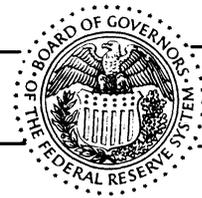


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# FEDERAL RESERVE statistical release

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G.17 (419) Supplement

For immediate release  
February 4, 1994

## INDUSTRIAL PRODUCTION AND CAPACITY UTILIZATION (A REVISION)

The Federal Reserve index of industrial production (IP) and the related measures of capacity and utilization have been updated. The revisions of the estimates of production begin in 1991 and mainly incorporate more comprehensive monthly source data, results of a review of productivity relationships, and updated seasonal factors. The revisions of the capacity indexes and utilization rates begin in 1990 and primarily reflect the results for 1991 and 1992 of the U.S. Bureau of the Census's Survey of Plant Capacity Utilization and a review of the relationships of capacity output to industry capital stocks. The estimates of capital stocks used to prepare the capacity estimates have been updated and improved.

Although estimates for some of the series were revised noticeably, the overall effect on the total production index was very small (in fact, the effect on production estimates cannot be seen in chart 1). For the fourth quarter of 1993, the revised production index was 112.9 percent of 1987 output, compared with 113.1 percent shown previously.<sup>1</sup> Total industrial capacity growth is now estimated to have been about a quarter of a percent per year higher in 1992 and 1993. As a result, the rate of capacity utilization—the ratio of production to capacity—was revised down about half a percentage point, to an estimated 82.3 percent in the fourth quarter of 1993.

Led by continuing strength in the output of computer and office equipment and rebounding production of motor vehicles and parts during the last four months of 1993, industrial output is now estimated to have advanced 4-1/4 percent over the four quarters of the year, more than double the 1.9 percent gain in capacity. As a result, the rate of utilization of industrial capacity rose about 2 percentage points. Utilization of the nation's factories, mines, and utilities is now shown to have surpassed the 1967–93 average by about a percentage point by the end of 1993 but to have remained well below earlier cyclical highs.

### Aspects of the revision

**Industrial Production.** The revisions to the estimates of production reflect (1) the incorporation of monthly, quarterly, and, in some cases, annual output data that were not available in time for inclusion in the monthly publications during the past year; (2) use of updated seasonal adjustment factors;<sup>2</sup> and (3) a review of output indexes based on monthly input measures.

Input measures, either hours worked by production workers or kilowatt-hours of electricity consumed by industry, are used to estimate monthly production indexes for more than half of industrial production. The input-based series were revised in three ways. First, the monthly production worker hours data were updated to include the benchmark adjustments introduced by the Bureau of Labor Statistics in late spring 1993. Second, the

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1. The production and utilization data for the fourth quarter are based on information available as of January 28. These figures are subject to further revision in the monthly statistical releases due to be published on the 15th of February, March, and April.

2. In the seasonal adjustment process, an effort was made to reconcile seasonal factors at the individual and aggregate levels to achieve consistency. For series based on production-worker hours, the current seasonal factors were estimated using data through October 1993; for other series, the factors were estimated using data through July 1993.

data for consumption of electric power by industry were statistically filtered for outliers. Third, new productivity factors based on productivity trends derived from annual input and output data through 1991 were applied to input data since 1991.

By major market group (table 2), output of consumer goods was revised up slightly despite a small downward revision to the rapid gains in the output of consumer durables in 1992 and 1993. Output of nondurable consumer goods advanced over the past three years at an average annual rate of only 1-1/2 percent, even after upward revisions. Growth in production of equipment in both 1992 and 1993 was revised down about a percentage point. The production of business equipment remained relatively strong; the weakness in commercial aircraft and defense and space industries was intensified. The production of industrial materials was revised little, and continues to show an acceleration of growth in 1992 and 1993 after the weakness in 1990 and 1991. The recovery in output of construction supplies was more moderate than had been previously estimated, and the recovery in production of business supplies, which had earlier been shown to be quite weak, was revised up.

By major industry group (table 3), several individual series were revised noticeably for 1992 and 1993. Upward revisions in nondurable manufacturing, particularly printing and publishing, were significant. In contrast, among durable manufacturing industries, downward revisions were noticeable for furniture and fixtures, machinery, miscellaneous manufactures, aerospace and miscellaneous transportation equipment, and stone, clay, and glass products.

Capacity and Capacity Utilization. The capacity indexes, which are designed to accompany the production indexes for major industry groups, have also been revised. Preliminary end-of-year indexes of capacity for many industries are calculated by dividing a production index by a utilization rate obtained from a survey. Thus the revised production indexes, as well as manufacturing utilization rates for the fourth quarters of 1991 and 1992 recently provided by the Bureau of the Census from their Survey of Plant Capacity Utilization, were key factors in updating the Federal Reserve capacity indexes. In addition, output and capacity data that are available in physical units, such as tons of steel and wood pulp or counts of motor vehicles, were updated.

With the exception of 1991, the revised Federal Reserve capacity estimates are generally consistent with the implicit capacity estimates for 1990–92 derived from the Census Bureau's utilization survey (chart 2). The Federal Reserve method of estimating capacity from survey data smooths through the 1991 drop in the implied capacity from the Census survey, in large part because available estimates of the capital stock continued to expand in 1991.<sup>3</sup> A review of the available evidence suggests that the decline in the implied capacity from the Census may be, in part, a cyclical phenomenon.<sup>4</sup> The growth of manufacturing capacity in 1993 was revised upward because the new estimates of the capital stock increased at a slightly faster rate than the previous estimates.

Although capacity indexes for mining, leather, steel, and aerospace and miscellaneous transportation equipment were lowered, capacity growth, on balance, was raised because of upward revisions in capacity for various nondurable manufacturing industries as well as for stone, clay, and glass products, copper, autos and light trucks, and especially computers and office equipment (table 4).

