. steelworks at Gary, IN. The U.S. Army Corps of Engineers officially opened the locks at Sault Ste. Marie, MI, to all navigation on March 21, with the Gott being the first eastbound vessel to transit. March shipments from U.S. loading docks on the Great Lakes reached 1.11 million tons, about 13% more than for March 1989. The U.S.-flag Great Lakes fleet plans to operate 65 of its 69 vessels in 1990, representing 98% of available carrying capacity.

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The Bureau of Mines is testing a system called **MINES-DATA**, to provide Mineral Industry Surveys on Iron Ore electronically. The Bureau expects that users with microcomputers and communications equipment in the United States and abroad can obtain iron ore data up to 4 weeks sooner than was previously possible. Monthly data usually will be available approximately 40 work days after the end of the period covered. March data which are given in this report were available on **MINES-DATA** on March 25. See page 2 for details on how to use **MINES-DATA**.

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Prepared in the Branch of Ferrous Metals and Branch of Data Collection and Coordination, May 25, 1990.

## How To Use MINES-DATA

**MINES-DATA** is an electronic data dissemination system that allows users to download Bureau of Mines' Mineral Industry Surveys on iron ore using personal computers. Other commodities will be added later. **MINES-DATA** is in the early stages of implementation and improvements are expected. The user needs a computer, a modem, communications software, a telephone line, and a disk for storing the downloaded files. A hard disk is recommended to assure sufficient storage capacity. There is no cost to use the system except for the cost of the telephone call.

There are two types of files on the system--text (ASCII) files that have the extension ".TXT", and executable files that have the extension ".EXE". Text files contain no formatting codes, and executable files contain all the text files for the Mineral Industry Survey for a given month in a data compressed format to facilitate faster data transfer.

Before calling, users should set their modems to call at either 1200 baud or 2400 baud, 8 data bits, no parity, and one stop bit (1200,N,8,1) or (2400,N,8,1). The telephone number is: 202-634-4637. First time users must register, provide a password, and answer questions such as whether their computer supports graphics or color screens. Turning on turbo-keys means that a user does not need to use the return or enter key after selecting a command. Users have an option to provide a default protocol. The recommended protocol is Ymodem. However, Xmodem is acceptable if the user's communications software does not support Ymodem. Both Ymodem and Xmodem are error checking protocols that employ algorithms to detect errors in data transmission. After the user answers the questions, the system stores the answers in a user profile. A user may change the information stored in his profile at any time by selecting "U" or utilities from the main menu.

After answering the introductory questions from the main menu the user may want to read bulletins by selecting the letter "B", and then selecting the number corresponding to the bulletin

desired. After reading the bulletins, the user may select the letter "F" from the main menu to see the files submenu. The user should select the letter "L" to list the commodities that are available on the system. The user then types the name of the commodity that they want to see, e.g. "IRON ORE", and a listing of the files corresponding to that commodity is presented. If a user wants to download all of the files for the December Iron Ore Mineral Industry Survey, the user types the filename "FEFEB90.EXE", followed by a return or enter key. The user should consult his communications software instructions for downloading procedures. A brief description of some of these instructions is contained in bulletin #3. The communications program notifies the user after a successful download. The user selects the letter "Q" to quit and the letter "G" for goodbye to sign off the system.

After logging off the system, the user has the option to print the text files. To print text (.TXT) files, a user must set his printer to compressed print in order to avoid word wrap of tables exceeding 80 columns in width. If the user has downloaded an ".EXE" file, e.g. filename "FEFEB90.EXE," typing the filename without the .EXE extension will extract and decompress the text files. The user then may use the DOS "PRINT" command to print the individual text files.

Questions on how to use **MINES-DATA** should be directed to the systems operator answering service in the Branch of Nonferrous Metals, 202-634-9632, available 24 hours-per-day. Written questions, comments or suggestions for improving this system also would be appreciated and may be sent to:

Bureau of Mines  
Branch of Nonferrous Metals  
Systems Operator (SYSOP), MS 5208  
2401 E St. NW  
Washington, DC 20241

### Long-term Projects Underway at Pea Ridge Mine

The Pea Ridge Iron Ore Co. operates the smallest of the 10 active mining and pelletizing complexes in the United States. The Pea Ridge Mine is located on the northeast flank of the Ozark uplift in Washington County near Sullivan, MO. The operation produced slightly more than 1 million tons of iron ore products in 1989 and is the only active underground iron mine in the country. The bulk of the production consisted of olivine-enriched pellets made from magnetite concentrate containing 70% Fe and less than 1% SiO<sub>2</sub>. Olivine is a magnesium-iron silicate and is added to the pellets to increase the reducibility of the pellet while improving its high-temperature properties in the blast furnace. In recent months, the complex has received increased attention because of its uniqueness and the novel steps taken by its engineering staff to solve problems shared by the entire North American iron ore industry.

