

# Petroleum Refineries: 2002

Issued December 2004

EC02-311-324110 (RV)

## 2002 Economic Census

*Manufacturing*

Industry Series



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U.S. Department of Commerce  
Economics and Statistics Administration  
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Secretary

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-- Not applicable for this report.

# Introduction to the Economic Census

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## **PURPOSES AND USES OF THE ECONOMIC CENSUS**

The economic census is the major source of facts about the structure and functioning of the nation's economy. It provides essential information for government, business, industry, and the general public. Title 13 of the United States Code (Sections 131, 191, and 224) directs the Census Bureau to take the economic census every 5 years, covering years ending in "2" and "7."

The economic census furnishes an important part of the framework for such composite measures as the gross domestic product estimates, input/output measures, production and price indexes, and other statistical series that measure short-term changes in economic conditions. Specific uses of economic census data include the following:

- Policymaking agencies of the federal government use the data to monitor economic activity and to assess the effectiveness of policies.
- State and local governments use the data to assess business activities and tax bases within their jurisdictions and to develop programs to attract business.
- Trade associations study trends in their own and competing industries, which allows them to keep their members informed of market changes.
- Individual businesses use the data to locate potential markets and to analyze their own production and sales performance relative to industry or area averages.

## **INDUSTRY CLASSIFICATIONS**

Data from the 2002 Economic Census are published primarily according to the 2002 North American Industry Classification System (NAICS). NAICS was first adopted in the United States, Canada, and Mexico in 1997. The 2002 Economic Census covers the following NAICS sectors:

21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
81	Other Services (except Public Administration)

(Not listed above are the Agriculture, Forestry, Fishing, and Hunting sector (NAICS 11), partially covered by the census of agriculture conducted by the U.S. Department of Agriculture, and the Public Administration sector (NAICS 92), largely covered by the census of governments conducted by the Census Bureau.)

The 20 NAICS sectors are subdivided into 100 subsectors (three-digit codes), 317 industry groups (four-digit codes), and, as implemented in the United States, 1,179 industries (six-digit codes).

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## **RELATIONSHIP TO HISTORICAL INDUSTRY CLASSIFICATIONS**

Prior to the 1997 Economic Census, data were published according to the Standard Industrial Classification (SIC) system. While many of the individual NAICS industries correspond directly to industries as defined under the SIC system, most of the higher level groupings do not. Particular care should be taken in comparing data for retail trade, wholesale trade, and manufacturing, which are sector titles used in both NAICS and SIC, but cover somewhat different groups of industries. The 1997 Economic Census *Bridge Between NAICS and SIC* demonstrates the relationships between NAICS and SIC industries. Where changes are significant, it may not be possible to construct time series that include data for points both before and after 1997.

Most industry classifications remained unchanged between 1997 and 2002, but NAICS 2002 includes substantial revisions within the construction and wholesale trade sectors, and a number of revisions for the retail trade and information sectors. These changes are noted in industry definitions and will be demonstrated in the *Bridge Between NAICS 2002 and NAICS 1997*.

For 2002, data for enterprise support establishments (those functioning primarily to support the activities of their company's operating establishments, such as a warehouse or a research and development laboratory) are included in the industry that reflects their activities (such as warehousing). For 1997, such establishments were termed auxiliaries and were excluded from industry totals.

## **BASIS OF REPORTING**

The economic census is conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each store, factory, shop, or other location. Each establishment is assigned a separate industry classification based on its primary activity and not that of its parent company. (For selected industries, only payroll, employment, and classification are collected for individual establishments, while other data are collected on a consolidated basis.)

## **GEOGRAPHIC AREA CODING**

Accurate and complete information on the physical location of each establishment is required to tabulate the census data for states, metropolitan and micropolitan statistical areas, counties, and corporate municipalities (places) including cities, towns, townships, villages, and boroughs. Respondents were required to report their physical location (street address, municipality, county, and state) if it differed from their mailing address. For establishments not surveyed by mail (and those single-establishment companies that did not provide acceptable information on physical location), location information from administrative sources is used as a basis for coding.

## **AVAILABILITY OF ADDITIONAL DATA**

All results of the 2002 Economic Census are available on the Census Bureau Internet site ([www.census.gov](http://www.census.gov)) and on digital versatile discs (DVD-ROMs) for sale by the Census Bureau. The American FactFinder system at the Internet site allows selective retrieval and downloading of the data. For more information, including a description of reports being issued, see the Internet site, write to the U.S. Census Bureau, Washington, DC 20233-6100, or call Customer Services at 301-763-4100.

## **HISTORICAL INFORMATION**

The economic census has been taken as an integrated program at 5-year intervals since 1967 and before that for 1954, 1958, and 1963. Prior to that time, individual components of the economic census were taken separately at varying intervals.

The economic census traces its beginnings to the 1810 Decennial Census, when questions on manufacturing were included with those for population. Coverage of economic activities was expanded for the 1840 Decennial Census and subsequent censuses to include mining and some commercial activities. The 1905 Manufactures Census was the first time a census was taken apart

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from the regular decennial population census. Censuses covering retail and wholesale trade and construction industries were added in 1930, as were some service trades in 1933. Censuses of construction, manufacturing, and the other business censuses were suspended during World War II.

The 1954 Economic Census was the first census to be fully integrated, providing comparable census data across economic sectors and using consistent time periods, concepts, definitions, classifications, and reporting units. It was the first census to be taken by mail, using lists of firms provided by the administrative records of other federal agencies. Since 1963, administrative records also have been used to provide basic statistics for very small firms, reducing or eliminating the need to send them census report forms.

The range of industries covered in the economic census expanded between 1967 and 2002. The census of construction industries began on a regular basis in 1967, and the scope of service industries, introduced in 1933, was broadened in 1967, 1977, and 1987. While a few transportation industries were covered as early as 1963, it was not until 1992 that the census broadened to include all of transportation, communications, and utilities. Also new for 1992 was coverage of financial, insurance, and real estate industries. With these additions, the economic census and the separate census of governments and census of agriculture collectively covered roughly 98 percent of all economic activity. New for 2002 is coverage of four industries classified in the agriculture, forestry, and fishing sector under the SIC system: landscape architectural services, landscaping services, veterinary services, and pet care services.

Printed statistical reports from the 1992 and earlier censuses provide historical figures for the study of long-term time series and are available in some large libraries. Reports for 1997 were published primarily on the Internet and copies of 1992 reports are also available there. CD-ROMs issued from the 1987, 1992, and 1997 Economic Censuses contain databases that include all or nearly all data published in print, plus additional statistics, such as ZIP Code statistics, published only on CD-ROM.

#### **SOURCES FOR MORE INFORMATION**

More information about the scope, coverage, classification system, data items, and publications for the 2002 Economic Census and related surveys is published in the *Guide to the 2002 Economic Census* at [www.census.gov/econ/census02/guide](http://www.census.gov/econ/census02/guide). More information on the methodology, procedures, and history of the census will be published in the *History of the 2002 Economic Census* at [www.census.gov/econ/www/history.html](http://www.census.gov/econ/www/history.html).



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# Manufacturing

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## SCOPE

The Manufacturing sector (sector 31-33) comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The assembling of component parts of manufactured products is considered manufacturing, except in cases where the activity is appropriately classified in Sector 23, Construction.

Establishments in the manufacturing sector are often described as plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. However, establishments that transform materials or substances into new products by hand or in the worker's home and those engaged in selling to the general public products made on the same premises from which they are sold, such as bakeries, candy stores, and custom tailors, may also be included in this sector. Manufacturing establishments may process materials or may contract with other establishments to process their materials for them. Both types of establishments are included in manufacturing.

The materials, substances, or components transformed by manufacturing establishments are raw materials that are products of agriculture, forestry, fishing, mining, or quarrying, as well as products of other manufacturing establishments. The materials used may be purchased directly from producers, obtained through customary trade channels, or secured without recourse to the market by transferring the product from one establishment to another, under the same ownership. The new product of a manufacturing establishment may be finished in the sense that it is ready for utilization or consumption, or it may be semifinished to become an input for an establishment engaged in further manufacturing. For example, the product of the alumina refinery is the input used in the primary production of aluminum; primary aluminum is the input to an aluminum wire drawing plant; and aluminum wire is the input for a fabricated wire product manufacturing establishment.

The subsectors in the manufacturing sector generally reflect distinct production processes related to material inputs, production equipment, and employee skills. In the machinery area, where assembling is a key activity, parts and accessories for manufactured products are classified in the industry of the finished manufactured item when they are made for separate sale. For example, a replacement refrigerator door would be classified with refrigerators and an attachment for a piece of metal working machinery would be classified with metal working machinery. However, components, input from other manufacturing establishments, are classified based on the production function of the component manufacturer. For example, electronic components are classified in Subsector 334, Computer and Electronic Product Manufacturing; and stampings are classified in Subsector 332, Fabricated Metal Product Manufacturing.

Manufacturing establishments often perform one or more activities that are classified outside the manufacturing sector of NAICS. For instance, almost all manufacturing has some captive research and development or administrative operations, such as accounting, payroll, or management. These captive services are treated the same as captive manufacturing activities. When the services are provided by separate establishments, they are classified to the NAICS sector where such services are primary, not in manufacturing.

The boundaries of manufacturing and the other sectors of the classification system can be somewhat blurry. The establishments in the manufacturing sector are engaged in the transformation of materials into new products. Their output is a new product. However, the definition of what constitutes a new product can be somewhat subjective. As clarification, the following activities are

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considered manufacturing in NAICS: milk bottling and pasteurizing; water bottling and processing; fresh fish packaging (oyster shucking, fish filleting); apparel jobbing (assigning of materials to contract factories or shops for fabrication or other contract operations); as well as contracting on materials owned by others; printing and related activities; ready-mixed concrete production; leather converting; grinding of lenses to prescription; wood preserving; electroplating, plating, metal heat treating, and polishing for the trade; lapidary work for the trade; fabricating signs and advertising displays; rebuilding or remanufacturing machinery (i.e., automotive parts); ship repair and renovation; machine shops; and tire retreading.

**Exclusions.** There are activities that are sometimes considered manufacturing, but for NAICS are classified in another sector. These activities include logging, classified in Sector 11, Agriculture, Forestry, Fishing and Hunting is considered a harvesting operation; the beneficiating of ores and other minerals, classified in Sector 21, Mining, is considered part of the activity of mining; the construction of structures and fabricating operations performed at the site of construction by contractors, is classified in Sector 23, Construction; establishments engaged in breaking of bulk and redistribution in smaller lots, including packaging, repackaging, or bottling products, such as liquors or chemicals; the customized assembly of computers; sorting of scrap; mixing paints to customer order; and cutting metals to customer order, classified in Sector 42, Wholesale Trade or Sector 44-45, Retail Trade, produce a modified version of the same product, not a new product; and publishing and the combined activity of publishing and printing, classified in Sector 51, Information, perform the transformation of information into a product where as the value of the product to the consumer lies in the information content, not in the format in which it is distributed (i.e., the book or software diskette).

The tabulations for this sector do not include central administrative offices, warehouses, or other establishments that serve manufacturing establishments within the same organization. Data for such establishments are classified according to the nature of the service they provide. For example, separate headquarters establishments are reported in NAICS Sector 55, Management of Companies and Enterprises.

The reports described below exclude establishments of firms with no paid employees. These “nonemployers,” typically self-employed individuals or partnerships operating businesses that they have not chosen to incorporate, are reported separately in Nonemployer Statistics. The contribution of nonemployers, relatively small for this sector, may be examined at [www.census.gov/nonemployerimpact](http://www.census.gov/nonemployerimpact).

The reports described below cover all manufacturing establishments with one or more paid employees.

**Definitions.** Industry categories are defined in Appendix B, NAICS Codes, Titles, and Descriptions. Other terms are defined in Appendix A, Explanation of Terms.

## REPORTS

The following reports provide statistics on this sector:

**Industry Series.** There are 473 reports, each covering a single NAICS industry (six-digit code). These reports include such statistics as number of establishments, employment, payroll, value added by manufacture, cost of materials consumed, value of shipments, capital expenditures, etc. The industry reports also include data for states with 100 employees or more in the industry. The data in industry reports are preliminary and subject to change in the following reports.

**Geographic Area Series.** There are 51 separate reports, one for each state and the District of Columbia. Each state report presents similar statistics at the “all manufacturing” level for each state and its metropolitan and micropolitan areas with 250 employees or more, and for counties, consolidated cities, and places with 500 employees or more. The state reports also include six-digit NAICS level data for industries with 100 employees or more in the state.

### Subject Series:

x Manufacturing

2002 Economic Census

- **Industry-Product Analysis Summary.** This report presents value of shipments, value of product shipments, percentage of product shipments of the total value of shipments, and percentage of distribution of value of product shipments on the NAICS six-digit industry level and by the six- and seven-digit product code levels. It also includes miscellaneous receipts at the six- and seven-digit product code levels by NAICS six-digit industry levels.
- **General Summary.** This report contains industry and geographic area statistics summarized in one report. It includes higher levels of aggregation than the industry and state reports, as well as revisions to the data made after the release of the industry and state reports.
- **Product Summary.** This report summarizes the products data published in the industry reports. This report also includes a table with data for products that are primary to more than one industry, which are not in the industry reports.
- **Materials Summary.** This report summarizes the materials data published in the industry reports.
- **Concentration Ratio Summary.** This report publishes data on the percentage of value of shipments and value added accounted for by the 4-, 8-, 20-, and 50-largest companies for each manufacturing industry. Also shown in this report are Herfindahl-Herschmann indexes for each industry.
- **Location of Manufacturing Plants Summary.** This report contains statistics on the number of establishments for the three- and six-digit NAICS industry by state, county, place, and ZIP Code by employment-size of the establishment.

**ZIP Code Statistics.** This report contains statistics on the number of establishments for the three- and six-digit NAICS industry by employment-size of the establishment by ZIP Code.