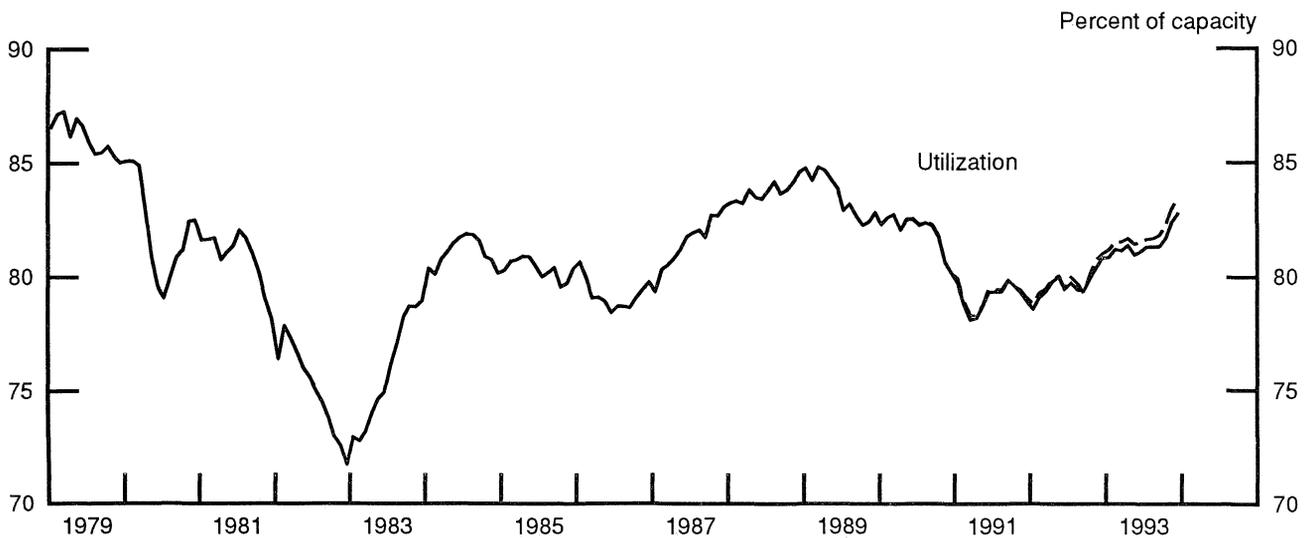
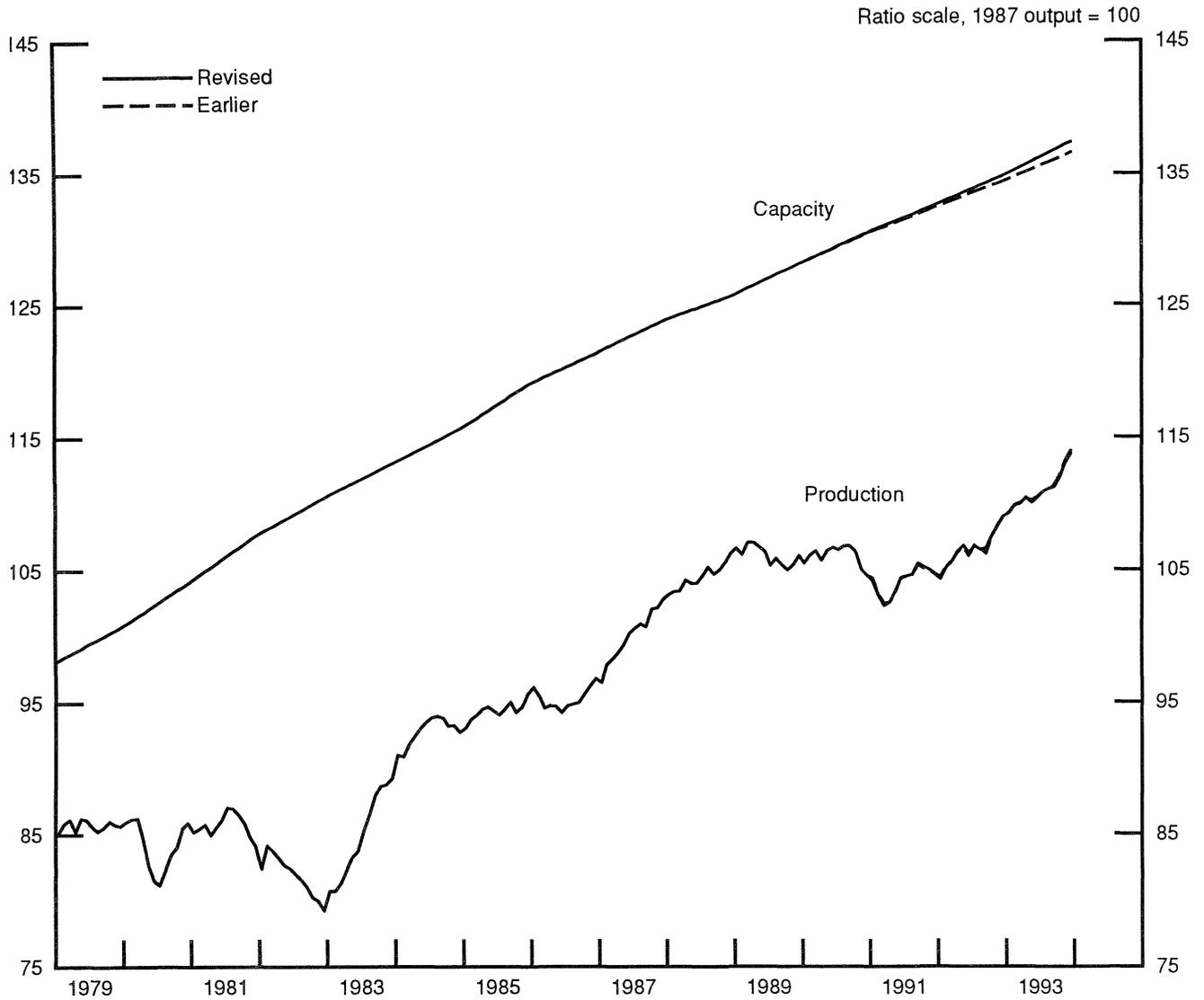
For some industries, revisions in utilization parallel those in the production index. Utilization for durable manufacturing in the fourth quarter of 1993 was lowered about 1-3/4 percentage points, to 80.6 percent

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3. New real net capital stock measures for manufacturing have been estimated using the perpetual inventory method. Elements included are (1) time series of investments in new equipment and structures by three-digit manufacturing industries; (2) corresponding decompositions of the annual investments into twenty-eight asset types; (3) asset-type deflators and service lives; and (4) estimates of losses in capital efficiency due to discards and economic decay as assets age. The capital stock estimates incorporate not only historical investment expenditures through 1991 from the Censuses and Annual Surveys of Manufactures, but also 1992–94 updates based on plant and equipment expenditures and plans reported by the Census Bureau.