Since 1988, Pea Ridge has become involved in three major projects that have long-term implications not only for iron ore producers, but also for several other segments of the metals mining sector. The three projects entail:

- o Reduction of iron oxide particulate emissions from the company's five shaft furnaces, and the improvement of air quality in the immediate vicinity of the pelletizing plant.
- o Improved liberation and separation of phosphorus-bearing minerals from the magnetite concentrate used as pellet feed.
- o Detailed underground mapping of the mine in collaboration with the U.S. Geological Survey (USGS) and the Missouri Department of Natural Resources (DNR).

In March 1990, DNR and company officials reached a settlement which should lead to improved air quality in the Sullivan area and bring the pelletizing plant into compliance with the Missouri Air Conservation Law. Under the terms of the agreement, Pea Ridge will install pollution control equipment on one of the five furnaces by September 30, 1990. Company personnel will then measure emissions from the furnace and deliver the results to DNR by November 30. If the tests show that particulate emissions have been reduced sufficiently to meet air quality standards, the company has agreed to install similar pollution control equipment on one furnace each year through 1994. DNR, on its part, will forgo any further enforcement action against Pea Ridge for the duration of the agreement, which expires November 30, 1994.

The principal ore mineral at Pea Ridge is fine-grained magnetite. Apatite and other phosphate minerals occur as inclusions in the magnetite and create quality control problems at the concentrator. Control of phosphorus is critical in the making of quality steels. The ideal situation is to keep the phosphorus as low as possible in the pellets, coke, and fluxes so that even minor amounts of the element cannot accompany the iron into the steel. In 1979, pellets from Pea Ridge averaged 0.080% P. At that time, the ore feeding the concentrator typically ran 0.60% P. Since then, the company has been able to gradually reduce the pellet phosphorus content to 0.020%.

In April 1988, the Missouri Division of Geology and Land Survey (DGLS) entered into a cooperative agreement with Pea Ridge to map selected levels of the mine. This mapping project is part of DGLS' larger "Operation Basement" study. Preliminary data indicate that many similarities exist between the basement rocks of southern Missouri and those of South Australia, especially in terms of age, composition, and apparent origin. The striking resemblance between the two basements has excited exploration geologists because South Australia is the host for the world-class Olympic Dam deposit discovered in 1975. Olympic Dam is a copper-uranium deposit, that also contains significant amounts of gold, silver, and rare earths.

DGLS (a division of DNR) and the USGS were extremely interested in mapping the Pea Ridge Mine because it is one of only a few sites in the mid-continent region where geologists can examine the buried Precambrian basement in three dimensions. Pea Ridge is referred to as a "blind" orebody because none of it is exposed at the ground surface. The dike-like mass of magnetite is covered by 400 m of overburden and extends almost vertically from the overburden boundary to an unknown depth greater than 1,000 m. The deepest working and development levels are now at 754 m and 815 m, respectively. The Rolla Research Center of the Bureau of Mines is working with the company to determine if it is economically feasible to recover rare earths as a byproduct of the operation.