**Other reports.** Data for this sector are also included in reports with multisector coverage, including Nonemployer Statistics, Comparative Statistics, Bridge Between 2002 NAICS and 1997 NAICS, Business Expenses, and the Survey of Business Owners reports.

## GEOGRAPHIC AREAS COVERED

The level of geographic detail varies by report. Maps are available at [www.census.gov/econ2002maps](http://www.census.gov/econ2002maps). Notes specific to areas in the state are included in Appendix D, Geographic Notes.

1. The United States as a whole.
2. States and the District of Columbia.
3. Metropolitan and micropolitan statistical areas with 250 employees or more. A core based statistical areas (CBSA) contains a core area with a substantial population nucleus, together with adjacent communities having a high degree of social and economic integration with that core. CBSAs are differentiated into metropolitan and micropolitan statistical areas based on size criteria. Both metropolitan and micropolitan areas are defined in terms of entire counties, and are listed in Appendix E, Metropolitan and Micropolitan Statistical Areas.
  - a. Metropolitan Statistical Areas (metro areas). Metro areas have at least one urbanized area of 50,000 or more population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties.
  - b. Micropolitan Statistical Areas (micro areas). Micro areas have at least one urban cluster of at least 10,000 but less than 50,000 population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties.
  - c. Metropolitan Divisions (metro divisions). If specified criteria are met, a metro area containing a single core with a population of 2.5 million or more may be subdivided to form smaller groupings of counties referred to as Metropolitan Divisions.

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- d. Combined Statistical Areas (combined areas). If specified criteria are met, adjacent metro and micro areas, in various combinations, may become the components of a new set of areas called Combined Statistical Areas. The areas that combine retain their own designations as metro or micro areas within the larger combined area.
4. Counties and county equivalents defined as of January 1, 2002, with 500 employees or more. Counties are the primary divisions of states, except in Louisiana where they are called parishes and in Alaska where they are called boroughs, census areas, and city and boroughs. Maryland, Missouri, Nevada, and Virginia have one place or more that is independent of any county organization and constitutes primary divisions of their states. These places are treated as counties and as places.
  5. Economic places with 500 employees or more.
    - a. Municipalities of 2,500 inhabitants or more defined as of January 1, 2002. These are areas of significant population incorporated as cities, boroughs, villages, or towns according to the 2000 Census of Population. For the economic census, boroughs and census areas in Alaska and boroughs in New York are not included in this category.
    - b. Consolidated cities defined as of January 1, 2002. Consolidated cities are consolidated governments that consist of separately incorporated municipalities.
    - c. Townships in Michigan, New Jersey, and Pennsylvania, and towns in New York, Wisconsin, and the six New England states with 10,000 inhabitants or more (according to the 2000 Census of Population).
    - d. Balance of county. Areas outside the entities listed above, including incorporated municipalities with populations of fewer than 2,500, town and townships not qualifying as noted above, and the remainders of counties outside places are categorized as "Balance of county."

## **DOLLAR VALUES**

All dollar values presented are expressed in current dollars; i.e., 2002 data are expressed in 2002 dollars, and 1997 data, in 1997 dollars. Consequently, when making comparisons with prior years, users of the data should consider the changes in prices that have occurred.

All dollar values are shown in thousands of dollars.

## **COMPARABILITY OF THE 1997 AND 2002 ECONOMIC CENSUSES**

Both the 2002 Economic Census and the 1997 Economic Census present data based on the North American Industry Classification System (NAICS). While there were revisions to selected industries for 2002, this sector is not affected by those revisions.

For 2002, there have been several additional data tables added, which did not exist in 1997. These tables for 2002 include products primary to more than one industry, industry-product analysis, e-commerce value of shipments, and leased and nonleased detail employment statistics by subsectors.

## **RELIABILITY OF DATA**

All data compiled for this sector are subject to nonsampling errors. Nonsampling errors can be attributed to many sources: inability to identify all cases in the actual universe; definition and classification difficulties; differences in the interpretation of questions; errors in recording or coding the data obtained; and other errors of collection, response, coverage, processing, and estimation for missing or misreported data. Selected data in tables titled "Detailed Statistics" are based on the Annual Survey of Manufactures and are subject to sampling errors as well as nonsampling errors.

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No direct measurement of these effects has been obtained except for estimation for missing or misreported data, as by the percentages shown in the tables. Precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize the effects of nonsampling errors. More information on the reliability of the data is included in Appendix C, Methodology.

## **DISCLOSURE**

In accordance with federal law governing census reports (Title 13 of the United States Code), no data are published that would disclose the operations of an individual establishment or company. However, the number of establishments in a specific industry or geographic area is not considered a disclosure; therefore, this information may be released even though other information is withheld. Techniques employed to limit disclosure are discussed at [www.census.gov/epcd/ec02/disclosure.htm](http://www.census.gov/epcd/ec02/disclosure.htm).

The disclosure analysis for "industry statistics" files is based on the total value of shipments. When the total value of shipments cannot be shown without disclosing information for individual companies, the complete line is suppressed except for capital expenditures. Nonetheless, the suppressed data are included in higher-level totals. A separate disclosure analysis is performed for capital expenditures, which can be suppressed even though value of shipments data are published.

## **AVAILABILITY OF MORE FREQUENT ECONOMIC DATA**

The Census Bureau conducts the Annual Survey of Manufactures (ASM) in each of the 4 years between the economic censuses. The ASM is a probability-based sample of approximately 55,000 establishments and collects many of the same industry statistics (including employment, payroll, value of shipments, etc.) as the economic census. However, there are selected statistics not included in the ASM. Among these are the number of companies and establishments, detailed product and materials data, and substate geographic data. In addition to the ASM, the Census Bureau conducts the Current Industrial Reports (CIR) program. The CIR program publishes selected detailed product statistics for selected manufacturing industries at the U.S. level annually and, in some cases, monthly and/or quarterly. The Census Bureau also conducts the monthly Manufacturers' Shipments, Inventories, and Orders (M3) Program, which publishes detailed statistics for manufacturing industries at the U.S. level.

In addition, the County Business Patterns program offers annual statistics on the number of establishments, employment, and payroll classified by industry within each county, and Statistics of U.S. Businesses provides annual statistics classified by the employment size of the enterprise, further classified by industry for the United States, and by broader categories for states and metropolitan areas.

## **CONTACTS FOR DATA USERS**

Questions about these data may be directed to the U.S. Census Bureau, Manufacturing & Construction Division, Information Services Center, 301-763-4673 or [ask.census.gov](mailto:ask.census.gov).

## **ABBREVIATIONS AND SYMBOLS**

The following abbreviations and symbols are used with these data:

A	Standard error of 100 percent or more
D	Withheld to avoid disclosing data of individual companies; data are included in higher level totals
F	Exceeds 100 percent because data include establishments with payroll exceeding revenue
N	Not available or not comparable
S	Withheld because estimates did not meet publication standards
X	Not applicable
Z	Less than half the unit shown
a	0 to 19 employees
b	20 to 99 employees
c	100 to 249 employees

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e	250 to 499 employees
f	500 to 999 employees
g	1,000 to 2,499 employees
h	2,500 to 4,999 employees
i	5,000 to 9,999 employees
j	10,000 to 24,999 employees
k	25,000 to 49,999 employees
l	50,000 to 99,999 employees
m	100,000 employees or more
p	10 to 19 percent estimated
q	20 to 29 percent estimated
r	Revised
s	Sampling error exceeds 40 percent
nsk	Not specified by kind
-	Represents zero (page image/print only)
(CC)	Consolidated city
(IC)	Independent city

**Table 1. Historical Statistics for the Industry: 2002 and Earlier Years**

[Data based on the 2002 Economic Census and the 2002 Annual Survey of Manufactures (ASM). For information on confidentiality protection, sampling error, nonsampling error, and explanation of terms, see note at end of table. For meaning of abbreviations and symbols, see introductory text]

Industry and year <sup>1</sup>	Com-panies <sup>2</sup>	All estab-lish-ments <sup>3</sup>	All employees		Production workers			Value added (\$1,000)	Total cost of materials (\$1,000)	Total value of shipments (\$1,000)	Total capital expenditures (\$1,000)
			Number <sup>4</sup>	Payroll (\$1,000)	Number <sup>4</sup>	Hours (1,000)	Wages (\$1,000)				
324110, Petroleum refineries .....	84	199	62 540	4 395 947	38 526	84 270	2 648 000	27 955 185	168 047 624	194 761 863	7 368 828
2002..	N	N	63 258	4 233 075	40 687	93 533	2 561 238	40 324 037	158 733 328	199 909 550	6 817 156
2001..	N	N	62 118	3 991 697	39 777	92 334	2 461 513	36 634 094	180 567 975	215 564 518	4 684 712
2000..	N	N	63 619	3 983 102	40 843	94 107	2 440 889	31 516 328	114 130 802	144 291 778	3 943 051
1999..	N	N	64 920	3 964 664	42 231	97 788	2 461 449	24 023 637	92 211 962	118 155 923	4 168 878
1998..	N	N	65 448	3 884 869	42 693	99 837	2 412 190	30 878 456	127 555 077	158 667 598	4 244 371
1997..	122	242									

<sup>1</sup>Statistics presented for years ending in 2 and 7 are census data. Interim census years are derived in a representative sample of manufacturing establishments canvassed in the Annual Survey of Manufactures (ASM).

<sup>2</sup>For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

<sup>3</sup>Includes establishments with payroll at any time during the year.

<sup>4</sup>Number of employees figures represent average number of production workers for pay period that includes the 12th of March, May, August, and November plus other employees for payroll period that includes the 12th of March.

Note: The data in this table are based on the 2002 Economic Census and the 2002 Annual Survey of Manufactures (ASM). To maintain confidentiality, the Census Bureau suppresses data to protect the identity of any business or individual. The census results in this table contain sampling errors and nonsampling errors. Data users who create their own estimates using data from American FactFinder tables should cite the Census Bureau as the source of the original data only. For explanation of terms, see Appendix A. For full technical documentation, see Appendix C.



**Table 2. Industry Statistics for Selected States: 2002**

[States that are a disclosure or with less than 100 employees are not shown. Data based on the 2002 Economic Census. For information on confidentiality protection, nonsampling error, explanation of terms, and geographical definitions, see note at end of table. For information on geographic areas followed by \*, see Appendix D. For meaning of abbreviations and symbols, see introductory text]

Industry and geographic area	E <sup>1</sup>	All establishments <sup>2</sup>		All employees		Production workers			Value added (\$1,000)	Total cost of materials (\$1,000)	Total value of shipments (\$1,000)	Total capital expenditures (\$1,000)
		Total	With 20 employees or more	Number <sup>3</sup>	Payroll (\$1,000)	Number <sup>3</sup>	Hours (1,000)	Wages (\$1,000)				
<b>324110, Petroleum refineries</b>												
United States.....	—	199	175	62 540	4 395 947	38 526	84 270	2 648 000	27 955 185	168 047 624	194 761 863	7 368 828
Alabama.....	—	4	4	424	28 170	270	539	16 536	143 890	1 245 106	1 383 561	20 268
California.....	—	25	24	8 561	625 567	5 202	11 777	372 318	4 503 410	17 325 679	22 004 975	2 983 544
Illinois.....	—	10	8	2 896	206 681	1 802	3 999	127 572	1 139 773	9 268 202	10 511 154	1 591 678
Kansas.....	—	4	3	1 260	73 935	747	1 470	45 416	233 357	2 887 150	3 131 435	25 969
Louisiana.....	—	21	21	8 326	604 340	4 828	10 872	341 199	4 566 358	27 779 549	32 017 153	686 107
Montana.....	—	4	4	857	52 453	604	1 219	35 371	243 859	1 547 152	1 798 305	38 245
New Jersey.....	—	8	5	2 176	159 320	1 362	3 159	99 212	1 123 501	6 327 556	7 389 351	236 155
Ohio.....	—	7	4	1 707	121 582	973	2 290	70 419	868 547	6 089 232	6 800 322	79 137
Oklahoma.....	1	6	5	1 680	103 252	1 102	2 331	60 939	230 069	4 753 747	4 943 120	127 256
Pennsylvania.....	—	9	8	3 482	229 429	2 041	4 469	137 644	1 558 499	8 887 479	10 360 921	46 315
Texas.....	—	36	34	16 912	1 239 043	10 749	24 267	748 691	7 618 815	48 504 583	55 558 909	1 351 639
Utah.....	—	5	4	705	47 849	466	1 022	30 836	175 996	1 579 667	1 745 287	38 545
Washington.....	—	6	6	2 711	200 466	1 650	2 645	119 374	1 578 745	5 056 589	6 598 320	239 603
Wyoming.....	—	5	5	713	42 153	501	1 092	27 768	171 677	1 504 940	1 652 614	29 389

<sup>1</sup>Some payroll and sales data for small single-establishment companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate statistics for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at the time data were tabulated. The following symbols are shown where estimated data account for 10 percent or more of the figures shown: 1–10 to 19 percent; 2–20 to 29 percent; 3–30 to 39 percent; 4–40 to 49 percent; 5–50 to 59 percent; 6–60 to 69 percent; 7–70 to 79 percent; 8–80 to 89 percent; 9–90 percent or more.

<sup>2</sup>Includes establishments with payroll at any time during the year.

<sup>3</sup>Number of employees figures represent average number of production workers for pay period that includes the 12th of March, May, August, and November plus other employees for payroll period that includes the 12th of March.

Note: The data in this table are based on the 2002 Economic Census. To maintain confidentiality, the Census Bureau suppresses data to protect the identity of any business or individual. The census results in this table contain nonsampling errors. Data users who create their own estimates using data from American FactFinder tables should cite the Census Bureau as the source of the original data only. For explanation of terms, see Appendix A. For full technical documentation, see Appendix C. For geographical definitions, see Appendix D.