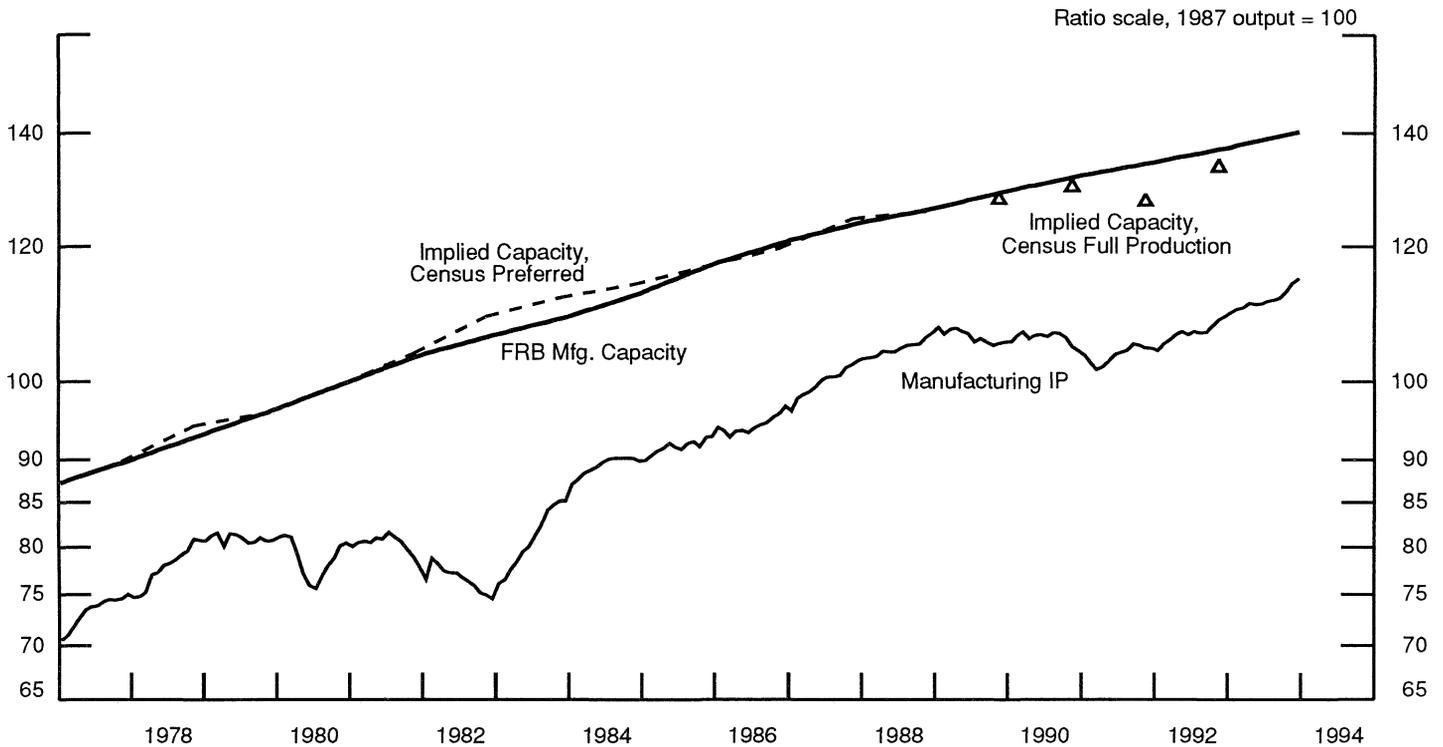
4. The Census questionnaire instructs respondents to define full production capacity in terms of a "normal" level of plant operating hours. However, many industries that reported large declines in implied capacity in 1991 also reported substantial cuts in *actual* plant operating hours, suggesting that the current economic environment may dominate some respondents' perceptions of capacity.

# 1. Industrial production, capacity, and utilization



(table 5). In contrast, utilization for nondurable manufacturing was revised up. Printing and publishing and also furniture and fixtures are examples of industries in which revised production indexes led to revised utilization rates. The largest downward revision in operating rates was for computers and office equipment; this change was based, in part, on the results of the Census survey, which showed that utilization for this industry remained near its average level in late 1992. As a result, capacity growth for computer and office equipment from 1990 to 1993 now averages about 14 percent per year, still below the rapid growth of output in 1992 and 1993.

## 2. FRB Capacity and Census Implied Capacity



The Census survey implied capacity is calculated by dividing IP by the survey utilization rate; to make the result comparable with the FRB capacity, the calculation is adjusted downward by the average difference between the Census utilization rate and McGraw-Hill/DRI utilization rate for 1977 to 1988. Until 1988, the Census preferred utilization rate related actual production to a preferred level of operations; beginning in 1989, the Census changed its definition to full production utilization, which related actual output to full production capability.

### Data Availability and Publication Changes

Diskettes containing either historical data (through 1985) or more recent data (1986 to those most recently published in the G.17 statistical release) are available from Publications Services, Board of Governors of the Federal Reserve System, Washington, DC 20551 (202-452-3245). Files containing the revised data and the text and tables from this release are also available through the Economic Bulletin Board of the Department of Commerce; for information, call 202-482-1986.

A document with printed tables of the revised estimates of series shown in the G.17 release is available upon written request to the Industrial Output Section, Mail Stop 82, Division of Research and Statistics, Board of Governors of the Federal Reserve System, Washington, DC 20551.

Capacity utilization and capacity data are now being published for the computer and office equipment industry. Historical data for these series have been added to the diskettes available; tables showing the histories of the series are also available upon written request from the Industrial Output Section.