# U.S. IRON ORE

## MONTHLY PRODUCTION AND SHIPMENTS

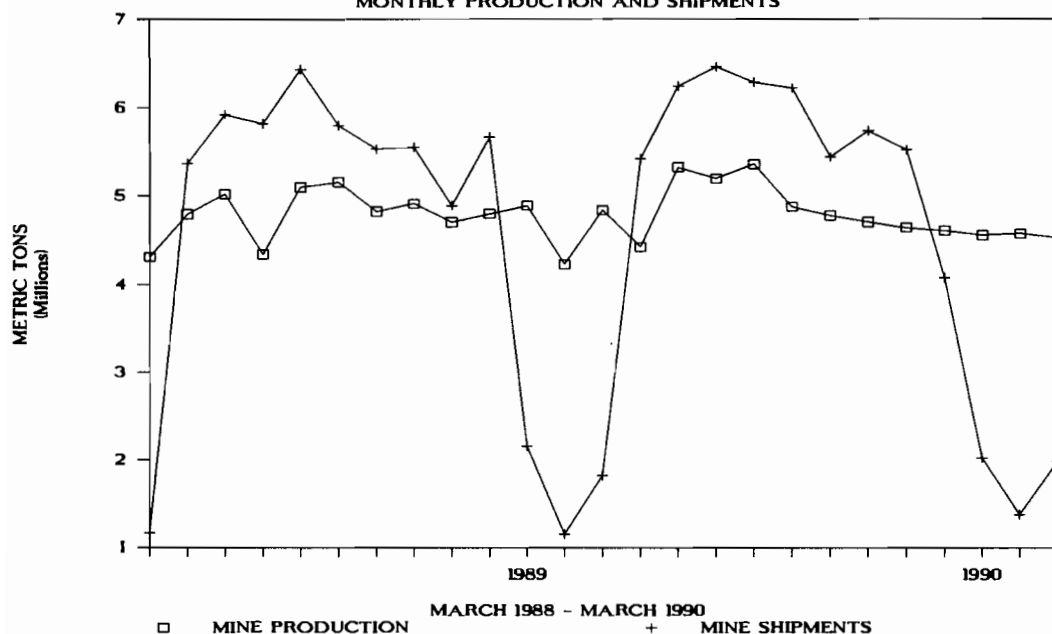


Table 1. - U.S. production and shipments of iron ore, by districts 1/  
(Exclusive of ore containing 5% or more manganese)  
(Thousand metric tons)

Period	Lake Superior	Other U.S.	Total 2/	
			1990	1989
<b>Production:</b>				
1989 p/-----	56,858	1,014	--	57,872
<b>1990:</b>				
January-----	4,481	74	4,555	4,890
February-----	4,509	63	4,572	4,229
March-----	4,436	86	4,522	4,841
<b>Shipments:</b>				
1989 p/-----	55,473	1,057	--	56,530
<b>1990:</b>				
January-----	1,947	74	2,021	2,155
February-----	1,304	73	1,378	1,158
March-----	1,893	82	1,976	1,817

p/ Preliminary.

1/ Excludes byproduct ore, except where noted.

2/ Data may not add to totals shown because of independent rounding.

Table 2. - U.S. mine production, shipments, and stocks of iron ore 1/  
(Exclusive of ore containing 5% or more manganese)  
(Thousand metric tons)

District	Production March		Shipments March		Mine Stocks March 31	
	1990	1989	1990	1989	1990	1989
Lake Superior:						
Michigan-----	1,146	1,510	381	495	3,355	3,552
Minnesota-----	3,290	3,248	1,512	1,269	9,322	8,343
Other U.S.-----	86	84	82	53	133	228
Total 2/-----	4,522	4,841	1,976	1,817	12,810	12,123

1/ Excludes byproduct ore.

2/ Data may not add to totals shown because of independent rounding.

Table 3. - Canada: Shipments of iron ore  
(Thousand dry metric tons)

Period	Newfound- land	Quebec	Ontario	British Columbia	Total 1/	
					1990	1989
1989 p/-----	20,662	15,395	3,353	64	--	39,474
1990:						
January-----	487	534	235	3	1,258	1,772
February-----	430	505	187	3	1,125	2,571
March-----	262	846	255	3	1,366	1,666

p/ Preliminary.

1/ Data may not add to totals shown because of independent rounding.

Source: Energy, Mines, and Resources Canada.

Table 4. - U.S. consumption and stocks of iron ore and agglomerates  
at consuming plants and production of pig iron  
(Thousand metric tons)

State or Region	Consumption			Stocks		
	February	Year to date 1/		February 28		
	1990	1990	1989	1990	1989	
Alabama, Kentucky, Tennessee, Texas, and Missouri-----	503	1,025	929	583	849	
California, Colorado, and Utah	159	322	334	117	47	
Delaware, Maryland, and West Virginia-----	536	1,109	1,403	1,843	1,665	
Illinois and Indiana-----	1,970	4,181	4,773	4,156	4,729	
Michigan and Minnesota-----	571	1,194	1,171	872	2,683	
New York, Ohio, Pennsylvania, New Jersey, Rhode Island----	1,646	3,506	4,059	2,693	2,777	
Total 2/-----	5,385	11,337	12,669	10,265	12,750	
Stocks at U.S. receiving/transfer docks-----				1,426	r/1,606	
Consuming Sector	Consumption by process			Pig iron produced		
	February	Year to date 1/		February	Year to date 1/	
	1990	1990	1989	1990	1990	1989
Blast furnaces-----	4,978	10,516	10,842	3,829	8,036	8,724
Steel furnaces-----	9	19	59	--	--	--
Agglomerating plants 3/-----	398	801	1,767	--	--	--
Miscellaneous 4/-----	1	1	(5/)	--	--	--
Total 2/-----	5,385	11,337	12,669	3,829	8,036	8,724

r/ Revised.