**Table 3. Detailed Statistics by Industry: 2002**

[Data based on the 2002 Economic Census and the 2002 Annual Survey of Manufactures (ASM). For information on confidentiality protection, sampling error, nonsampling error, and explanation of terms, see note 2 at end of table. For meaning of abbreviations and symbols, see introductory text]

Item	Value
<b>324110, Petroleum refineries</b>	
Companies <sup>1</sup> .....	number.. 84
All establishments <sup>2</sup> .....	number.. 199
Establishments with 1 to 19 employees .....	number.. 24
Establishments with 20 to 99 employees .....	number.. 51
Establishments with 100 employees or more .....	number.. 124
All employees <sup>3</sup> .....	number.. 62 540
Total compensation .....	\$1,000.. 5 850 207
Annual payroll .....	\$1,000.. 4 395 947
Total fringe benefits .....	\$1,000.. 1 454 260
Production workers, average for year .....	number.. 38 526
Production workers on March 12 .....	number.. 37 956
Production workers on May 12 .....	number.. 39 081
Production workers on August 12 .....	number.. 38 776
Production workers on November 12 .....	number.. 38 259
Production worker hours .....	1,000.. 84 270
Production worker wages .....	\$1,000.. 2 648 000
Total cost of materials .....	\$1,000.. 168 047 624
Materials, parts, containers, packaging, etc., used .....	\$1,000.. 157 415 200
Resales .....	\$1,000.. 4 075 636
Purchased fuels .....	\$1,000.. 4 318 634
Purchased electricity .....	\$1,000.. 1 486 965
Contract work .....	\$1,000.. 751 189
Quantity of electricity purchased for heat and power .....	1,000 kWh.. 35 807 724
Quantity of electricity generated less sold for heat and power .....	1,000 kWh.. 11 894 656
Total value of shipments .....	\$1,000.. 194 761 863
Primary products value of shipments .....	\$1,000.. 187 405 681
Secondary products value of shipments .....	\$1,000.. 3 047 338
Total miscellaneous receipts .....	\$1,000.. 4 308 844
Value of resales .....	\$1,000.. 4 165 993
Contract receipts .....	\$1,000.. 68 155
Other miscellaneous receipts .....	\$1,000.. 74 696
Primary products specialization ratio .....	percent.. 98
Value of primary products shipments made in all industries .....	\$1,000.. 187 903 659
Value of primary products shipments made in this industry .....	\$1,000.. 187 405 681
Value of primary products shipments made in other industries .....	\$1,000.. 497 978
Coverage ratio .....	percent.. 100
Value added .....	\$1,000.. 27 955 185
Total inventories, beginning of year .....	\$1,000.. 11 093 736
Finished goods inventories .....	\$1,000.. 5 143 357
Work-in-process inventories .....	\$1,000.. 3 052 712
Materials and supplies inventories .....	\$1,000.. 2 897 667
Total inventories, end of year .....	\$1,000.. 12 713 561
Finished goods inventories .....	\$1,000.. 6 029 438
Work-in-process inventories .....	\$1,000.. 3 407 577
Materials and supplies inventories .....	\$1,000.. 3 276 546
Gross value of depreciable assets (acquisition costs) at beginning of year .....	\$1,000.. '77 315 888
Total capital expenditures (new and used) .....	\$1,000.. '7 368 828
Buildings and other structures (new and used) .....	\$1,000.. '3 303 348
Machinery and equipment (new and used) .....	\$1,000.. '4 065 480
Automobiles, trucks, etc., for highway use .....	\$1,000.. '25 841
Computers and peripheral data processing equipment .....	\$1,000.. '186 515
All other expenditures for machinery and equipment .....	\$1,000.. '3 853 124
Total retirements .....	\$1,000.. '1 174 309
Gross value of depreciable assets at end of year .....	\$1,000.. '83 510 407
Depreciation charges during year .....	\$1,000.. '3 721 401
Total rental payments .....	\$1,000.. 471 657
Buildings and other structures .....	\$1,000.. 109 018
Machinery and equipment .....	\$1,000.. 362 639
Total other expenses <sup>4</sup> .....	\$1,000.. 7 588 176
Response coverage ratio <sup>5</sup> .....	percent.. 92
Repair and maintenance services of buildings and/or machinery <sup>4</sup> .....	\$1,000.. 2 034 646
Communications services <sup>4</sup> .....	\$1,000.. 64 566
Legal services <sup>4</sup> .....	\$1,000.. 60 447
Accounting, auditing, and bookkeeping services <sup>4</sup> .....	\$1,000.. 57 495
Advertising and promotional services <sup>4</sup> .....	\$1,000.. 24 504
Expensed computer hardware and supplies and purchased computer services <sup>4</sup> .....	\$1,000.. 129 699
Refuse removal (including hazardous waste) services <sup>4</sup> .....	\$1,000.. 203 522
Management consulting and administrative services <sup>4</sup> .....	\$1,000.. 287 685
Taxes and license fees <sup>4</sup> .....	\$1,000.. 503 312
All other expenses <sup>4</sup> .....	\$1,000.. 4 222 300

<sup>1</sup>For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

<sup>2</sup>Includes establishments with payroll at any time during the year.

<sup>3</sup>Number of employees figures represent average number of production workers for pay period that includes the 12th of March, May, August, and November plus other employees for payroll period that includes the 12th of March.

<sup>4</sup>Based on Annual Survey of Manufactures (ASM) sample data.

<sup>5</sup>A response coverage ratio is derived for this item by calculating the ratio of the weighted employment (establishment data multiplied by sample weight) for those Annual Survey of Manufactures (ASM) establishments that reported to the weighted total employment for all ASM establishments classified in this industry.

Note 1: The amounts shown for other expenses reflect only those services that establishments purchase from other companies.

Note 2: The data in this table are based on the 2002 Economic Census and the 2002 Annual Survey of Manufactures (ASM). To maintain confidentiality, the Census Bureau suppresses data to protect the identity of any business or individual. The census results in this table contain sampling errors and nonsampling errors. Data users who create their own estimates using data from American FactFinder tables should cite the Census Bureau as the source of the original data only. For explanation of terms, see Appendix A. For full technical documentation, see Appendix C.

**Table 4. Industry Statistics by Employment Size: 2002**

[Data based on the 2002 Economic Census. For information on confidentiality protection, nonsampling error, and explanation of terms, see note at end of table. For meaning of abbreviations and symbols, see introductory text]

Employment size class	E <sup>1</sup>	All establishments <sup>2</sup>	All employees		Production workers			Value added (\$1,000)	Total cost of materials (\$1,000)	Total value of shipments (\$1,000)	Total capital expenditures (\$1,000)
			Number <sup>3</sup>	Payroll (\$1,000)	Number <sup>3</sup>	Hours (1,000)	Wages (\$1,000)				
<b>324110, Petroleum refineries</b>											
All establishments .....	—	199	62 540	4 395 947	38 526	84 270	2 648 000	27 955 185	168 047 624	194 761 863	7 368 828
Establishments with—											
1 to 4 employees .....	—	—	—	—	—	—	—	—	—	—	—
5 to 9 employees .....	—	3	21	968	12	25	541	6 406	41 585	48 104	1 111
10 to 19 employees .....	5	21	287	17 602	189	416	10 810	129 340	607 372	737 159	17 928
20 to 49 employees .....	1	31	1 005	57 728	633	1 352	33 212	386 098	1 668 344	2 050 716	34 247
50 to 99 employees .....	—	20	1 396	75 473	950	2 069	48 768	2 185 532	2 038 583	4 220 741	55 304
100 to 249 employees .....	—	42	7 441	484 430	4 890	10 399	311 110	2 801 618	17 164 897	19 770 054	321 762
250 to 499 employees .....	—	37	12 768	877 180	7 884	17 471	539 342	5 959 257	37 601 347	43 079 652	1 071 861
500 to 999 employees .....	—	31	22 276	1 598 689	13 409	30 736	966 882	6 986 546	63 811 587	70 817 131	4 569 912
1,000 to 2,499 employees .....	—	14	17 346	1 283 877	10 559	21 802	737 335	9 500 388	45 113 909	54 038 306	1 296 703
2,500 employees or more .....	—	—	—	—	—	—	—	—	—	—	—
Administrative records <sup>4</sup> .....	—	—	—	—	—	—	—	—	—	—	—

<sup>1</sup>Some payroll and sales data for small single-establishment companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate statistics for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at the time data were tabulated. The following symbols are shown where estimated data account for 10 percent or more of the figures shown: 1–10 to 19 percent; 2–20 to 29 percent; 3–30 to 39 percent; 4–40 to 49 percent; 5–50 to 59 percent; 6–60 to 69 percent; 7–70 to 79 percent; 8–80 to 89 percent; 9–90 percent or more.

<sup>2</sup>Includes establishments with payroll at any time during the year.

<sup>3</sup>Number of employees figures represent average number of production workers for pay period that includes the 12th of March, May, August, and November plus other employees for payroll period that includes the 12th of March.

<sup>4</sup>Some payroll and sales data for small single-establishment companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate statistics for these small establishments. Data are also included in respective size classes shown.

Note: The data in this table are based on the 2002 Economic Census. To maintain confidentiality, the Census Bureau suppresses data to protect the identity of any business or individual. The census results in this table contain nonsampling errors. Data users who create their own estimates using data from American FactFinder tables should cite the Census Bureau as the source of the original data only. For explanation of terms, see Appendix A. For full technical documentation, see Appendix C.

**Table 5. Industry Statistics by Primary Product Class Specialization: 2002**

[Data based on the 2002 Economic Census. For information on confidentiality protection, nonsampling error, and explanation of terms, see note at end of table. For meaning of abbreviations and symbols, see introductory text]

Industry or product class code	Industry or primary product class	All establishments <sup>1</sup>	All employees		Production workers			Value added (\$1,000)	Total cost of materials (\$1,000)	Total value of shipments (\$1,000)	Total capital expenditures (\$1,000)
			Number <sup>2</sup>	Payroll (\$1,000)	Number <sup>2</sup>	Hours (1,000)	Wages (\$1,000)				
324110	Petroleum refineries .....	199	62 540	4 395 947	38 526	84 270	2 648 000	27 955 185	168 047 624	194 761 863	'7 368 828
324110I	Gasoline, including finished base stocks and blending agents .....	119	55 804	3 984 035	34 339	75 182	2 397 088	24 350 916	156 522 958	179 672 927	'7 105 380
3241104	Jet fuel .....	5	886	65 781	645	1 466	49 100	582 941	2 492 292	3 102 986	'40 418
324110A	Light fuel oils .....	10	1 034	55 034	553	1 088	28 350	261 414	1 755 228	2 000 284	'31 540
324110D	Heavy fuel oils, including grades No. 5, 6, heavy diesel-type, heavy gas-enrichment oils, etc. ....	1	c	D	D	D	D	D	D	D	D
324110G	Petroleum lubricating oils and greases, made in a refinery .....	9	e	D	D	D	D	D	D	D	D
324110J	Unfinished oils and lubricating oil base stock .....	19	1 656	95 607	1 047	2 259	57 017	385 379	2 443 913	2 814 945	'45 166
324110M	Asphalt .....	17	643	37 310	437	973	24 271	266 609	1 294 626	1 548 214	'25 652
324110T	Other finished petroleum products, including waxes, made in a refinery .....	9	1 731	113 105	1 038	2 374	69 178	1 967 324	2 683 706	4 645 215	'97 564

<sup>1</sup>Includes establishments with payroll at any time during the year.

<sup>2</sup>Number of employees figures represent average number of production workers for pay period that includes the 12th of March, May, August, and November plus other employees for payroll period that includes the 12th of March.

Note: The data in this table are based on the 2002 Economic Census. To maintain confidentiality, the Census Bureau suppresses data to protect the identity of any business or individual. The census results in this table contain nonsampling errors. Data users who create their own estimates using data from American FactFinder tables should cite the Census Bureau as the source of the original data only. For explanation of terms, see Appendix A. For full technical documentation, see Appendix C.

**Table 6a. Products Statistics: 2002 and 1997**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. Data based on the 2002 Economic Census. For information on confidentiality protection, nonsampling error, and explanation of terms, see note 2 at end of table. For meaning of abbreviations and symbols, see introductory text]