Table 1

INDUSTRIAL PRODUCTION, CAPACITY AND UTILIZATION: 1987-1993

Table 1

TOTAL INDUSTRY																		
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Q1	Q2	Q3	Q4	Annual <sup>2</sup>	
<b>Industrial Production, Percent Change</b>																		
1990	.5	.5	.3	-.7	.7	2.2	-2.2	.3	.0	-5	1.3	-4	2.1	1.1	1.6	5.2	.0	
1991	.4	-1.1	-.8	.2	.9	1.9	2.1	.1	.8	-2	-2	-3	-7.8	5.0	5.7	3.3	-1.8	
1992	-.3	.8	.5	.7	.4	-5	.5	-3	.1	.9	.7	.6	.3	5.6	6	6.4	2.3	
1993	.2	.6	.1	.4	-.4	.3	.4	.2	.2	.7	.9	.7	5.2	2.3	2.8	6.8	4.1	
<b>Industrial Production</b>																		
1990	105.5	106.1	106.4	105.7	106.5	106.7	106.5	106.8	106.8	106.3	105.0	104.5	106.0	106.3	106.7	105.3	106.0	
1991	104.2	103.0	102.3	102.5	103.4	104.3	104.5	104.6	105.4	105.2	105.0	104.6	103.2	103.4	104.9	104.9	104.1	
1992	104.3	105.2	105.6	106.4	106.8	106.2	106.8	106.5	106.6	107.5	108.3	109.0	105.0	106.5	106.6	108.3	106.5	
1993	109.2	109.9	110.0	110.5	110.0	110.4	110.9	111.1	111.3	112.0	113.0	113.8	109.7	110.3	111.1	112.9	110.9	
<b>Capacity</b>																		
1990	128.2	128.4	128.6	128.8	129.0	129.2	129.4	129.6	129.8	130.0	130.2	130.4	128.4	129.0	129.6	130.2	129.3	
1991	130.6	130.8	131.0	131.1	131.3	131.5	131.7	131.8	132.0	132.2	132.4	132.6	130.8	131.3	131.8	132.4	131.6	
1992	132.7	132.9	133.1	133.3	133.5	133.7	133.9	134.1	134.3	134.5	134.6	134.8	132.9	133.5	134.1	134.6	133.8	
1993	135.0	135.3	135.5	135.7	135.9	136.1	136.3	136.5	136.8	137.0	137.2	137.4	135.3	135.9	136.5	137.2	136.2	
<b>Utilization</b>																		
1990	82.3	82.6	82.7	82.1	82.5	82.5	82.3	82.4	82.3	81.8	80.6	80.2	82.5	82.4	82.3	80.9	82.0	
1991	79.8	78.8	78.1	78.2	78.7	79.3	79.4	79.4	79.9	79.6	79.3	78.9	78.9	78.8	79.5	79.3	79.1	
1992	78.6	79.1	79.4	79.8	80.0	79.5	79.8	79.4	79.4	80.0	80.4	80.8	79.0	79.8	79.5	80.4	79.7	
1993	80.9	81.2	81.2	81.4	81.0	81.1	81.3	81.4	81.4	81.8	82.4	82.8	81.1	81.2	81.4	82.3	81.5	

MANUFACTURING

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Q1	Q2	Q3	Q4	Annual <sup>2</sup>
<b>Industrial Production, Percent Change</b>																	
1990	-.1	.9	.4	-.9	.5	.0	-.3	.5	-.1	-.6	-1.2	-.5	3.7	.2	1.0	-5.5	-.3
1991	-.7	-1.1	-.9	.3	.8	1.0	.3	.2	.9	-.2	-.3	.0	-9.1	.8	6.9	1.1	-2.2
1992	-.4	.9	.5	.7	.4	-.4	.4	-.1	.1	.9	.8	.5	1.2	6.1	.9	6.5	3.0
1993	.5	.4	.2	.7	-.2	.1	.4	.1	.3	.8	1.1	.7	6.0	3.3	2.4	8.3	4.6
<b>Industrial Production</b>																	
1990	105.5	106.5	107.0	106.0	106.6	106.6	106.3	106.9	106.8	106.2	104.9	104.4	106.3	106.4	106.6	105.1	106.1
1991	103.7	102.6	101.7	102.0	102.8	103.8	104.1	104.3	105.3	105.1	104.8	104.7	102.7	102.9	104.6	104.9	103.7
1992	104.4	105.3	105.9	106.6	107.1	106.7	107.1	106.9	107.0	107.9	108.8	109.3	105.2	106.8	107.0	108.7	106.8
1993	109.9	110.4	110.5	111.3	111.1	111.2	111.6	111.8	112.1	113.0	114.3	115.0	110.3	111.2	111.8	114.1	111.7
<b>Capacity</b>																	
1990	129.6	129.8	130.0	130.3	130.5	130.7	130.9	131.2	131.4	131.6	131.8	132.0	129.8	130.5	131.2	131.8	130.8
1991	132.3	132.5	132.7	132.9	133.1	133.3	133.5	133.7	133.9	134.1	134.3	134.5	132.5	133.1	133.7	134.3	133.4
1992	134.7	134.9	135.2	135.4	135.6	135.8	136.1	136.3	136.5	136.7	137.0	137.2	134.9	135.6	136.3	137.0	135.9
1993	137.4	137.7	137.9	138.2	138.4	138.7	138.9	139.2	139.5	139.7	140.0	140.2	137.7	138.4	139.2	140.0	138.8
<b>Utilization</b>																	
1990	81.4	82.0	82.3	81.4	81.7	81.5	81.2	81.5	81.3	80.7	79.6	79.1	81.9	81.5	81.3	79.8	81.1
1991	78.4	77.4	76.7	76.8	77.2	77.9	78.0	78.0	78.6	78.4	78.0	77.9	77.5	77.3	78.2	78.1	77.8
1992	77.5	78.1	78.3	78.7	78.9	78.5	78.7	78.5	78.4	78.9	79.4	79.7	77.9	78.7	78.5	79.4	78.6
1993	80.0	80.2	80.1	80.6	80.2	80.1	80.3	80.3	80.4	80.9	81.6	82.0	80.1	80.3	80.3	81.5	80.6

1. Estimates from October 1993 through December 1993 are subject to further revision in the upcoming monthly releases.  
 2. Annual averages of industrial production are calculated from not seasonally adjusted indexes.

