

**COMPARISONS & ANALYSES  
OF U.S. & GLOBAL ECONOMIC DATA & TRENDS**



***Subproject B:***  
**Comparison of Wages and  
Other Compensation Between  
Manufacturing Industries and  
Other Sectors**

**September 2004**



Manufacturing Extension Partnership



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**COMPARISONS & ANALYSES OF  
U.S. & GLOBAL  
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*Subproject B:*

**Comparison of Wages and Other Compensation Between Manufacturing  
Industries and Other Sectors**

*Prepared by:*



*Prepared for:*

**Futures Group  
Manufacturing Extension Partnership  
National Institute of Standards and Technology  
U.S. Department of Commerce**

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## **I. INTRODUCTION AND EXECUTIVE SUMMARY**

The debate concerning the state of U.S. manufacturing is rising in intensity. Some claim that the sector faces a crisis of falling output and employment, while others believe that U.S. manufacturing is healthy and robust but undergoing structural change. All, however, do agree on the importance of manufacturing to the economy. Manufacturing has been a primary driver of U.S. productivity gains, technological innovation, and economic growth. A strong manufacturing base is a vital mainstay of state and local economies, providing jobs and tax revenues for essential public services.

Another reason given for the importance of manufacturing to the U.S. economy is that jobs in the manufacturing sector pay higher wages and other forms of compensation than those of many other sectors. The goal of this subtask is to present data on the status of compensation in the U.S. manufacturing sector. In particular, this analysis aims to provide an in-depth examination and comparison of wage and other forms of worker compensation within various manufacturing industries and between manufacturing and other sectors.

This report was prepared by SRI International for the Futures Group of the Manufacturing Extension Partnership (MEP) of the National Institute of Standards and Technology (NIST) as Subtask B, “Comparisons of wages and other compensation between industries and other sectors,” under Project 1, “Various comparisons and analyses of U.S. and global economic data and trends.”

### **A. Study Design**

Following this introduction and executive summary, this report is organized into five sections. Using existing data sources provided by the U.S. Department of Labor’s Bureau of Labor and Statistics, the SRI team analyzed and compared the following sets of indicators:

1. Wage differentials between manufacturing and non-manufacturing industries;
2. Wage differentials among the manufacturing sub-sectors;
3. Wages by occupational category;
4. Wages in high-tech vs. low-tech sectors; and
5. Non-wage/non-salary compensation in manufacturing, non-manufacturing, and service industries.

Each section in this report contains a brief description of the data analysis methodology, followed by a presentation of findings.

## B. Overall Data Analysis Methodology

### *Wage/Salary Data*

The primary data source for the wage analysis is the Bureau of Labor Statistics' *National Industry-Specific Occupational Employment and Wage Estimates (OES)* survey.<sup>1</sup> This data series provides detailed estimates of employment and wages organized by industry and by occupation:

- Industry-level data is organized by 2-digit and 3-digit SIC code. Beginning in 2002, the Bureau of Labor Statistics started classifying the OES data according to the NAICS system. The SRI team chose to use the 2001 data set, classified by SIC codes, in order to facilitate more accurate time series comparisons with previous years' data.
- Occupational-level data is organized by the Standard Occupational Classification (SOC) system. The SOC system consists of 821 detailed occupations in 23 major occupational groups. Data for 1998 and earlier are based on the old Occupational Employment Statistics (OES) classification system, which utilized 7 major occupational groups and 770 detailed occupations. About half of the occupations changed slightly in the conversion from the OES to the SOC system. For this reason, the data after 1998 are not always directly comparable to data from 1998 and earlier. In order to make the most accurate time series comparisons possible, the SRI team utilized an OES-to-SOC crosswalk table to make conversions between the two systems.

The SRI team chose the OES data series over other available data sources because (1) it allows for the flexibility to conduct time-series analysis over a period of several years; (2) it provides comprehensive data at the 3-digit SIC level and for over 700 occupations, allowing for detailed analysis by industry and occupational category; and (3) it is updated semi-annually. The OES survey covers all full-time and part-time wage and salary workers in non-farm industries. It does not cover the self-employed, owners and partners in unincorporated firms, household workers, or unpaid family workers.