Product code	Product	Number of companies with shipments of \$100,000 or more	Quantity of production for all purposes	Product shipments	
				Quantity	Value (\$1,000)
324110	Petroleum refineries .....	2002.. N 1997.. N	X X	X X	187 903 659 152 755 956
3241101	Gasoline, including finished base stocks and blending agents .....	2002.. N 1997.. N	X X	X X	97 455 097 77 557 632
32411011	Gasoline, including finished base stocks and blending agents .....	2002.. N 1997.. N	X X	X X	97 455 097 76 888 379
3241101111	Aviation gasoline (excluding jet fuel), including finished base stocks and blending agents .....	2002.. 25 1997.. 17	X X	S 21.6	3 751 214 1 013 731
3241101121	Motor gasoline, including finished base stocks and blending agents .....	2002.. 51 1997.. 62	X X	P2 927.7 2 816.1	93 703 883 75 874 648
3241101Y	Gasoline, including finished base stocks and blending agents, nsk .....	2002.. N 1997.. N	X X	X X	- 669 253
3241101YVW	Gasoline, including finished base stocks and blending agents, nsk .....	2002.. N 1997.. N	X X	X X	- 669 253
3241104	Jet fuel .....	2002.. N 1997.. N	X X	X X	17 374 167 14 017 775
32411041	Jet fuel .....	2002.. N 1997.. N	X X	X X	17 374 167 13 835 166
3241104111	Jet fuel, naphtha-type .....	2002.. 14 1997.. 22	X X	977.6 S	2 327 771 2 641 296
3241104121	Jet fuel, kerosene-type .....	2002.. 36 1997.. 47	X X	495.8 470.4	15 046 396 11 193 870
3241104Y	Jet fuel, nsk .....	2002.. N 1997.. N	X X	X X	- 182 609
3241104YVW	Jet fuel, nsk .....	2002.. N 1997.. N	X X	X X	- 182 609
3241107	Kerosene, excluding jet fuel .....	2002.. N 1997.. N	X X	X X	749 518 960 019
32411071	Kerosene, excluding jet fuel .....	2002.. N 1997.. N	X X	X X	749 518 960 019
3241107100	Kerosene, excluding jet fuel .....	2002.. 24 1997.. 26	X X	24.6 37.3	749 518 960 019
324110A	Light fuel oils .....	2002.. N 1997.. N	X X	X X	38 560 945 28 941 405
324110A1	Light fuel oils .....	2002.. N 1997.. N	X X	X X	38 553 029 28 643 819
324110A111	Distillate light fuel oil, including grades No. 1, 2, light diesel-type, light gas-enrichment oils, etc. ....	2002.. 54 1997.. 70	X X	P1 272.8 X	37 183 368 27 377 088
324110A121	No. 4 type light fuel oil .....	2002.. 13 1997.. 14	X X	S 59.5	1 369 661 1 266 731
324110AY	Light fuel oils, nsk .....	2002.. N 1997.. N	X X	X X	7 916 297 586
324110AYVW	Light fuel oils, nsk .....	2002.. N 1997.. N	X X	X X	7 916 297 586
324110D	Heavy fuel oils, including grades No. 5, 6, heavy diesel-type, heavy gas-enrichment oils, etc. ....	2002.. N 1997.. N	X X	X X	6 132 764 4 295 288
324110D1	Heavy fuel oils, including grades No. 5, 6, heavy diesel-type, heavy gas-enrichment oils, etc. ....	2002.. N 1997.. N	X X	X X	6 132 764 4 295 288
324110D100	Heavy fuel oils, including grades No. 5, 6, heavy diesel-type, heavy gas-enrichment oils, etc. ....	2002.. 40 1997.. 57	X X	284.4 262.6	6 132 764 4 295 288
324110G	Petroleum lubricating oils and greases, made in a refinery .....	2002.. N 1997.. N	X X	X X	1 157 968 704 035
324110G1	Petroleum lubricating oils and greases, made in a refinery .....	2002.. N 1997.. N	X X	X X	1 157 968 667 596
324110G111	Lubricating oils (including hydraulic fluids, quenching and cutting oils, transformer oils, liquid rust preventives, etc.), made in a refinery <sup>1</sup> .....	2002.. 14 1997.. 16	X X	P20.7 P11.7	1 052 710 556 138
324110G121	Lubricating greases, made in a refinery <sup>2</sup> .....	2002.. 6 1997.. 8	X X	S S	105 258 111 458
324110GY	Lubricating oils and greases, made in a refinery, nsk .....	2002.. N 1997.. N	X X	X X	- 36 439
324110GYVW	Lubricating oils and greases, made in a refinery, nsk .....	2002.. N 1997.. N	X X	X X	- 36 439
324110J	Unfinished oils and lubricating oil base stock .....	2002.. N 1997.. N	X X	X X	8 465 540 8 219 990
324110J1	Unfinished oils and lubricating oil base stock .....	2002.. N 1997.. N	X X	X X	8 465 540 7 826 566
324110J111	Unfinished oils, naphthenic and paraffinic .....	2002.. 34 1997.. 33	X X	117.7 129.5	2 952 035 3 298 305
324110J121	Naphtha and other unfinished oils for use as petrochemical feedstocks, excluding carbon black .....	2002.. 25 1997.. 29	X X	P83.4 65.2	2 446 589 2 161 763
324110J131	Carbon black feedstock (unfinished oils) .....	2002.. 17 1997.. 14	X X	P35.9 S	700 412 154 226
324110J141	Lubricating oil petroleum-base bright stock .....	2002.. 7 1997.. 11	X X	2.4 9.3	128 525 358 447
324110J151	Lubricating oil petroleum-base neutral stock .....	2002.. 13 1997.. 16	X X	S 32.1	1 539 984 1 212 715
324110J161	Lubricating oil petroleum-base red and pale oils .....	2002.. 5 1997.. 10	X X	D P4.6	D 184 531
324110J171	Other lubricating oil petroleum-base stocks .....	2002.. 14 1997.. 14	X X	D 15.7	D 456 579
324110JY	Unfinished oils and lubricating oil base stock, nsk .....	2002.. N 1997.. N	X X	X X	- 393 424
324110JYVW	Unfinished oils and lubricating oil base stock, nsk .....	2002.. N 1997.. N	X X	X X	- 393 424

See footnotes at end of table.

**Table 6a. Products Statistics: 2002 and 1997—Con.**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. Data based on the 2002 Economic Census. For information on confidentiality protection, nonsampling error, and explanation of terms, see note 2 at end of table. For meaning of abbreviations and symbols, see introductory text]

Product code	Product	Number of companies with shipments of \$100,000 or more	Quantity of production for all purposes	Product shipments	
				Quantity	Value (\$1,000)
324110	Petroleum refineries—Con.				
324110M	Asphalt .....	2002.. N	X	X	4 323 290
		1997.. N	X	X	3 320 500
324110M1	Asphalt .....	2002.. N	X	X	4 323 290
		1997.. N	X	X	2 954 739
324110M111	Paving grade asphalts .....	2002.. 41 mil bbl.	X	q141.4	3 340 593
		1997.. 51	X	P140.0	2 463 004
324110M121	Roofing grade asphalts .....	2002.. 21 mil bbl.	X	S	387 803
		1997.. 22	X	q10.5	222 233
324110M131	All other miscellaneous asphalts .....	2002.. 21 mil bbl.	X	S	594 894
		1997.. 20	X	15.0	269 502
324110MY	Asphalt, nsk .....	2002.. N	X	X	—
		1997.. N	X	X	365 761
324110MYWV	Asphalt, nsk .....	2002.. N	X	X	—
		1997.. N	X	X	365 761
324110P	Liquefied refinery gases (aliphatics), made in a refinery .....	2002.. N	X	X	6 689 403
		1997.. N	X	X	8 157 277
324110P1	Liquefied refinery gases (aliphatics), made in a refinery .....	2002.. N	X	X	6 689 403
		1997.. N	X	X	8 110 982
324110P111	Liquefied refinery gases (aliphatics), for use as a chemical raw material, made in a refinery <sup>3</sup> .....	2002.. 25	X	X	3 898 198
		1997.. 34	X	X	4 526 761
324110P121	Liquefied refinery gases (aliphatics), for other uses, made in a refinery <sup>4</sup> .....	2002.. 25	X	X	2 791 205
		1997.. 29	X	X	3 584 221
324110PY	Liquefied refinery gases (aliphatics), made in a refinery, nsk .....	2002.. N	X	X	—
		1997.. N	X	X	46 295
324110PYWV	Liquefied refinery gases (aliphatics), made in a refinery, nsk .....	2002.. N	X	X	—
		1997.. N	X	X	46 295
324110T	Other finished petroleum products, including waxes, made in a refinery .....	2002.. N	X	X	6 758 344
		1997.. N	X	X	5 091 239
324110T1	Other finished petroleum products, including waxes, made in a refinery .....	2002.. N	X	X	6 713 460
		1997.. N	X	X	4 941 721
324110T111	Petrolatum .....	2002.. 8 mil bbl.	X	S	152 907
		1997.. 8	X	S	86 098
324110T121	Petroleum coke .....	2002.. 11 1,000 s tons.	X	S	255 396
		1997.. 23	X	S	661 878
324110T131	Calcined petroleum coke, made in a refinery .....	2002.. 13 1,000 s tons.	X	S	379 699
		1997.. 8	X	S	264 381
324110T141	Road oil, made in a refinery .....	2002.. 2 mil bbl.	X	D	D
		1997.. 4	X	.6	13 046
324110T151	Still gas (refinery gas) .....	2002.. 6 bil cu ft.	X	S	239 672
		1997.. 5	X	S	137 467
324110T161	Special petroleum naphthas .....	2002.. 6 mil bbl.	X	D	D
		1997.. 7	X	3.3	120 197
324110T171	Aromatics (benzene, toluene, xylene, etc.), for use as a chemical raw material, made in a refinery <sup>5</sup> .....	2002.. 17	X	X	2 851 861
		1997.. 17	X	X	2 082 146
324110T181	Aromatics (benzene, toluene, xylene, etc.), for other uses, made in a refinery <sup>6</sup> .....	2002.. 4	X	X	D
		1997.. 7	X	X	254 442
324110T191	Microcrystalline petroleum waxes, made in a refinery <sup>7</sup> .....	2002.. 4 mil bbl.	X	1.2	81 741
		1997.. 7	X	q1.9	113 417
324110T1A1	Fully refined crystalline petroleum waxes, made in a refinery <sup>8</sup> .....	2002.. 6 mil bbl.	X	q1.9	118 152
		1997.. 13	X	4.2	273 867
324110T1B1	Other crystalline petroleum waxes, made in a refinery <sup>9</sup> .....	2002.. 5 mil bbl.	X	P3.4	137 741
		1997.. 10	X	S	41 082
324110T1C1	Other finished petroleum products, made in a refinery .....	2002.. 19 mil bbl.	X	S	1 762 019
		1997.. 24	X	P37.2	893 700
324110TY	Other finished petroleum products, including waxes, made in a refinery, nsk .....	2002.. N	X	X	44 884
		1997.. N	X	X	149 518
324110TYWV	Other finished petroleum products, including waxes, made in a refinery, nsk .....	2002.. N	X	X	44 884
		1997.. N	X	X	149 518
324110W	Petroleum refineries, nsk, total .....	2002.. N	X	X	236 623
		1997.. N	X	X	1 490 796
324110WY	Petroleum refineries, nsk, total .....	2002.. N	X	X	236 623
		1997.. N	X	X	1 490 796
324110WYWW	Petroleum refineries, nsk, for nonadministrative-record establishments .....	2002.. N	X	X	236 623
		1997.. N	X	X	1 490 796
324110WYWY	Petroleum refineries, nsk, for administrative-record establishments .....	2002.. N	X	X	—
		1997.. N	X	X	—

<sup>1</sup>This product code is primary to more than one industry. See industry 324191, product code 3241910111.

<sup>2</sup>This product code is primary to more than one industry. See industry 324191, product code 3241910121.

<sup>3</sup>This product code is primary to more than one industry. See industry 325110, product code 3251104111.

<sup>4</sup>This product code is primary to more than one industry. See industry 325110, product code 3251104121.

<sup>5</sup>This product code is primary to more than one industry. See industry 325110, product code 3251101111.

<sup>6</sup>This product code is primary to more than one industry. See industry 325110, product code 3251101121.

<sup>7</sup>This product code is primary to more than one industry. See industry 324199, product code 3241992211.

<sup>8</sup>This product code is primary to more than one industry. See industries 324110 and 324199, product codes 324110T1B1 and 3241992221.

<sup>9</sup>This product code is primary to more than one industry. See industries 324110 and 324199, product codes 324110T1A1 and 3241992221.

Note 1: For some establishments, data have been estimated from central unit values that are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: p-10 to 19 percent estimated; q-20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by S.

Note 2: The data in this table are based on the 2002 Economic Census. To maintain confidentiality, the Census Bureau suppresses data to protect the identity of any business or individual. The census results in this table contain nonsampling errors. Data users who create their own estimates using data from American FactFinder tables should cite the Census Bureau as the source of the original data only. For explanation of terms, see Appendix A. For full technical documentation, see Appendix C.

**Table 6b. Product Class Shipments for Selected States: 2002 and 1997**

[Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in Table 2. Also, product classes are not shown if they are miscellaneous or "not specified by kind" classes. Statistics for some states are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 2002. Data based on the 2002 Economic Census. For information on confidentiality protection, nonsampling error, explanation of terms, and geographic definitions, see note at end of table. For information on geographic areas followed by \*, see Appendix D. For meaning of abbreviations and symbols, see introductory text]

NAICS product class code	Product class and geographic area	Value of product shipments (\$1,000)
3241101	Gasoline, including finished base stocks and blending agents	
	United States .....	2002.. 97 455 097
	California .....	1997.. 77 557 632
	Illinois .....	2002.. 12 570 292
	Kansas .....	1997.. 11 276 628
	Louisiana .....	2002.. 6 474 052
	Montana .....	1997.. 5 087 219
	New Jersey .....	2002.. 1 881 953
	Ohio .....	1997.. 1 415 994
	Oklahoma .....	2002.. 14 678 001
	Texas .....	1997.. 11 419 313
	Utah .....	2002.. 1 020 852
	Washington .....	1997.. 868 774
	Wyoming .....	2002.. 3 319 350
		1997.. 3 211 603
		2002.. 3 874 923
		1997.. 2 661 086
		2002.. 2 636 535
		1997.. 2 054 699
	2002.. 26 709 533	
	1997.. 21 930 259	
	2002.. 1 023 982	
	1997.. 848 063	
	2002.. 2 999 575	
	1997.. 2 404 010	
	2002.. 819 557	
	1997.. 601 374	
3241104	Jet fuel	
	United States .....	2002.. 17 374 167
	California .....	1997.. 14 017 775
	Illinois .....	2002.. 2 517 969
	Louisiana .....	1997.. 2 404 119
	Montana .....	2002.. 520 550
	New Jersey .....	1997.. N
	Ohio .....	2002.. 2 983 163
	Oklahoma .....	1997.. 3 282 276
	Texas .....	2002.. 40 552
	Washington .....	1997.. 73 329
		2002.. 618 152
		1997.. 296 148
		2002.. 458 972
		1997.. N
		2002.. 319 701
		1997.. 296 703
		2002.. 5 363 845
		1997.. 3 272 618
	2002.. 974 380	
	1997.. 719 259	
3241107	Kerosene, excluding jet fuel	
	United States .....	2002.. 749 518
	Louisiana .....	1997.. 960 019
	Ohio .....	2002.. 167 460
	Pennsylvania .....	1997.. N
		2002.. 16 029
324110A	Light fuel oils	
	United States .....	2002.. 38 560 945
	Alabama .....	1997.. 28 941 405
	California .....	2002.. 201 994
	Illinois .....	1997.. 225 907
	Kansas .....	2002.. 3 204 384
	Louisiana .....	1997.. 2 615 561
	Montana .....	2002.. 2 038 319
	New Jersey .....	1997.. 1 742 451
	Ohio .....	2002.. 1 051 872
	Oklahoma .....	1997.. 839 167
	Pennsylvania .....	2002.. 6 609 074
	Texas .....	1997.. 3 684 343
	Utah .....	2002.. 544 998
	Washington .....	1997.. 433 991
	Wyoming .....	2002.. 1 721 273
		1997.. 1 540 969
		2002.. 1 536 742
		1997.. 904 786
	2002.. 1 261 408	
	1997.. 1 006 679	
	2002.. 2 161 191	
	1997.. 1 611 639	
	2002.. 9 383 970	
	1997.. 7 297 271	
	2002.. 469 516	
	1997.. 419 221	
	2002.. 1 487 576	
	1997.. 1 114 840	
	2002.. 519 451	
	1997.. 386 782	
324110D	Heavy fuel oils, including grades No. 5, 6, heavy diesel-type, heavy gas-enrichment oils, etc.	
	United States .....	2002.. 6 132 764
	California .....	1997.. 4 295 288
	Illinois .....	2002.. 490 041
		1997.. 668 441
	2002.. 129 887	
	1997.. N	

See footnotes at end of table.