**Table 2**  
**Rates of growth in industrial production, by major market group, 1990–1993<sup>1</sup>**

Item	Revised index (percent)				Difference between revised and earlier indexes (percentage points)			
	1990	1991	1992	1993	1990	1991	1992	1993
<b>Total index</b>	-.2	-.3	3.2	4.3	.0	.0	.0	-.2
<b>Products, total</b>	-.4	-.6	3.9	4.0	.0	.1	.2	-.3
<b>Final products</b>	-.1	-.1	4.1	4.1	.0	-.1	-.3	-.4
<b>Consumer goods</b>	-1.8	2.3	3.2	2.3	.0	.2	.4	.2
<b>Durable</b>	-8.3	5.0	6.4	9.2	.0	.3	-.2	-.7
Automotive products	-11.7	5.0	11.7	12.6	.0	.1	.8	.0
Other durable goods	-5.4	4.9	2.1	6.2	.0	.4	-1.0	-1.3
<b>Nondurable</b>	.1	1.6	2.4	.4	.0	.2	.6	.4
<b>Equipment, total</b>	2.3	-3.1	5.2	6.6	.0	-.4	-1.4	-.9
<b>Business equipment</b>	3.0	-.5	8.7	10.0	.0	-.1	-1.1	-1.0
Industrial	-1.4	-5.9	3.6	4.1	.0	.0	-2.5	-2.2
Information processing & related	6.2	1.1	16.4	16.1	.0	-.4	.2	.4
Transit	7.0	7.7	-1.1	1.5	.0	.2	-2.2	-1.5
Other	-2.2	-4.8	6.3	10.6	.0	.4	-1.5	-3.5
<b>Defense and space equipment</b>	-.9	-8.7	-10.3	-9.4	.0	-1.2	-2.5	-1.5
<b>Intermediate products</b>	-1.6	-2.5	3.1	3.8	.0	.7	1.5	.2
Construction supplies	-4.3	-4.5	3.4	5.0	.0	.4	-1.0	-1.2
Business supplies	.2	-1.2	2.9	3.0	.0	.9	3.1	1.1
<b>Materials</b>	.2	.1	2.2	4.6	.0	-.1	-.2	-.1
Durable	-.1	-.3	3.4	8.1	.0	-.1	-.6	.0
Nondurable	.7	1.2	2.1	3.2	.0	-.1	-.1	-.1
Energy	.2	-.1	.1	-.8	.0	-.2	.4	-.1

1. Growth rates are calculated as the percent change in the seasonally adjusted index from the fourth quarter of the previous year to the fourth quarter of the year specified in the column heading.

**Table 3**  
**Rates of growth in industrial production, industry groups, 1990–1993<sup>1</sup>**

Item	SIC	Revised index (percent)				Difference between revised and earlier indexes (percentage points)			
		1990	1991	1992	1993	1990	1991	1992	1993
<b>Total index</b>		-.2	-.3	3.2	4.3	.0	.0	.0	-.2
<b>Manufacturing</b>		-.2	-.3	3.6	5.0	.0	.0	-.1	-.2
<b>Primary processing</b>		-1.2	-.7	2.8	4.3	.0	.1	-.1	.0
<b>Advanced processing</b>		.2	-.1	4.0	5.3	.0	.0	-.1	-.2
<b>Durable</b>		-.7	-.9	4.3	7.6	.0	-.1	-1.1	-.7
Lumber and products	24	-8.5	.7	8.4	4.7	.0	.2	1.3	-1.1
Furniture and fixtures	25	-4.2	-1.2	3.7	5.7	.0	-.1	-2.9	-3.2
Stone, clay, and glass products	32	-3.3	-6.7	5.1	3.2	.0	-2	-8	-1.9
Primary metals	33	.9	-3.4	.8	6.4	.0	.5	-.1	.9
Iron and steel	331,2	2.9	-5.2	1.3	8.0	.0	.5	.0	.7
Raw steel		5.6	-8.2	1.7	5.8	.0	-.3	-.1	.2
Nonferrous	333-6,9	-2.0	-.7	.2	4.0	.0	.3	-.2	1.2
Fabricated metal products	34	-3.0	-2.3	1.0	4.9	.0	.0	-1.3	-.1
Industrial machinery and equipment	35	1.7	-2.7	13.3	17.5	.0	-.1	-1.9	-.5
Computer and office equip.	357	11.0	2.0	31.8	33.8	.0	.1	.7	-.6
Electrical machinery	36	-.2	2.5	5.2	11.0	.0	-1.0	-2.9	.2
Transportation equipment	37	-1.2	.6	-.2	3.6	.0	.1	-.4	-1.5
Motor vehicles and parts	371	-7.2	9.4	10.5	16.7	.0	1.2	.3	-1.6
Autos and light trucks		-11.1	12.3	11.2	17.0	.0	.7	2.7	.6
Aerospace and misc.	372-6,9	4.1	-6.2	-10.0	-10.8	.0	-.8	-1.3	-1.8
Instruments	38	2.0	-.5	.0	-2.1	.0	.2	1.6	-.4
Miscellaneous	39	-1.1	.7	.7	2.1	.0	-.4	-2.9	-.8
<b>Nondurable</b>		.4	.5	2.8	1.7	.0	.3	1.1	.5
Foods	20	1.7	1.0	1.9	1.1	.0	.4	1.1	.3
Tobacco products	21	.0	-9.5	9.7	-12.0	.0	-.5	.7	-.5
Textile mill products	22	-5.2	6.7	5.1	1.3	.0	.2	.7	.0
Apparel products	23	-4.6	4.4	.1	-1.7	.0	.3	1.7	1.2
Paper and products	26	2.6	1.2	.1	5.0	.0	.0	.2	.5
Printing and publishing	27	-.7	-2.1	3.1	.9	.0	1.2	5.0	1.4
Chemicals and products	28	1.4	.7	3.3	2.5	.0	-.3	-.5	.5
Petroleum products	29	-.1	-.9	3.5	2.9	.0	.0	.7	-.5
Rubber and plastics products	30	.6	1.2	4.9	5.0	.0	.5	1.1	1.0
Leather and products	31	-7.5	-4.3	.1	-4.1	.0	-1.7	-8.4	-7.3
<b>Mining</b>		2.6	-3.4	-.5	-.6	.0	-.1	.4	-.5
Metal mining	10	4.4	.5	5.1	6.4	.0	-.4	-1.4	1.3
Coal mining	12	1.4	-2.5	-.7	-3.2	.0	-.3	2.0	-1.4
Oil and gas extraction	13	3.0	-3.5	-1.1	-.9	.0	-.1	.2	-.6
Stone and earth minerals	14	.6	-7.5	.6	1.2	.0	.4	-.4	-.3
<b>Utilities</b>		-2.0	2.4	1.9	1.1	.0	-.1	-.1	.4
Electric	491,3pt	-.6	1.2	2.1	.5	.0	-.1	.2	.1
Gas	492,3pt	-6.8	6.9	1.3	3.3	.0	.0	-.9	1.6

1. Growth rates are calculated as the percent change in the seasonally adjusted index from the fourth quarter of the previous year to the fourth quarter of the year specified in the column heading.