1/ May include revisions for previous month.

2/ Data may not add to totals shown because of independent rounding.

3/ Iron ore and iron ore concentrates consumed in agglomerating plants not located at the mine site.

4/ Sold to nonreporting companies or used for purposes not listed.

5/ Less than one-half unit.

Source: American Iron Ore Association (consumption of iron ore).  
American Iron and Steel Institute (production of pig iron).

Table 5. - U.S. exports of iron ore and agglomerates, by country of destination  
(Thousand metric tons)

Period	Canada	Mexico	Other	Total 1/	
				1990	1989
1989 p/----- 1990	5,345	(2/)	6	--	5,351
January-----	100	--	--	100	344
February-----	248	(2/)	1	250	2

p/ Preliminary.

1/ Data may not add to totals shown because of independent rounding.

2/ Less than one-half unit.

Source: Bureau of the Census data reported under heading 2601 of the export classification system (Schedule B).

Table 6. - U.S. exports of iron ore and agglomerates, by type  
(Thousand metric tons)

Period	Pellets	Concentrates	Direct shipping ores	Other	Total 1/
1989 p/----- 1990	2,873	2,318	145	16	5,351
January-----	81	(2/)	(2/)	19	100
February-----	216	1	1	32	250

p/ Preliminary.

1/ Data may not add to totals shown because of independent rounding.

2/ Less than one-half unit.

Source: Bureau of the Census data reported under heading 2601 of the export classification system (Schedule B).



Table 7. - U.S. imports for consumption of iron ore and agglomerates, by country  
(Exclusive of ore containing 20% or more manganese)

Country of origin	February 1990		Year to date 1990			Year to date 1989
	Thousand metric tons	Value 1/ (thousand dollars)	Thousand metric tons	Value 1/ (thousand dollars)	Value 1/ (dollars per ton)	(thousand metric tons)
Australia-----	--	--	--	--	--	119
Brazil-----	284	6,448	536	10,623	19.82	350
Canada-----	379	14,252	779	29,385	37.70	954
Liberia-----	--	--	--	--	--	65
Mauritania-----	--	--	64	1,102	17.21	69
Norway-----	--	--	--	--	--	40
Peru-----	--	--	2/(5/)	2/9	2/9,428.00	3/19
Philippines 4/--	--	--	--	--	--	66
Venezuela-----	360	9,586	465	13,245	28.49	515
Other -----	2/(5/)	2/2	2/(5/)	2/2	2/1,671.00	(5/)
<b>Total 6/-----</b>	<b>1,023</b>	<b>30,288</b>	<b>1,844</b>	<b>54,366</b>	<b>7/29.48</b>	<b>2,198</b>

1/ Customs value. Excludes international freight, insurance, and other c.i.f. charges

2/ Being questioned.

3/ Includes 32 tons of roasted iron pyrites (2601.20.00). The material had a customs value of \$1,522.

4/ Sinter made from raw materials supplied by Australia, Brazil, and other countries

5/ Less than one-half unit.

6/ Data may not add to totals shown because of independent rounding. Unit values shown above are calculated from unrounded data.

7/ Weighted average calculated by dividing total value by total tonnage.

Source: Bureau of the Census data reported under heading 2601 of the Harmonized Tariff Schedules of the United States.

Table 8. - U.S. imports for consumption of iron ore and agglomerates, by type  
(Exclusive of ore containing 20% or more manganese)

Type of product	February 1990		Year to date 1990			Year to date 1989
	Thousand metric tons	Value 1/ (thousand dollars)	Thousand metric tons	Value 1/ (thousand dollars)	Value 1/ (dollars per ton)	thousand metric tons
Concentrates-----	11	336	12	378	32.74	41
Coarse ores-----	37	915	48	1,491	31.29	(2/)
Fine ores-----	583	16,385	932	23,024	24.70	r/1,319
Pellets-----	392	12,652	853	29,463	34.54	772
Briquettes-----	--	--	--	--	--	--
Other						
agglomerates---	--	--	--	--	--	r/66
Roasted pyrites--	--	--	3/(2/)	3/9	3/9,428.00	(2/)
<b>Total 4/-----</b>	<b>1,023</b>	<b>30,288</b>	<b>1,844</b>	<b>54,366</b>	<b>5/29.48</b>	<b>2,198</b>

r/ Revised.