**Table 6b. Product Class Shipments for Selected States: 2002 and 1997—Con.**

[Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in Table 2. Also, product classes are not shown if they are miscellaneous or "not specified by kind" classes. Statistics for some states are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 2002. Data based on the 2002 Economic Census. For information on confidentiality protection, nonsampling error, explanation of terms, and geographic definitions, see note at end of table. For information on geographic areas followed by \*, see Appendix D. For meaning of abbreviations and symbols, see introductory text]

NAICS product class code	Product class and geographic area	Value of product shipments (\$1,000)
324110D	Heavy fuel oils, including grades No. 5, 6, heavy diesel-type, heavy gas-enrichment oils, etc.—Con.	
	United States—Con.	
	Louisiana .....	2002 .. 1 589 116
	Montana .....	1997 .. 744 926
	Texas .....	2002 .. 6 706
	Utah .....	1997 .. N
	Washington .....	2002 .. 1 570 375
	Washington .....	1997 .. 967 233
	Washington .....	2002 .. 10 303
	Washington .....	1997 .. 37 064
324110G	Petroleum lubricating oils and greases, made in a refinery	
	United States .....	2002 .. 1 157 968
	California .....	1997 .. 704 035
	California .....	2002 .. 45 505
324110J	Unfinished oils and lubricating oil base stock	
	United States .....	2002 .. 8 465 540
	California .....	1997 .. 8 219 990
	Illinois .....	2002 .. 1 504 616
	Louisiana .....	1997 .. 2 094 865
	New Jersey .....	2002 .. 158 354
	New Jersey .....	1997 .. 125 064
	Texas .....	2002 .. 2 002 029
	Texas .....	1997 .. 1 200 725
	Washington .....	2002 .. 469 022
	Washington .....	1997 .. N
	Wyoming .....	2002 .. 2 324 397
	Wyoming .....	1997 .. 3 003 464
	324110M	Asphalt
United States .....		2002 .. 4 323 290
California .....		1997 .. 3 320 500
Montana .....		2002 .. 562 915
New Jersey .....		1997 .. 231 673
New Jersey .....		2002 .. 144 536
Oklahoma .....		1997 .. N
Oklahoma .....		2002 .. 534 501
Texas .....		1997 .. 452 001
Wyoming .....		2002 .. 171 718
324110P	Liquefied refinery gases (aliphatics), made in a refinery	
	United States .....	2002 .. 6 689 403
	California .....	1997 .. 8 157 277
	Illinois .....	2002 .. 387 637
	Illinois .....	1997 .. 318 248
	Kansas .....	2002 .. 171 877
	Louisiana .....	1997 .. 197 900
	Louisiana .....	2002 .. 48 189
	Montana .....	1997 .. N
	Montana .....	2002 .. 1 431 151
	New Jersey .....	1997 .. 1 447 755
	New Jersey .....	2002 .. 24 826
	Ohio .....	1997 .. 25 653
	Ohio .....	2002 .. 252 720
	Oklahoma .....	1997 .. 208 578
	Oklahoma .....	2002 .. 203 739
Texas .....	1997 .. 145 214	
Texas .....	2002 .. 90 744	
Utah .....	1997 .. 78 267	
Utah .....	2002 .. 2 986 532	
Washington .....	1997 .. 4 292 934	
Washington .....	2002 .. 13 738	
Washington .....	1997 .. 21 801	
Washington .....	2002 .. 214 798	
Wyoming .....	1997 .. 148 704	
Wyoming .....	2002 .. 16 739	
Wyoming .....	1997 .. 16 332	
324110T	Other finished petroleum products, including waxes, made in a refinery	
	United States .....	2002 .. 6 758 344
	California .....	1997 .. 5 091 239
	Illinois .....	2002 .. 314 618
	Illinois .....	1997 .. 268 228
	Louisiana .....	2002 .. 310 234
	Louisiana .....	1997 .. 99 517
	Pennsylvania .....	2002 .. 1 199 499
	Pennsylvania .....	1997 .. 701 019
	Texas .....	2002 .. 528 360
Texas .....	1997 .. 395 345	
Texas .....	2002 .. 3 409 057	
Texas .....	1997 .. 2 465 633	

Note: The data in this table are based on the 2002 Economic Census. To maintain confidentiality, the Census Bureau suppresses data to protect the identity of any business or individual. The census results in this table contain nonsampling errors. Data users who create their own estimates using data from American FactFinder tables should cite the Census Bureau as the source of the original data only. For explanation of terms, see Appendix A. For full technical documentation, see Appendix C. For geographical definitions, see Appendix D.



**Table 7. Materials Consumed by Kind: 2002 and 1997**

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. Data based on the 2002 Economic Census. For information on confidentiality protection, nonsampling error, and explanation of terms, see note 2 at end of table. For meaning of abbreviations and symbols, see introductory text]

Material code	Material consumed	Quantity	Delivered cost (\$1,000)
324110	<b>Petroleum refineries</b>		
0090001	Total materials .....	X	157 415 200
	.....2002..	X	118 682 535
	.....1997..		
21111103	Domestic crude petroleum, including lease condensate .....	P2 570.7	63 157 497
	..... mil bbl., 2002..	2 801.5	47 220 759
	.....1997..		
00999830	Foreign crude petroleum, including lease condensate .....	2 950.8	69 102 574
	..... mil bbl., 2002..	2 495.9	48 172 988
	.....1997..		
00999827	Foreign unfinished oils (received from foreign countries for further processing) .....	95.1	2 297 967
	..... mil bbl., 2002..	P127.1	2 373 376
	.....1997..		
21111205	Ethane (C <sub>2</sub> ) (80 percent purity or more) .....	D	D
	..... mil bbl., 2002..	D	D
	.....1997..		
21111207	Propane (C <sub>3</sub> ) (80 percent purity or more) .....	6.7	118 257
	..... mil bbl., 2002..	P18.0	269 928
	.....1997..		
21111203	Butane (C <sub>4</sub> ) (80 percent purity or more) .....	82.7	1 925 738
	..... mil bbl., 2002..	80.1	1 567 875
	.....1997..		
21111021	Gas mixtures (C <sub>2</sub> , C <sub>3</sub> , C <sub>4</sub> ) .....	52.4	1 296 875
	..... mil bbl., 2002..	448.3	952 009
	.....1997..		
21111023	Isopentane and natural gasoline .....	74.6	1 843 708
	..... mil bbl., 2002..	65.1	1 381 100
	.....1997..		
21111209	Other natural gas liquids, including plant condensate .....	35.5	810 530
	..... mil bbl., 2002..	90.3	1 427 123
	.....1997..		
32519214	Toluene and xylene (100 percent basis) .....	12.5	455 442
	..... mil bbl., 2002..	N	N
	.....1997..		
32500017	Additives (including antioxidants, antiknock compounds, and inhibitors) .....	.8	159 563
	..... mil bbl., 2002..	S	262 228
	.....1997..		
32500019	Other additives (including soaps and detergents) .....	.8	40 842
	..... mil bbl., 2002..	S	200 005
	.....1997..		
31100013	Animal and vegetable oils .....	2.7	709
	..... mil lb., 2002..	D	D
	.....1997..		
32518825	Chemical catalytic preparations .....	X	D
	.....2002..	X	647 040
	.....1997..		
32518107	Sodium hydroxide (caustic soda)(100 percent NaOH) .....	S	129 324
	..... 1,000 s tons., 2002..	S	41 741
	.....1997..		
32518805	Sulfuric acid, excluding spent (100 percent H <sub>2</sub> SO <sub>4</sub> ) .....	S	189 912
	..... 1,000 s tons., 2002..	S	56 514
	.....1997..		
33240000	Metal containers .....	X	9 450
	.....2002..	X	60 531
	.....1997..		
32610029	Plastics containers .....	X	D
	.....2002..	X	N
	.....1997..		
32220015	Paper and paperboard containers .....	X	D
	.....2002..	X	18 404
	.....1997..		
32410007	Cost of materials received from petroleum refineries and lube manufacturers .....	P279.3	8 980 758
	..... mil bbl., 2002..	P226.8	4 981 370
	.....1997..		
00970099	All other materials and components, parts, containers, and supplies .....	X	5 722 580
	.....2002..	X	4 233 383
	.....1997..		
00971000	Materials, ingredients, containers, and supplies, nsk .....	X	576 175
	.....2002..	X	4 779 890
	.....1997..		

Note 1: For some establishments, data have been estimated from central unit values that are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: p-10 to 19 percent estimated; q-20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by S.

Note 2: The data in this table are based on the 2002 Economic Census. To maintain confidentiality, the Census Bureau suppresses data to protect the identity of any business or individual. The census results in this table contain nonsampling errors. Data users who create their own estimates using data from American FactFinder tables should cite the Census Bureau as the source of the original data only. For explanation of terms, see Appendix A. For full technical documentation, see Appendix C.

# Appendix A.

## Explanation of Terms

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### **BEGINNING- AND END-OF-YEAR INVENTORIES**

Respondents were asked to report their beginning-of-year and end-of-year inventories at cost or market. Effective with the 1982 Economic Census, this change to a uniform instruction for reporting inventories was introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). Beginning in 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and, then, to report the LIFO reserve and the LIFO value after adjustment for the reserve.

### **Inventory data by stage of fabrication**

Total inventories and three detailed components (1)finished goods, (2)work-in-process, and (3)materials, supplies, fuels, etc., were collected.

When using inventory data by stage of fabrication for “all industries” and at the three-digit subsector level, it should be noted that an item treated as a finished product by an establishment in one industry may be reported as a raw material by an establishment in a different industry. For example, the finished-product inventories of a steel mill would be reported as raw materials by a stamping plant. Such differences are present in the inventory figures by stage of fabrication shown for all publication levels.

### **COST OF MATERIALS**

This term refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuel consumed, whether purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

Included in this item are:

1. Cost of parts, components, containers, etc. Includes all raw materials, semifinished goods, parts, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year.
2. Cost of products bought and sold in the same condition.
3. Cost of fuels consumed for heat and power. Includes the cost of materials or fuel consumed, whether purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.
4. Cost of purchased electricity. The cost of purchased electric energy represents the amount actually used during the year for heat and power. In addition, information was collected on the quantity of electric energy generated by the establishment and the quantity of electric energy sold or transferred to other plants of the same company.
5. Cost of contract work. This term applies to work done by others on materials furnished by the manufacturing establishment. The actual cost of the material is to be reported on the cost of materials, parts, and containers line of this item. The term “Contract Work” refers to the fee a company pays to another company to perform a service.

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## **Specific materials consumed**

In addition to the total cost of materials, which every establishment was required to report, information also was collected for most manufacturing industries on the consumption of major materials used in manufacturing. The inquiries were restricted to those materials that were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. If less than \$25,000 of a listed material was consumed by an establishment, the cost data could be reported in the "Cost of all other materials" Census material code 00970099.

Also, the cost of materials for small establishments for which administrative records or short forms were used was imputed into the "Materials not specified by kind" Census materials code 00971000.

## **Duplication in cost of materials and value of shipment**

The aggregate of the cost of materials and value of shipments figures for industry groups and for all manufacturing industries includes large amounts of duplication since the products of some industries are used as materials by others. This duplication results, in part, from the addition of related industries representing successive stages in the production of a finished manufactured product. Examples are the addition of flour mills to bakeries in the food group and the addition of pulp mills to paper mills in the paper and allied products group of industries.

Estimates of the overall extent of this duplication indicate that the value of manufactured products exclusive of such duplication (the value of finished manufactures) tends to approximate two-thirds of the total value of products reported in the survey.

Duplication of products within individual industries is significant within a number of industry groups, e.g., machinery and transportation industries. These industries frequently include complete machinery and their parts. In this case, the parts made for original equipment are materials consumed for assembly plants in the same industry.

Even when no significant amount of duplication is involved, value of shipments figures are deficient as measures of the relative economic importance of individual manufacturing industries or geographic areas because of the wide variation in ratio of materials, labor, and other processing costs of value of shipments, both among industries and within the same industry.

Before 1962, cost of materials and value of shipments were not published for some industries which included considerable duplication. Since then, these data have been published for all industries at the U.S. level and beginning in 1964, for all geographic levels.

## **SELECTED PURCHASED SERVICES**

Annual Survey of Manufactures (ASM) establishments were requested to provide information on the cost of selected purchased services for the repair and maintenance services of buildings and/or machinery; communication services; legal services; accounting, auditing, and bookkeeping services; advertising and promotional services; expensed computer hardware and supplies and purchased computer services; refuse removal services; management consulting and administrative services; taxes and license fees; and all other expenses not previously stated. Each of these items reflects the costs paid directly by the establishment and excludes salaries paid to employees of the establishment for these services. These expenses are normally considered as nonproduction related costs purchased from other companies.