**Table 4**  
**Rates of growth in capacity, industry groups, 1990–1993<sup>1</sup>**

Item	SIC	Revised index (percent)				Difference between revised and earlier indexes (percentage points)			
		1990	1991	1992	1993	1990	1991	1992	1993
<b>Total index</b>		1.9	1.7	1.7	1.9	.1	.1	.2	.3
<b>Manufacturing</b>		2.1	1.9	2.0	2.2	.0	.1	.2	.4
<b>Primary processing</b>		1.7	1.1	1.0	1.1	.0	.2	.3	.2
<b>Advanced processing</b>		2.3	2.2	2.4	2.7	.0	.0	.2	.5
<b>Durable</b>		2.1	1.8	2.1	2.6	.0	-.1	.1	.5
Lumber and products	24	.6	.1	.2	.7	.5	1.1	.0	.2
Furniture and fixtures	25	2.2	.7	.8	1.3	.1	.0	-.2	.0
Stone, clay and glass products	32	.7	.3	.9	1.1	.3	.6	.9	1.0
<b>Primary metals</b>	33	.6	-1.0	-1.4	-1.2	.0	-.3	-.4	-1.1
Iron and steel	331,2	.9	-1.2	-2.3	-1.9	.0	.0	-.9	-2.2
Raw steel		.0	-1.6	-2.2	-2.0	.0	.0	-1.0	-2.1
Nonferrous	333-6,9	.0	-.6	-.1	-.1	-.1	-.7	.3	.5
Fabricated metal products	34	.3	-.1	-.2	-.2	-.2	-.2	-.2	-.2
Industrial machinery and equipment	35	4.7	5.3	5.3	5.9	1.7	.9	1.3	1.6
Computer and office equip.	357	15.3	14.4	13.4	14.0	5.8	2.3	3.6	4.1
Electrical machinery	36	3.6	2.7	2.9	5.0	-.5	-.4	-.7	.9
Transportation equipment	37	1.0	.8	2.0	1.3	-.6	-1.0	-.2	.1
Motor vehicles and parts	371	1.1	1.7	3.5	3.6	-.8	-1.1	-.8	.9
Autos and light trucks		.8	1.0	4.8	3.7	-.7	-.7	.4	.6
Aerospace and misc.	372-6,9	.8	-.1	.4	-1.0	-.5	-1.0	.3	-.6
Instruments	38	1.3	1.3	1.4	1.5	-1.0	-.6	-.2	.1
Miscellaneous	39	1.6	1.7	1.7	1.6	-.3	.1	.2	-.5
<b>Nondurable</b>		2.1	2.0	1.8	1.7	.0	.3	.4	.2
Foods	20	1.4	2.1	2.5	2.5	.1	.7	1.0	.9
Tobacco products	21	-.4	-.4	-.4	-.4	-.4	-.4	-.4	-.4
Textile mill products	22	1.6	1.0	1.0	1.7	.3	.2	.4	1.0
Apparel products	23	.1	-.5	-.8	-.8	-.1	-.1	-.2	-.4
Paper and products	26	2.9	2.4	1.8	1.6	.3	.2	.4	.2
Printing and publishing	27	2.9	1.6	.7	.7	.1	.2	.3	-.1
Chemicals and products	28	2.5	2.9	2.6	2.4	-.5	.3	.1	-.3
Petroleum products	29	.9	-.8	-1.3	-.5	.0	.0	.0	.3
Rubber and plastics products	30	4.0	3.4	3.3	3.0	.0	.3	.8	.2
Leather and products	31	-.3.5	-.3.5	-.3.6	-.3.8	-.3	-.2.3	-.2.8	-.3.3
<b>Mining</b>		-1.4	-.6	-1.0	-1.1	.0	.1	.0	-.3
Metal mining	10	5.3	2.2	1.6	1.5	.0	-.3	.2	-.3
Coal mining	12	2.1	2.1	1.0	1.1	.0	.0	-.2	-.4
Oil and gas extraction	13	-.3.0	-.1.5	-.1.9	-.2.0	.0	.2	.0	-.2
Stone and earth minerals	14	-.1	-.5	-.2	-.1	.0	.0	.0	.0
<b>Utilities</b>		2.4	1.4	1.2	1.0	.7	.3	-.1	-.1
Electric	491,3pt	3.2	1.8	1.5	1.4	.9	.4	-.2	.0
Gas	492,3pt	.0	.0	.0	.0	.0	.0	.0	.0

1. Growth rates are calculated as the percent change in the seasonally adjusted index from the fourth quarter of the previous year to the fourth quarter of the year specified in the column heading.