1/ Customs value. Excludes international freight, insurance, and other c.i.f. charges.

2/ Less than one-half unit.

3/ Being questioned.

4/ Data may not add to totals shown because of independent rounding. Unit values shown above are calculated from unrounded data.

5/ Weighted average calculated by dividing total value by total tonnage.

Source: Bureau of the Census data reported under heading 2601 of the Harmonized Tariff Schedules of the United States.

Table 9. - U.S. imports for consumption of iron ore and agglomerates  
in February 1990  
(Exclusive of ore containing 20% or more manganese)  
(Thousand metric tons)

Country of origin	Type of Product						Total 1/
	Concentrates	Coarse ores	Fine ores	Pellets	Briquettes and other agglomerates	Roasted pyrites	
Brazil-----	11	--	152	122	--	--	284
Canada-----	1	--	215	163	--	--	379
Venezuela---	--	37	216	106	--	--	360
Other---	--	2/(3/)	--	--	--	--	2/(3/)
<b>Total 1/</b>	<b>11</b>	<b>37</b>	<b>583</b>	<b>392</b>	<b>--</b>	<b>--</b>	<b>1,023</b>

1/ Data may not add to totals shown because of independent rounding.

2/ Being questioned.

3/ Less than one-half unit.

Source: Bureau of the Census data reported under heading 2601 of the Harmonized  
Tariff Schedules of the United States.

Table 10. - U.S. imports for consumption of pellets, by country

Country of origin	February 1990		Year to date 1990			Year to date 1989
	Thousand metric tons	Value 1/ (thousand dollars)	Thousand metric tons	Value 1/ (thousand dollars)	Value 1/ (dollars per ton)	(thousand metric tons)
Brazil-----	122	3,337	122	3,337	27.39	26
Canada-----	163	5,936	530	19,654	37.07	476
Peru-----	--	--	--	--	--	19
Venezuela---	106	3,379	201	6,473	32.19	251
<b>Total 2/--</b>	<b>392</b>	<b>12,652</b>	<b>853</b>	<b>29,463</b>	<b>3/34.54</b>	<b>772</b>

1/ Customs value. Excludes international freight, insurance, and other c.i.f. charges.

2/ Data may not add to totals shown because of independent rounding. Unit values shown above are calculated from unrounded data.

3/ Weighted average calculated by dividing total value by total tonnage.

Source: Bureau of the Census data reported under item 2601.12.00.30 of the Harmonized Tariff Schedules of the United States.

Table 11. - U.S. imports for consumption of iron ore and agglomerates,  
by customs district  
(Exclusive of ore containing 20% or more manganese)  
(Thousand metric tons)

Customs district	February 1990	Year to date	
		1990	1989
Baltimore (13)-----	491	651	1/720
Charleston, SC (16)-----	71	71	81
Chicago (39)-----	--	--	113
Detroit (38)-----	--	1	(2/)
Houston-Galveston (53)---	--	--	(2/)
Laredo (23)-----	10	10	--
Los Angeles (27)-----	3/(2/)	3/(2/)	--
Mobile (19)-----	170	231	315
New Orleans (20)-----	11	199	364
New York (10)-----	--	--	(2/)
Ogdensburg, NY (07)--	1	1	1
Philadelphia (11)-----	269	680	604
San Juan, PR (49)-----	(2/)	(2/)	--
Other-----	--	--	1/--
<b>Total 4/-----</b>	<b>1,023</b>	<b>1,844</b>	<b>2,198</b>

1/ Port data for February 1989 were revised. Fine ore from Mauritania totaling 69,158 tons entered the Baltimore Customs District, not the Boston Customs District as was originally reported.

2/ Less than one-half unit.

3/ Being questioned.

4/ Data may not add to totals shown because of independent rounding.

Source: Bureau of the Census data reported under heading 2601 of the Harmonized Tariff Schedules of the United States.

Table 12. - U.S. imports for consumption of pellets, by customs district  
(Thousand metric tons)

Customs district	February 1990	Year to date	
		1990	1989
Baltimore (13)-----	64	64	10
Charleston, SC (16)-----	47	47	45
Chicago (39)-----	--	--	113
Laredo (23)-----	10	10	--
Mobile (19)-----	38	99	--
Philadelphia (11)-----	232	633	604
<b>Total 1/-----</b>	<b>392</b>	<b>853</b>	<b>772</b>

1/ Data may not add to totals shown because of independent rounding.

Source: Bureau of the Census data reported under item 2601.12.00.30  
of the Harmonized Tariff Schedules of the United States.