Included in the cost of selected purchased services for the repair and maintenance services of buildings and/or machinery are payments made for all maintenance and repair work on buildings and equipment. Payments made to other establishments of the same company and for repair and maintenance of any leased property also are included. Excluded from this item are extensive repairs or reconstruction that was capitalized, which is considered capital expenditures; costs incurred directly by the establishment in using its own work force to perform repairs and maintenance work; and repairs and maintenance provided by the building or machinery owner as part of the rental contract.

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Included in the cost of selected purchased services for communication is the actual expense incurred or payable during the year for any type of communication. Such types of communication include telephone, data transmission, telegraph, Internet, connectivity, FAX, telex, photo transmission, paging, cellular telephone, on-line access and related services, etc.

Included in the cost of selected purchased services for legal services are payments made to other companies for these services that were paid directly by the establishment. Excluded are the salaries paid to employees of the establishment for these services.

Included in the cost of selected accounting, auditing, and bookkeeping services are payments made to other companies for these services that were paid directly by the establishment. Excluded are the salaries paid to employees of this establishment for these services.

Included in the cost of selected advertising and promotional services are payments made to other companies for these services that were paid directly by the establishment. These include payments for printing, media coverage, and other services and materials. Excluded are the salaries paid to employees of this establishment for these services.

Included in the cost of selected expensed computer hardware and supplies and purchased computer services are actual expenses incurred or payable during the year for this item. Purchases for computer hardware and supplies, computer services (software, data transmission, processing services, Web design, etc.) are all included. Excluded are services provided by other establishments of the same company (such as a separate central data processing unit).

Included in the cost of selected purchased refuse removal services are payments made to other companies for these services that were paid directly by the establishment, including costs for hazardous waste removal or treatment. Excluded are all costs included in rental payments or as capital expenditures and the salaries paid to employees of the establishment for these services.

Included in the cost of selected purchased management consulting and administrative services are payments made to other companies for these services that were paid directly by the establishment. Excluded are the salaries paid to employees of this establishment for these services.

Included in the cost of selected purchased taxes and license fees are payments made to other companies for these services that were paid directly by the establishment, excluding income, sales, payroll, and excise taxes. Excluded are also the salaries paid to employees of this establishment for these services.

### **Response coverage ratio**

A response coverage ratio is a measure of the extent to which respondents report for an item. The estimate is made by calculating the ratio value of the weighted total employment data for all the ASM establishments that report the item to the weighted total employment data for all ASM establishments classified in an industry (reporters and nonreporters).

### **DEPRECIATION CHARGES FOR FIXED ASSETS**

This item includes depreciation and amortization charged during the year against assets. Depreciation charged against fixed assets acquired since the beginning of the year and against assets sold or retired during the year are components of this category. Respondents were requested to make certain that they did not report accumulated depreciation.

### **NUMBER OF EMPLOYEES**

This item includes all full-time and part-time employees on the payrolls of operating manufacturing establishments during any part of the pay period that included the 12th of the months specified on the report form. Included are employees on paid sick leave, paid holidays, and paid vacations; not included are proprietors and partners of unincorporated businesses.

These individuals comprise of all full-time and part-time employees who are on the payrolls of establishments who worked or received pay for any part of the pay period including the 12th of March, May, August, and November.

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The “all employees” number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average for the payroll periods including the 12th of March, May, August, and November

### **Production Workers**

The “production workers” number includes workers (up through the line-supervisor level) engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant’s own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Employees above the working-supervisor level are excluded from this item.

### **All Other Employees**

The “other employees” covers nonproduction employees of the manufacturing establishment including those engaged in factory supervision above the line-supervisor level. It includes sales (including driver-salespersons), sales delivery (highway truck drivers and their helpers), advertising, credit, collection, installation and servicing of own products, clerical and routine office functions, executive, purchasing, financing, legal, personnel (including cafeteria, medical, etc.), professional, and technical employees. Also included are employees on the payroll of the manufacturing establishment engaged in the construction of major additions or alterations utilized as a separate work force.

### **TOTAL FRINGE BENEFITS**

This item is the employer’s costs for social security tax, unemployment tax, workmen’s compensation insurance, state disability insurance pension plans, stock purchase plans, union-negotiated benefits, life insurance premiums, and insurance premiums on hospital and medical plans for employees.

Fringe benefits are divided into legally required expenditures and payments for voluntary programs. The legally required portion consists primarily of federal old age and survivors’ insurance, unemployment compensation, and workers’ compensation. Payments for voluntary programs include all programs not specifically required by legislation, whether they were employer initiated or the result of collective bargaining. They include the employer portion of such plans as insurance premiums, premiums for supplemental accident and sickness insurance, pension plans, supplemental unemployment compensation, welfare plans, stock purchase plans on which the employer payment is not subject to withholding tax, and deferred profit-sharing plans. They exclude such items as company-operated cafeterias, in-plant medical services, free parking lots, discounts on employee purchases, and uniforms and work clothing for employees.

### **GROSS VALUE OF DEPRECIABLE ASSETS (ACQUISITION COSTS) AT BEGINNING OF YEAR (BOY) AND END OF YEAR (EOY)**

Total value of depreciable assets is collected on all census forms.

It shows the value of depreciable assets for the beginning of year (BOY) and end of year (EOY). The data encompass all fixed depreciable assets on the books of establishments. The values shown (book value) represent the actual cost of assets at the time they were acquired, including all costs incurred in making the assets usable (such as transportation and installation). Included are all buildings, structures, machinery, and equipment (production, office, and transportation equipment) for which depreciation reserves are maintained. Excluded are nondepreciable capital assets including inventories and intangible assets, such as timber and mineral rights.

The definition of fixed depreciable assets is consistent with the definition of capital expenditures. For example, expenditures include actual capital outlays during the year rather than the final value of equipment put in place and buildings completed during the year.

Accordingly, the value of assets at the end of the year includes the value of construction in progress.

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In addition, respondents were requested to make certain that assets at the beginning of the year plus capital expenditures, less retirements, equaled assets at the end of the year.

## **ESTABLISHMENT**

An establishment is a single physical location where business is conducted or where services or industrial operations are performed. Data in this sector includes those establishments where manufacturing is performed. A separate report was required for each manufacturing establishment (plant) with one employee or more that were in operation at any time during the year.

An establishment not in operation for any portion of the year was requested to return the report form with the proper notation in the "Operational Status" section of the form. In addition, the establishment was requested to report data on any employees, capital expenditures, inventories, or shipments from inventories during the year.

## **Company**

A company or ("enterprise") is comprised of all the establishments that operate under the ownership or control of a single organization. A company may be a business, service, or membership organization; consist of one or several establishments; and operate at one or several locations. It includes all subsidiary organizations, all establishments that are majority-owned by the company or any subsidiary, and all the establishments that can be directed or managed by the company or any subsidiary.

A company may have one or many establishments. Examples include product and service sales offices (retail and wholesale), industrial production plants, processing or assembly operations, mines or well sites, and support operations (such as an administrative office, warehouse, customer service center, or regional headquarters). Each establishment should receive, complete, and return a separate census form.

If the company operated at different physical locations, even if the individual locations were producing the same line of goods, a separate report was requested for each location. If the company operated in two or more distinct lines of manufacturing at the same location, a separate report was requested for each activity.

## **PAYROLL**

This item includes the gross earnings of all employees on the payrolls of operating manufacturing establishments paid in the calendar year. Respondents were told they could follow the definition of payrolls used for calculating the federal withholding tax. It includes all forms of compensation, such as salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' social security contributions, withholding taxes, group insurance, union dues, and savings bonds. The total includes salaries of officers of corporations; it excludes payments to proprietors or partners of unincorporated concerns. Also excluded are payments to members of Armed Forces and pensioners carried on the active payrolls of manufacturing establishments.

The census definition of payrolls is identical to that recommended to all federal statistical agencies by the Office of Management and Budget. It should be noted that this definition does not include employers' social security contributions or other nonpayroll labor costs, such as employees' pension plans, group insurance premiums, and workers' compensation.

The ASM provides estimates of employers' total supplemental labor costs (those required by federal and state laws and those incurred voluntarily or as part of collective bargaining agreements).

## **PRODUCT CODES AND CLASSES OF PRODUCTS**

NAICS United States industries are identified by a six-digit code. The longer code accommodates the large number of sectors and allows more flexibility in designing subsectors. Each product or service is assigned a ten-digit code. The product coding structure represents an extension by the Census Bureau of the six-digit industry classifications of the manufacturing and mining sectors. The classification system operates so that the industrial coverage is progressively narrower with the successive addition of digits.

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As in previous censuses, data were collected for most industries on the quantity and value of individual products shipped. Since the 1997 census programs, information is collected on the output of almost 10,000 individual product items.

In the manufacturing sector for 2002, there are 21 subsectors (three-digit NAICS), 86 industry groups (four-digit NAICS), 184 NAICS industries (five-digit NAICS) that are comparable with Canadian and Mexican classification, and 473 U.S. industries (six-digit NAICS). Product classes and products of the manufacturing industries have been assigned codes based on the industry from which they originate. There are 1,450 product classes (seven-digit codes), 5,674 census products, and an additional 3,746 ten-digit product codes. The ten-digit products are considered the primary products of the industry with the same first six digits.

The list of products for which separate information was collected was prepared after consultation with industry and government representatives.

Comparability with previous figures was given considerable weight in the selection of product categories, so that comparable 1992 information is presented for most products.

Typically, both quantity and value of shipments information were collected. However, if quantity was not significant or could not be reported by manufacturers, only value of shipments was collected.

Shipments include both commercial shipments and transfers of products to other plants of the same company. For industries in which a considerable portion of the total shipments is transferred to other plants of the same company, separate information on interplant transfers also was collected. Moreover, for products that are used to a large degree within the same establishment as materials or components in the fabrication of other products, total production and often consumption of the item within the plant (quantity produced and consumed) was collected. Typically, the information on production also was collected for products for which there are significant differences between total production and shipments in a given year because of wide fluctuations in finished goods inventories. Other measures of output of products with long production cycles were used as appropriate and feasible.

### **PRODUCTION-WORKER HOURS**

This item covers all hours worked or paid for at the manufacturing plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave when the employee was not at the establishment.

### **QUANTITY OF ELECTRICITY PURCHASED FOR HEAT AND POWER**

Data on the cost of purchased electric energy were collected on all census forms. However, data on the quantity of purchased electric energy were collected only on the Annual Survey of Manufactures (ASM) form. In addition, information is collected on the quantity of electric energy generated by the establishment and the quantity of electric energy sold or transferred to other plants of the same company.

### **RENTAL PAYMENTS**

Total rental payments are collected on all census forms. However, the breakdown between rental payments for buildings and other structures and rental payments for machinery and equipment is collected only on the ASM forms. This item includes rental payments for the use of all items for which depreciation reserves would be maintained, if they were owned by the establishment, e.g., structures and buildings, and production, office, and transportation equipment. Excluded are royalties and other payments for the use of intangibles and depletable assets and land rents where separable.

When an establishment of a multiestablishment company was charged rent by another part of the same company for the use of assets owned by the company, it was instructed to exclude that cost from rental payments.

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However, the book value (original cost) of these company-owned assets was to be reported as assets of the establishment at the end of the year.

If there were assets at an establishment rented from another company and the rents were paid centrally by the head office of the establishment, the company was instructed to report these rental payments as if they were paid directly by the establishment.

### **RETIREMENTS OF DEPRECIABLE ASSETS**

Included in this item is the gross value of assets sold, retired, scrapped, destroyed, etc., during the calendar year. When a complete operation or establishment changed ownership, the respondent was instructed to report the value of the assets sold at the original cost as recorded in the books of the seller. The respondent also was requested to report retirements of equipment or structures owned by a parent company that the establishment was using as if it were a tenant.

### **CAPITAL EXPENDITURES FOR NEW AND USED PLANT AND EQUIPMENT**

Represents the total new and used capital expenditures reported by establishments in operation and any known plants under construction.

These data include expenditures for:

1. Permanent additions and major alterations to manufacturing and mining establishments.
2. New and used machinery and equipment used for replacement and additions to plant capacity, if they are of the type for which depreciation, depletion, or (for mining establishments) Office of Minerals Exploration accounts are ordinarily maintained. In addition, for mining establishments, these data include expenditures made during the year for development and exploration of mineral properties. For manufacturing establishments, these data are broken down into three types.
  - a. Automobiles, trucks, etc. for highway use. These include vehicles acquired under a lease-purchase agreement and excludes vehicles leased or normally designed to transport materials, property, or equipment on mining, construction, petroleum development, and similar projects. These vehicles are of such size or weight as to be normally restricted by state laws or regulations from operating on public highways. It also excludes purchases of vehicles that are purchased by a company for highway use.
  - b. Computers and peripheral data processing equipment. This item include all purchases of computers and related equipment.
  - c. All other expenditures for machinery and equipment excluding automobiles and computer equipment.

Capital expenditures include work done by contract, as well as by the establishment's own workforce.

These data exclude expenditures for land and mineral rights and cost of maintenance and repairs charged as current operating expenses.

### **VALUE ADDED**

This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments (products manufactured plus receipts for services rendered). The result of this calculation is adjusted by the addition of value added by merchandising operations (i.e., the difference between the sales value and the cost of merchandise sold without further manufacture, processing, or assembly) plus the net change in finished goods and work-in-process between the beginning- and end-of-year inventories.



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For those industries where value of production is collected instead of value of shipments, value added is adjusted only for the change in work-in-process inventories between the beginning and end of year. For those industries where value of work done is collected, the value added does not include an adjustment for the change in finished goods or work-in-process inventories.