**Table 5**  
**Revised and earlier capacity utilization rates, by industry group**

Percent of capacity, seasonally adjusted

Item	SIC	Revised index				Difference between revised and earlier indexes (percentage points)			
		1967-1993 Ave.	1988-1989 High	1990-1991 Low	1992 Q4	1993 Q4	1990-1991 Low	1992 Q4	1993 Q4
<b>Total industry</b>		81.9	84.8	78.1	80.4	82.3	-.2	-.2	-.6
<b>Manufacturing</b>		81.2	85.1	76.7	79.4	81.5	.1	-.2	-.7
<b>Primary processing</b>		82.2	89.1	78.0	82.3	84.9	.1	-.4	-.6
<b>Advanced processing</b>		80.6	83.3	76.0	78.1	80.1	-.1	-.2	-.7
<b>Durable</b>		79.0	83.9	73.8	76.8	80.6	.0	-.9	-1.8
Lumber and products	24	83.1	93.3	76.2	87.3	90.8	-.7	-.3	-1.5
Furniture and fixtures	25	81.7	86.8	71.6	77.6	80.9	-.1	-2.2	-4.8
Stone, clay, and glass products	32	77.8	83.7	71.6	75.5	77.1	.6	-2.2	-4.6
<b>Non-durable</b>		80.0	92.9	74.4	82.2	88.5	.1	1.0	2.7
Primary metals	33	80.0	92.9	74.4	82.2	88.5	.1	1.0	2.7
Iron and steel	331,2	79.7	95.7	72.2	82.1	90.3	-.1	1.3	3.8
Raw steel		79.2	92.7	71.4	81.7	88.2	.2	.6	2.6
Nonferrous	333-6,9	80.9	88.9	75.8	82.3	85.7	-.1	.5	1.2
Fabricated metal products	34	77.2	82.0	72.0	74.5	78.3	.2	-.6	-.5
Industrial machinery and equipment	35	80.8	83.7	71.4	77.3	85.8	-1.7	-4.4	-6.6
Computer and office equip.	357	80.5	84.4	63.4	74.4	87.4	-4.0	-7.6	-12.9
Electrical machinery	36	80.4	84.9	77.3	79.6	84.1	.6	-1.6	-2.3
<b>Transportation equipment</b>		74.9	84.2	70.5	73.1	74.8	.4	1.1	.0
Motor vehicles and parts	371	75.7	84.5	57.3	74.9	84.4	-.6	2.9	1.4
Autos and light trucks <sup>1</sup>			89.6	53.7	75.8	85.6	.0	1.0	1.1
Aerospace and misc.	372-6,9	75.5	88.3	78.5	71.2	64.1	.4	-.8	-1.6
Instruments	38	82.0	81.2	76.1	75.8	73.1	1.1	2.7	2.2
Miscellaneous	39	75.6	80.1	72.9	74.8	75.2	.0	-2.4	-2.7
<b>Nondurable</b>		83.5	86.8	80.4	82.8	82.8	.0	.6	.9
Foods	20	82.3	83.3	80.8	81.0	79.8	.0	-.2	-.7
Tobacco products	21	91.6	102.4	79.3	92.5	81.8	-.3	1.3	1.0
Textile mill products	22	86.2	92.1	78.5	90.0	89.6	-.2	-.1	-1.1
Apparel products	23	81.1	84.2	74.9	80.5	79.7	.3	1.9	3.2
Paper and products	26	89.7	94.9	86.3	87.7	90.7	.3	-.7	-.5
Printing and publishing	27	86.5	92.3	78.5	81.7	81.9	.1	4.4	5.6
Chemicals and products	28	80.0	85.9	79.4	80.9	81.0	.9	-.6	.1
Petroleum products	29	85.5	88.5	84.5	90.3	93.5	.4	.6	.0
Rubber and plastics products	30	83.6	90.5	78.3	82.7	84.3	-.2	.4	1.1
Leather and products	31	81.9	83.8	76.4	81.9	81.6	.9	-3.5	-6.9
<b>Mining</b>		87.4	87.0	86.8	87.6	88.0	.0	.1	-.1
Metal mining	10	78.3	87.5	80.0	85.9	90.1	.6	-1.4	.0
Coal mining	12	87.0	91.4	82.9	83.1	79.6	-.2	1.6	.7
Oil and gas extraction	13	88.3	86.9	87.8	90.0	91.1	.0	-.1	-.3
Stone and earth minerals	14	83.8	90.0	77.9	79.5	80.5	.3	.0	-.3
<b>Utilities</b>		86.7	92.6	83.1	86.2	86.3	-.3	-.8	-.4
Electric	491,3pt	88.8	94.8	86.3	88.0	87.3	-1.1	-.9	-.8
Gas	492,3pt	82.5	85.5	68.3	80.1	82.7	.0	-.6	.6

1. Series begins in 1977.

Note—The "high" columns refer to periods in which utilization generally peaked; the "low" columns refer to recession years in which utilization generally bottomed out. The monthly highs and lows are specific to each series, and all did not occur in the same month.

## Explanatory Note

The statistical release of **Industrial Production and Capacity Utilization** reports measures of output, capacity, and capacity utilization in manufacturing, mining, and the electric and gas utilities industries. It also includes survey data on the use of electric power in manufacturing and mining. Data in the release are available on-line on the day of issue through the Economic Bulletin Board of the Department of Commerce. For information, call (202) 482-1986. Diskettes containing historical data and the data published in this release are available from the Board of Governors of the Federal Reserve System, Publications Services, (202) 452-3245.

## Industrial Production

**Coverage.** The industrial production (IP) index measures output in the manufacturing, mining, and electric and gas utilities industries. For the period since 1987, the total IP index has been constructed from 255 individual series based on the 1987 Standard Industrial Classification (SIC). These individual series are classified and grouped in two ways: (1) market groups (shown in table 1), such as consumer goods, equipment, intermediate products, and materials; and (2) industry groups (shown in tables 2 and 6), such as two-digit SIC industries and major aggregates of these industries—for example, durable and nondurable manufacturing, mining, and utilities.

**Market groups.** For purposes of analysis, the individual IP series are grouped into final products, intermediate products, and materials. Final products are assumed to be purchased by consumers, businesses, or government for final use. Intermediate products are expected to become inputs in nonindustrial sectors, such as construction, agriculture, and services. Materials are industrial output requiring further processing within the industrial sector. Total products comprise final and intermediate products, and final products are divided into consumer goods and equipment.

**Timing.** The first estimate of output for a month is published around the 15th of the following month. The estimate is preliminary (denoted by the superscript "p" in tables) and subject to revision in each of the subsequent three months as new source data become available. (Revised estimates are denoted by the superscript "r" in tables.) After the fourth month, indexes are not revised further until the time of an annual revision or a benchmark revision. The last three benchmark revisions were published in 1990, 1985, and 1976. In 1993, a revision that converted the indexes to the 1987 SIC from 1987 forward was published.

**Source data.** In annual or benchmark revisions, the individual IP indexes are constructed from a variety of source data, such as the quinquennial *Censuses of Manufactures and Mineral Industries* and the *Annual Survey of Manufactures*, prepared by the Bureau of the Census; the *Minerals Yearbook*, prepared by the Bureau of Mines; and publications of the Department of Energy. On a monthly basis, the individual indexes of industrial production are constructed from two main types of source data: (1) output measured in physical units and (2) data on inputs to the production process, from which output is inferred. Data on physical products, such as tons of steel or barrels of oil, are obtained from private trade associations as well as from government agencies including those listed above; data of this type are used to estimate monthly IP where possible and appropriate. When suitable data on physical product are unavailable, estimates of output are based on either production-worker hours or electric power use by industry. Data on hours worked by production workers are collected in the monthly establishment survey conducted by the Bureau of Labor Statistics. The data on electric power use are described below. The factors used to convert inputs into estimates of production are based on historical relationships between the inputs and the comprehensive data used to benchmark the IP indexes; these factors also may be influenced by technological or cyclical developments. Especially for the first and second estimates for a given month, the available source data are limited and subject to revision.