“Value added” avoids the duplication in the figure for value of shipments that results from the use of products of some establishments as materials by others. Value added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

### **VALUE OF SHIPMENTS**

This item covers the received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts, such as receipts for contract work performed for others, installation and repair, sales of scrap, and sales of products bought and sold without further processing. Included are all items made by or for the establishments from material owned by it, whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, including not only the direct cost of production but also a reasonable proportion of “all other costs” (including company overhead) and profit.

In addition to the value for NAICS defined products, aggregates of the following categories of miscellaneous receipts are reported as part of a total establishment’s value of product shipments: Reported contract work — receipts for work or services that a plant performed for others on their materials. Value of resales — sales of products brought and sold without further manufacture, processing, or assembly. Other miscellaneous receipts — such as repair work, installation, sales of scrap, etc.

Industry primary product value of shipments represents one of the three components of value of shipments. These components are: Primary products value of shipments. Secondary product value of shipments. Total miscellaneous receipts.

Primary product shipments is used in the calculations of industry specialization ratio and industry coverage ratio. The term “Value of primary products shipments made in this industry” is used in this publication and refers to the same data.

### **Duplication in cost of materials and value of shipment**

The aggregate of the cost of materials and value of shipments figures for industry groups and for all manufacturing industries includes large amounts of duplication since, the products of some industries are used as materials by others. This duplication results, in part, from the addition of related industries representing successive stages in the production of a finished manufactured product. Examples are the addition of flour mills to bakeries in the food group and the addition of pulp mills to paper mills in the paper and allied products group of industries.

Estimates of the overall extent of this duplication indicate that the value of manufactured products exclusive of such duplication (the value of finished manufactures) tends to approximate two-thirds of the total value of products reported in the annual survey.

Duplication of products within individual industries is significant within a number of industry groups, e.g., machinery and transportation industries. These industries frequently include complete machinery and their parts. In this case, the parts made for original equipment are materials consumed for assembly plants in the same industry.

Even when no significant amount of duplication is involved, value of shipments figures are deficient as measures of the relative economic importance of individual manufacturing industries or geographic areas because of the wide variation in ratio of materials, labor, and other processing costs of value of shipments, both among industries and within the same industry.

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Before 1962, cost of materials and value of shipments were not published for some industries that included considerable duplication. Since then, these data have been published for all industries at the U.S. level and beginning in 1964, for all geographic levels.

### **Specialization and coverage ratio**

These items are not collected on the report forms, but are derived from the data shown in Table 3. An establishment is classified in a particular industry, if its shipments of primary products of that industry exceed in value its shipments of the products of any other single industry.

An establishment's shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.).

Specialization and coverage ratio have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in Tables 1 through 5 and data on product shipments shown in Tables 6a and 6b.

Specialization ratio represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments wherever classified.

# Appendix B.

## NAICS Codes, Titles, and Descriptions

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### **324110 PETROLEUM REFINERIES**

This U.S. industry comprises establishments primarily engaged in refining crude petroleum into refined petroleum. Petroleum refining involves one or more of the following activities:

1. fractionation;
2. straight distillation of crude oil; and
3. cracking.

# Appendix C.

## Methodology

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### SOURCES OF THE DATA

The manufacturing sector includes approximately 350,000 establishments. This number includes those industries in the North American Industry Classification System (NAICS) definition of manufacturing. The amount of information requested from manufacturing establishments was dependent upon a number of factors. The more important considerations were the size of the company and whether it was included in the Annual Survey of Manufactures (ASM).

Establishments in the 2002 Economic Census are divided into those sent report forms and those not sent report forms. The coverage of and the method of obtaining census information from each are described below:

1. Establishments sent a report form:

- a. ASM sample establishments. This group accounts for approximately 15 percent of all manufacturing establishments. The ASM panel covers all the units of large manufacturing establishments, as well as a sample of the medium and smaller establishments. The probability of selection was proportionate to size. For more information, see the Description of the ASM Survey Sample.

In an economic census year, the ASM report form (MA-10000) replaces the first page of the regular census form for those establishments included in the ASM. In addition to information on employment, payroll, and other items normally requested on the regular census form, establishments in the ASM sample were requested to supply additional information on gross book value of assets and capital expenditures. ASM establishments were also requested to provide information on retirements, depreciation, rental payments, and supplemental labor costs. For establishments not included in the ASM, these additional items were estimated using relationships observed in the ASM establishment data. The census statistics for these variables are a sum of the ASM establishment data and the estimated data for non-ASM establishments. ASM establishments were also requested to provide information for selected purchased services. The census statistics for the purchased service items were derived solely from the ASM establishments. See Appendix A. Explanation of Terms, for an explanation of these items. The census part of the report form is 1 of 220 versions containing product, material, and special inquiries. The diversity of manufacturing activities necessitated the use of this many forms to canvass the 473 manufacturing industries. Each form was developed for a group of related industries.

Appearing on each form was a list of products primary to the group of related industries, as well as secondary products and miscellaneous services that establishments classified in these industries were likely to perform. Respondents were requested to identify the products, the value of each product, and, in certain cases, the quantity of the product shipped during the survey year. Space also was provided for the respondent to describe products not specifically identified on the form.

The report form also contained a materials-consumed inquiry, which varied from form to form depending on the industries being canvassed. The respondents were asked to review a list of materials generally used in their production processes. From this list, each establishment was requested to identify those materials consumed during the survey year, the cost of each, and, in certain cases, the quantity consumed. Once again, space was provided

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for the respondent to describe significant materials not listed on the form.

A wide variety of special inquiries were included to measure activities peculiar to a given industry, such as operations performed and equipment used.

- b. Large and medium establishments (non-ASM). Approximately 30 percent of all manufacturing establishments were included in this group. A variable cutoff, based on administrative-record payroll data and determined on an industry-by-industry basis, was used to select those establishments that were to receive 1 of the 220 economic census — manufacturing regular forms. The first page, requesting establishment data for items such as employment and payroll, was standard but did not contain the detailed statistics included on the ASM form. The product, material, and special inquiry sections supplied were based on the historical industry classification of the establishment.
- c. Small single-establishment companies (non-ASM). This group includes approximately 15 percent of all manufacturing establishments. For those industries where application of the variable cutoff for administrative-record cases resulted in a large number of small establishments being included in the mail canvass, an abbreviated “short form” was used. These establishments received 1 of the 31 versions of the short form, which requested summary product and material data and totals but no details on employment, payroll, cost of materials, inventories, and capital expenditures.

Use of the short form has no adverse effect on published totals for the industry statistics, because the same data were collected on the short form as on the long form. However, detailed information on products and materials consumed was not collected on the short form; thus, its use would increase the value of the “not specified by kind” (nsk) categories.

## 2. Establishments not sent a report form:

- a. Small single-establishment companies not sent a report form. Approximately 40 percent of the manufacturing establishments were small single-establishment companies that were excused from filing a census report. Selection of these establishments was based on two factors: annual payroll and the Census Bureau’s ability to assign the correct six-digit NAICS industry classification to the establishment. For each six-digit NAICS industry code, an annual payroll cutoff was determined. These cutoffs were derived so that the establishments with payroll less than the cutoff were expected to account for no more than 3 percent of the value of shipments for the industry. Generally, all single-establishment companies with less than 5 employees were excused, while all establishments with more than 20 employees were mailed forms. Establishments below the cutoff that could not be directly assigned a six-digit NAICS code were mailed a classification report that requested information for assigning NAICS industry codes. Establishments below the cutoff that could be directly assigned a six-digit NAICS code were excused from filing any report. For below cutoff establishments, information on the physical location, payroll, and receipts was obtained from the administrative records of other federal agencies under special arrangements that safeguarded their confidentiality.

Estimates of data for these small establishments were developed using industry averages in conjunction with the administrative information. The value of shipments and cost of materials were not distributed among specific products and materials for these establishments, but were included in the product and material “not specified by kind” (nsk) categories.

The industry classification codes included in the administrative-record files were assigned on the basis of brief descriptions of the general activity of the establishment. As a result, an indeterminate number of establishments were erroneously coded to a six-digit NAICS industry. This was especially true whenever there was a relatively fine line of demarcation between industries or between manufacturing and nonmanufacturing activity.

Sometimes the administrative-record cases had only two- or three-digit NAICS group classification codes available in the files. For manufacturing, these establishments were sent a

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separate classification form, which requested information on the products and services of the establishment. This form was used to code many of these establishments to the appropriate six-digit NAICS level. Establishments that did not return the classification form were coded later to those six-digit NAICS industries identified as “All other” industries within the given subsector.

As a result of these situations, a number of small establishments may have been misclassified by industry. However, such possible misclassification has no significant effect on the statistics, other than on the number of companies and establishments.

The total establishment count for individual industries should be viewed as an approximation rather than a precise measurement. The counts for establishments with 20 employees or more are far more reliable than the count of total number of establishments.

- b. All nonemployers, i.e., all firms subject to federal income tax, with no paid employees, during 2002 are excluded as in previous censuses. Data for nonemployers are not included in this report, but are released in the annual *Nonemployer Statistics* series.

The report forms used to collect information for establishments in this sector are available at [help.econ.census.gov/econhelp/resources/](http://help.econ.census.gov/econhelp/resources/).

A more detailed examination of census methodology is presented in the *History of the Economic Census* at [www.census.gov/econ/www/history.html](http://www.census.gov/econ/www/history.html).

## **INDUSTRY CLASSIFICATION OF ESTABLISHMENTS**

The classifications for all establishments covered in the 2002 Economic Census — Manufacturing are classified in 1 of 473 industries in accordance with the industry definitions in the *North American Industry Classification System (NAICS), United States, 2002* manual. There were no changes between the 2002 edition and the 1997 edition affecting this sector. When applicable, Appendix F of this report shows the product class and product comparability between the two systems for data in this report.

In the NAICS system, an industry is generally defined as a group of establishments that have similar production processes. To the extent practical, the system uses supply-based or production-oriented concepts in defining industries. The resulting group of establishments must be significant in terms of number, value added by manufacture, value of shipments, and number of employees.

The coding system works in such a way that the definitions progressively become narrower with successive additions of numerical digits. In the manufacturing sector for 2002, there are 21 subsectors (three-digit NAICS), 86 industry groups (four-digit NAICS), 184 NAICS industries (five-digit NAICS) that are comparable with Canadian and Mexican classification, and 473 U.S. industries (six-digit NAICS). Product classes and products of the manufacturing industries have been assigned codes based on the industry from which they originate. There are 1,450 product classes (seven-digit codes), 5,674 census products, and an additional 3,746 ten-digit product codes. The ten-digit products are considered the primary products of the industry with the same first six digits.

For the 2002 Economic Census — Manufacturing, all establishments were classified in particular industries based on the products they produced. If an establishment made products of more than one industry, it was classified in the industry with the largest product value. For 2002, there were no “resistance rules” or “frozen industries.”

In ASM years, establishments included in the ASM sample with certainty weights are reclassified by industry only if the change in the primary activity from the prior year is significant or if the change has occurred for 2 successive years. This procedure prevents reclassification when there are minor shifts in product mix.

In ASM years, establishments included in the ASM sample with noncertainty weight are not shifted from one industry classification to another. They are retained in the industry where they were classified in the base census year. However, in the following census year, these ASM plants are allowed to shift from one industry to another.

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The results of these rules covering the switching of plants from one industry classification to another are that some industries comprise different mixes of establishments in different survey years. Hence, comparisons between prior-year and current-year published totals, particularly at the six-digit NAICS level, should be viewed with caution. This is particularly true for the comparison between the data shown for a census year versus the data shown for the previous ASM year.

As previously noted, the small establishments that may have been misclassified by industry are usually administrative-record cases whose industry codes were assigned on the basis of incomplete descriptions of the general activity of the establishment. Such possible misclassifications have no significant effect on the statistics other than on the number of companies and establishments.

Establishments frequently make products classified both in their industry (primary products) and other industries (secondary products). Industry statistics (employment, payroll, value added by manufacture, value of shipments, etc.) reflect the activities of the establishments that may make both primary and secondary products. Product statistics, however, represent the output of all establishments without regard for the classification of the producing establishment. For this reason, when relating the industry statistics, especially the value of shipments, to the product statistics, the composition of the industry's output should be considered.

The extent to which industry and product statistics may be matched with each other is measured by the primary product specialization ratio and the coverage ratio. The primary product specialization ratio is the proportion of industry shipments accounted for by the primary products of establishments classified in the industry. The coverage ratio is the proportion of product shipments accounted for by establishments classified in the industry.

### **ESTABLISHMENT BASIS OF REPORTING**

The 2002 Economic Census — Manufacturing is conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each location or establishment. The ASM also is conducted on an establishment basis, but separate reports are filed for just those establishments selected in the sample. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports, if the plant records permit such a separation and if the activities are substantial in size.

In 2002, as in earlier years, a minimum size limit was set for inclusion of establishments in the census. All establishments employing one person or more at any time during the census year are included. The same size limitation has applied since 1947 in censuses and annual surveys of manufactures. In the 1939 and earlier censuses, establishments with less than \$5,000 value of products were excluded. The change in the minimum size limit in 1947 does not appreciably affect the historical comparability of the census figures, except for data on number of establishments for a few industries.

The 2002 Economic Census — Manufacturing excludes data for central administrative offices (CAOs). These would include separately operated administrative offices, warehouses, garages, and other auxiliary units that service manufacturing establishments of the same company. These data are published in a separate report series.

### **DESCRIPTION OF THE ASM SURVEY SAMPLE**

The ASM sample is drawn for the second survey year after a census. The most recent sample was drawn for the 1999 survey year based on the 1997 Economic Census — Manufacturing. This sample will be in place through the 2003 ASM.

In 1997, there were approximately 370,000 individual manufacturing establishments. For sample efficiency and cost considerations, the establishments in the 1997 manufacturing population were partitioned into two components for developing estimates within the ASM. The details of each are described below:

1. Mail stratum. The mail stratum of the survey is comprised of larger single-location manufacturing companies and all manufacturing establishments of multiunit companies (companies

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that operate at more than one physical location). Approximately 200,000 of the 370,000 establishments in the 1997 census were assigned to the mail stratum. On an annual basis, the mail stratum is supplemented with larger, newly active single-location companies identified from a list provided by the Internal Revenue Service (IRS) and new manufacturing locations of multiunit companies identified from the Census Bureau's Company Organization Survey (COS).

For the 1999 survey, a new sample of approximately 58,000 individual establishments was selected from the mail stratum assembled from the 1997 census. Supplemental samples representing both 1998 and 1999 births (newly active establishments that were not included in the 1997 census) were also selected. Establishments selected for the sample are mailed an ASM survey questionnaire for each year through 2003.

The 1999-2003 ASM sample design is similar to the one used since 1984. Companies in the 1997 Economic Census — Manufacturing with manufacturing shipments of at least \$500 million were defined as company certainties. For these large companies, each manufacturing establishment is included in the mail sample. For the 1999-2003 sample, there are approximately 500 certainty companies collectively accounting for over 18,000 establishments.

For the remaining portion of the mail component of the survey, the establishment was defined as the sample unit. All establishments with 250 employees or more were defined as employment certainties. Across these arbitrary certainty classes, there were approximately 25,000 establishments included in the sample with certainty. Collectively, these certainty establishments accounted for approximately 80 percent of the total value of shipments in the 1997 Economic Census — Manufacturing.

Smaller establishments in the remaining portion of the mail stratum were sampled with probabilities ranging from .02 to 1.00. The initial probabilities of selection assigned to these establishments were proportionate to a measure-of-size determined for each establishment. The measure-of-size was a function of the establishment's 1997 industry classification and its 1997 product class data. For each product class (1,755) and six-digit industry (473), a desired reliability constraint was specified. Using a technique developed by Dr. James R. Chromy of the Research Triangle Institute, the initial establishment probabilities were optimized such that the expected sample satisfied all industry and product class reliability constraints, while the sample size was minimized. This technique reduces the likelihood of selecting nonrepresentative samples for individual product classes or industries.

This method of assigning probabilities based on product class shipments is motivated by the Census Bureau's primary desire to produce reliable estimates of both product class and industry shipments. The high correlation between shipments and employment, value-added, and other general statistics assures that these variables will also be well represented by the sample. The actual sample selection procedure uses an independent chance of selection method (Poisson sampling) that permits us to prevent small establishments from being selected in consecutive samples without introducing a bias into the survey estimates.

2. Nonmail stratum. The initial nonmail component of the survey was comprised of approximately 170,000 small, single-establishment companies that were tabulated as administrative records in the 1997 Economic Census — Manufacturing. The nonmail stratum is also supplemented annually using the list of newly active single-location companies provided by the Internal Revenue Service (IRS) and payroll cutoffs. Companies with payroll below the payroll cutoff are added to the nonmail stratum. For this portion of the population, sampling is not used. The data for this group are estimated based on selected information obtained annually from the administrative records of the IRS and Social Security Administration (SSA). This administrative information, which includes payroll, total employment, industry classification, and physical location, is obtained under conditions which safeguard the confidentiality of both tax and census records.

## **RELIABILITY OF DATA**

All data compiled in the economic census are subject to nonsampling errors. Nonsampling errors can be attributed to many sources during the development or execution of the census. The following are two ways that further explain this method: ASM Estimating Procedure. Most of the ASM



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estimates derived for the mail stratum are computed using a difference estimator. At the establishment level, there is a strong correlation between the current-year data values and the corresponding 1997 (base) data values. Therefore, within the mailed stratum, for each item at each level of aggregation, an estimate of the “difference” between the current year and the base year is computed from sample cases and added to the corresponding base-year values. For the 1998-2002 ASM estimates, the 1997 Economic Census — Manufacturing values serve as the base year. For the 2003 ASM, the base will be updated to be the 2002 Economic Census — Manufacturing.

Due to the positive year-to-year correlation, estimates derived using this methodology are generally more reliable than comparable estimates developed from the current sample data alone. Estimates for the capital expenditures variables are not generated using the difference estimator because the year-to-year correlations are considerably weaker. The standard linear estimator is used for these variables.

For the nonmail stratum, estimates for payroll and employment are directly tabulated from the administrative-record data provided by IRS and SSA. Estimates of data other than payroll and employment are developed from industry averages. Although the nonmail stratum contained approximately 170,000 individual establishments in 1999, it accounts for less than 2 percent of the estimate for total value of shipments at the total manufacturing level.

Corresponding estimates for the mail and nonmail components are combined to produce the estimates included in this publication. ASM Data Qualifications. The estimates developed from the sample are apt to differ somewhat from the results of a survey covering all companies in the sample lists, but otherwise conducted under essentially the same conditions as the actual sample survey. The estimates of the magnitude of the sampling errors (the difference between the estimates obtained and the results theoretically obtained from a comparable, complete-coverage survey) are provided by the standard errors of estimates.

The particular sample selected for the ASM is one of many similar probability samples that, by chance, might have been selected under the same specifications. Each of the possible samples would yield somewhat different sets of results, and the standard errors are measures of the variation of all the possible sample estimates around the theoretically comparable, complete-coverage values.

Estimates of the standard errors have been computed from the sample data for selected ASM statistics in this report. They are represented in the form of relative standard errors (the standard errors divided by the estimated values to which they refer).

In conjunction with its associated estimate, the relative standard error may be used to define confidence intervals (ranges that would include the comparable, complete-coverage value for specified percentages of all the possible samples).

The complete-coverage value would be included in the range:

- From one standard error below to one standard error above the derived estimate for about two-thirds of all possible samples.
- From two standard errors below to two standard errors above the derived estimate for about 19 out of 20 of all possible samples.
- From three standard errors below to three standard errors above the derived estimate for nearly all samples.

An inference that the comparable, complete-survey result would be within the indicated ranges would be correct in approximately the relative frequencies shown. Those proportions, therefore, may be interpreted as defining the confidence that the estimates from a particular sample would differ from complete-coverage results by as much as one, two, or three standard errors, respectively.

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For example, suppose an estimated total is shown at 50,000 with an associated relative standard error of 2 percent, that is, a standard error of 1,000 (2 percent of 50,000). There is approximately 67 percent confidence that the interval 49,000 to 51,000 includes the complete-coverage total, about 95 percent confidence that the interval 48,000 to 52,000 includes the complete-coverage total, and almost certain confidence that the interval 47,000 to 53,000 includes the complete-coverage total.

In addition to the sample errors, the estimates are subject to various response and operational errors: errors of collection, reporting, coding, transcription, imputation for nonresponse, etc. These operational errors also would occur if a complete canvass were to be conducted under the same conditions as the survey. Explicit measures of their effects generally are not available. However, it is believed that most of the important operational errors were detected and corrected during the Census Bureau's review of the data for reasonableness and consistency. The small operational errors usually remain. To some extent, they are compensating in the aggregated totals shown. When important operational errors were detected too late to correct the estimates, the data were suppressed or were specifically qualified in the tables.

As derived, the estimated standard errors included part of the effect of the operational errors. The total errors, which depend upon the joint effect of the sampling and operational errors, are usually of the order of size indicated by the standard error, or moderately higher. However, for particular estimates, the total error may considerably exceed the standard errors shown. Any figures shown in the tables in this publication having an associated standard error exceeding 15 percent may be combined with higher level totals, creating a broader aggregate, which then may be of acceptable reliability.

#### **DUPLICATION IN COST OF MATERIALS AND VALUE OF SHIPMENTS**

Data for cost of materials and value of shipments include varying amounts of duplication, especially at higher levels of aggregation. This is because the products of one establishment may be the materials of another. The value added statistics avoid this duplication and are, for most purposes, the best measure for comparing the relative economic importance of industries and geographic areas.

#### **VALUE OF INDUSTRY SHIPMENTS COMPARED WITH VALUE OF PRODUCT SHIPMENTS**

The 2002 Economic Census — Manufacturing shows value of shipments data for industries and products. In the industry statistics tables and files, these data represent the total value of shipments of all establishments classified in a particular industry. The data include the shipments of the products classified in the industry (primary to the industry), products classified in other industries (secondary to the industry), and miscellaneous receipts (repair work, sale of scrap, research and development, installation receipts, and resales). Value of product shipments shown in the products statistics tables and files represent the total value of all products shipped that are classified as primary to an industry regardless of the classification of the producing establishment.

#### **DISCLOSURE**

In accordance with federal law governing census reports (Title 13 of the United States Code), no data are published that would disclose the operations of an individual establishment or company. However, the number of establishments in a specific industry or geographic area is not considered a disclosure; therefore, this information may be released even though other information is withheld. Techniques employed to limit disclosure are discussed at [www.census.gov/epcd/ec02/disclosure.htm](http://www.census.gov/epcd/ec02/disclosure.htm).

The disclosure analysis for the industry statistics files is based on the total value of shipments. When the total value of shipments cannot be shown without disclosing information for individual companies, the complete line is suppressed except for capital expenditures. Nonetheless, the suppressed data are included in higher-level totals. A separate disclosure analysis is performed for capital expenditures, which can be suppressed even though value of shipments data are published.

# Appendix D. Geographic Notes

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Not applicable for this report.

# Appendix E. Metropolitan Areas and Micropolitan Statistical Areas

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Not applicable for this report.

# Appendix F. Comparability of Product Classes and Product Codes: 2002 to 1997

2002 published	2002 collected	1997 published	2002 published	2002 collected	1997 published	2002 published	2002 collected	1997 published
3241101	3241101	3241101	324110P	324110P	324110P	3241222251	3241222251	3241222251
3241101111	3241101111	3241101111	324110P111	324110P111	324110P111	3241222361	3241222361	3241222361
3241101121	3241101121	3241101121	324110P121	324110P121	324110P121	3241222371	3241222371	3241222371
3241101YVW	3241101YVW	3241101YVW	324110PYVW	324110PYVW	324110PYVW	3241222481	3241222481	3241222481
						3241222591	3241222591	3241222591
3241104	3241104	3241104	324110T	324110T	324110T	32412226A1	32412226A1	32412226A1
3241104111	3241104111	3241104111	324110T111	324110T111	324110T111	32412226B1	32412226B1	32412226B1
3241104121	3241104121	3241104121	324110T121	324110T121	324110T121	3241222711	3241222711	3241222711
3241104YVW	3241104YVW	3241104YVW	324110T131	324110T131	324110T131	32412227C1	32412227C1	32412227C1
			324110T141	324110T141	324110T141	32412227D1	32412227D1	32412227D1
			324110T151	324110T151	324110T151			
3241107	3241107	3241107	324110T161	324110T161	324110T161	32412227E1	32412227E1	32412227E1
3241107100	3241107100	3241107100	324110T171	324110T171	324110T171	32412227F1	32412227F1	32412227F1
			324110T181	324110T181	324110T181	32412227G1	32412227G1	32412227G1
			324110T191	324110T191	324110T191	32412227H1	32412227H1	32412227H1
324110A	324110A	324110A	324110T1A1	324110T1A1	324110T1A1	32412227J1	32412227J1	32412227J1
324110A111	324110A111	324110A111	324110T1B1	324110T1B1	324110T1B1	3241222YVW	3241222YVW	3241222YVW
324110A121	324110A121	324110A121	324110T1C1	324110T1C1	324110T1C1			
324110AYVW	324110AYVW	324110AYVW	324110TYVW	324110TYVW	324110TYVW			
						324122W	324122W	324122W
						324122WYVW	324122WYVW	324122WYVW
						324122WYVY	324122WYVY	324122WYVY
324110D	324110D	324110D	324110W	324110W	324110W	3241910	3241910	3241910
324110D100	324110D100	324110D100	324110WYVW	324110WYVW	324110WYVW	3241910111	3241910111	3241910111
			324110WYVY	324110WYVY	324110WYVY	3241910121	3241910121	3241910121
						3241910YVW	3241910YVW	3241910YVW
						3241910YVY	3241910YVY	3241910YVY
324110G	324110G	324110G	3241210	3241210	3241210	3241991	3241991	3241991
324110G111	324110G111	324110G111	3241210111	3241210111	3241210111	3241991111	3241991111	3241991111
324110G121	324110G121	324110G121	3241210121	3241210121	3241210121	3241991121	3241991121	3241991121
324110GYVW	324110GYVW	324110GYVW	3241210131	3241210131	3241210131	3241991131	3241991131	3241991131
			3241210141	3241210141	3241210141	3241991141	3241991141	3241991141
			3241210YVW	3241210YVW	3241210YVW	3241991151	3241991151	3241991151
						3241991YVW	3241991YVW	3241991YVW
324110J	324110J	324110J	3241221	3241221	3241221	3241992	3241992	3241992
324110J111	324110J111	324110J111	3241221111	3241221111	3241221111	3241992131	3241992131	3241992131
324110J121	324110J121	324110J121	3241221221	3241221221	3241221221	3241992211	3241992211	3241992211
324110J131	324110J131	324110J131	3241221231	3241221231	3241221231	3241992221	3241992221	3241992221
324110J141	324110J141	324110J141	3241221341	3241221341	3241221341	3241992241	3241992241	3241992241
324110J151	324110J151	324110J151	3241221351	3241221351	3241221351	3241992YVW	3241992YVW	3241992YVW
324110J161	324110J161	324110J161	3241221YVW	3241221YVW	3241221YVW			
324110J171	324110J171	324110J171				324199W	324199W	324199W
324110JYVW	324110JYVW	324110JYVW				324199WYVW	324199WYVW	324199WYVW
						324199WYVY	324199WYVY	324199WYVY
324110M	324110M	324110M	3241222	3241222	3241222			
324110M111	324110M111	324110M111	3241222121	3241222121	3241222121			
324110M121	324110M121	324110M121	3241222131	3241222131	3241222131			
324110M131	324110M131	324110M131	3241222241	3241222241	3241222241			
324110MYVW	324110MYVW	324110MYVW						