**Weights.** In the index, series that measure the output of an individual industry are weighted according to their proportion in the total value-added output of all industries. The industrial production index, which extends back to 1919, is built in chronological segments that are linked together to form a continuous index expressed as a percentage of output in a comparison base year (currently 1987). Each segment, which usually spans five years, is a Laspeyres quantity index showing changes in quantities with prices (Census value added per unit of output) held at base-year values for the segment. For the period from 1987 to the present, IP is aggregated on the basis of 1987 value-added weights. The aggregation of the index for the 1982-86 period is based on 1982 weights, whereas 1977 weights are used for the 1977-81 period. The other weight years in the postwar period are 1972, 1967, 1963, 1958, 1954, and 1947. The 1987 value-added weights used to aggregate the index are shown in the first column of tables 1, 2, and 6, in the "1987" column under the heading "Proportion in total IP." To the extent that a given industry grows faster (slower) than the total index after 1987, its current proportion will rise (fall). Proportions for the most recent complete year of data are shown in the second column of tables 1, 2, and 6.

**Seasonal adjustment.** Individual series are seasonally adjusted by the X-11 ARIMA method, developed at Statistics Canada. For series based on production-worker hours, the current seasonal factors were estimated with data through October 1993; for other series, the factors were estimated with data through July 1993. In some cases, series were preadjusted for the effects of holidays or the business cycle before using X-11 ARIMA. The seasonally adjusted total index is calculated by

aggregating the seasonally adjusted major market groups, and may not precisely equal an aggregation of the seasonally adjusted industry groups.

**Reliability.** The average revision to the level of the total IP index, without regard to sign, between the preliminary estimate and its third revision (or from the first and the fourth estimates) was 0.35 percent during the 1972-92 period. The average revision to the percent change in total IP, without regard to sign, from the first to the fourth estimates was 0.26 percentage point during the same period. In most cases (about 85 percent), the direction of change in output indicated by the first estimate for a given month is the same as that shown by the fourth estimate.

**Rounding.** In some cases, components may not add to totals because of independent rounding. In addition, the published percent changes are calculated from unrounded indexes, and may not be the same as percent changes calculated from the rounded indexes shown in the release.

**References.** *Industrial Production—1986 Edition* contains a more detailed description of the methods used to compile the index, plus a history of its development, a glossary of terms, and a bibliography. To obtain *Industrial Production—1986 Edition* (\$9.00 per copy), write to Board of Governors of the Federal Reserve System, Publications Services, Washington, DC 20551. The 1990 and 1993 revisions were described in the *Federal Reserve Bulletin*, vol. 76 (April 1990), pp. 187-204 and vol. 79 (June 1993), pp. 590-605, respectively.

## Capacity Utilization

**Definition.** Capacity utilization is calculated for the manufacturing, mining, and electric and gas utilities industries. For a given industry, the utilization rate is equal to an output index divided by a capacity index. Output is measured by seasonally adjusted indexes of industrial production. The capacity indexes attempt to capture the concept of sustainable practical capacity, which is defined as the greatest level of output that a plant can maintain within the framework of a realistic work schedule, taking account of normal downtime, and assuming sufficient availability of inputs to operate the machinery and equipment in place. The 75 individual capacity indexes are based on a variety of data, including capacity data measured in physical units compiled by trade associations, surveys of utilization rates and investment, and estimates of growth of the capital stock.

**Groups.** Estimates of capacity and utilization are available for a variety of groups, including primary and advanced processing industries within manufacturing, durable and nondurable manufacturing, total manufacturing, mining, utilities, and total industry. Component industries of the primary and advanced processing groups within manufacturing are listed in the note on tables 2 and 3 of the release.

**Weights.** Value-added proportions are used to weight the individual capacity indexes in aggregations in the same manner as individual IP series are aggregated to the total index of industrial production. Although each utilization rate is the result of dividing an IP series by a corresponding capacity index, aggregate utilization rates are equivalent to combinations of individual utilization rates aggregated with proportions that reflect current capacity levels of output valued in base-period value-added per unit of actual output. The implied proportions of individual industry operating rates in the rate for total industry for the most recent year are shown in the first column of table 3.

**Perspective.** The historical highs and lows in capacity utilization shown in the tables above are specific to each series and did not all occur in the same month. Industrial plants usually operate at capacity utilization rates that are well below 100 percent: none of the broad aggregates has ever reached 100 percent. For total industry and total manufacturing, utilization rates as high as 90 percent have been exceeded only in wartime.

**References.** The basic methodology used to estimate capacity and utilization is discussed in the *Federal Reserve Bulletin*, vol. 71 (October 1985), pp. 754-66. The 1990 and 1993 revisions were described in the *Federal Reserve Bulletin*, vol. 76 (June 1990), pp. 412-35 and vol. 79 (June 1993), pp. 590-605, respectively.

## Electric Power

Data on electric power (expressed in kilowatt hours) are collected by the Federal Reserve District Banks from electric utilities and also from manufacturing and mining establishments that generate electric power for their own use (cogenerators). The indexes of power use shown in table 9 are sums of kilowatt hours used by an industry or industry group expressed as a percentage of that industry's or group's usage in 1987. The first column of the table shows, for reference, electric power use in billions of kilowatt hours as reported by manufacturing and mining industries in the 1987 censuses of those industries. The supplementary group, "Total, less nuclear nondefense," is shown separately because the nondefense nuclear material series (part of SIC 2819) accounts for a disproportionately large part of total electric power use. Because the value-added proportion for this industry in total IP is considerably smaller than its share of total electric power use, excluding this component from total power use facilitates comparisons with total IP.

## Release Schedule for 1994

At 9:15 a.m. on January 14, February 15, March 15, April 15, May 16, June 15, July 15, August 15, September 16, October 14, November 15, and December 14.