Data for both 2001 and 1997 were collected in order to examine trends over time. The year 1997 is the earliest year for which comparable data were available. Prior to this year, industries were surveyed only every three years.<sup>2</sup>

### *Non-Wage Compensation Data*

Data from the BLS *Employer Costs for Employee Compensation (ECEC)* survey are used to measure the non-wage compensation of workers.<sup>3</sup> The ECEC is an annual survey that shows the average cost to employers, per employee hour worked, for wages and salaries and benefits. It provides data on compensation costs for the following categories:

- Wages and salaries;

<sup>1</sup> Available at <http://www.bls.gov/oes/>.

<sup>2</sup> See [http://www.bls.gov/oes/oes\\_dl.htm](http://www.bls.gov/oes/oes_dl.htm).

<sup>3</sup> ECEC is a component of the BLS *National Compensation Survey*. See <http://www.bls.gov/ncs/home.htm>.

- Total benefit costs;
- Separate benefit costs for broad benefit categories, such as paid leave, supplemental pay, insurance, retirement and savings, legally required benefits, and other benefits;
- Separate benefit costs for detailed benefits, such as paid holidays, health insurance, defined benefit pension, and workers' compensation.

According to the ECEC, wages and salaries are defined as the hourly straight-time wage rate, or for workers not paid on an hourly basis, straight-time earnings divided by corresponding hours. Straight-time wage and salary rates are total earnings before payroll deductions, including production bonuses, incentive earnings, commission payments, and cost-of-living adjustments. Premium pay for overtime and for work on weekends and holidays, shift differentials, and non-production bonuses are included in the benefits component.

Benefits are defined as follows:

- **Paid leave:** vacations, holidays, sick leave, and other leave
- **Insurance benefits:** life, health, short-term disability, and long-term disability insurance
- **Retirement and savings benefits:** defined benefit and defined contribution plans
- **Legally required benefits:** Social Security (OASDI and Medicare), federal and state unemployment insurance, and workers' compensation
- **Supplemental pay:** premium pay (such as overtime, weekend, and holiday pay), shift differentials, and non-production bonuses (lump-sum payments provided in lieu of wage increases)
- **Other benefits:** severance pay and supplemental unemployment plans

For the purposes of this study, the data set was limited to private industry only. The self-employed, farm workers, and household workers are excluded from private industry in the ECEC survey.

The SRI team collected 2001 and 1997 ECEC data for three major industry groups: manufacturing, non-manufacturing, and service producing. Manufacturing includes SIC 20-39. Non-manufacturing is defined as all industries with the exception of SIC 20-39. Service producing includes transportation, communication, and public utilities; wholesale and retail trade; finance, insurance, and real estate; and other service industries. For more detailed analysis, the three industry groupings were further sub-divided into all workers, white collar workers, and blue collar workers.

### C. Summary Findings

Over the past two decades, the U.S. manufacturing sector has undergone many changes. Some industries have been characterized by strong capital investment, accelerating productivity growth, and innovation leadership. Other industries have faced heightened competition and relative stagnation or actual decline. Although the manufacturing sector continues to be the cornerstone of the American economy and its prospects for future growth, it has not been immune to recent unprecedented cyclical and structural changes.

**U.S. Manufacturing Jobs.** U.S. manufacturing jobs have been particularly affected by the pressures. In 1997, the U.S. manufacturing sector employed about 19 million workers. In 2001,

it accounted for just under 17 million workers. Employment in manufacturing suffered a net decrease of 2 million jobs over this period. In 2001, manufacturing was the third largest employer in the country, representing 13 percent of total U.S. employment, behind the services sector (48 million jobs or 37 percent of total jobs) and retail trade (23 million jobs or 18 percent of total jobs).

**U.S. Manufacturing Wages.** It has become a common assumption that manufacturing sector jobs pay higher wages than jobs in other sectors. The data examined in this study confirms this general finding. In 2001, the average hourly wage in manufacturing, \$17.45, was above the national average of \$16.35. Nevertheless, manufacturing wages are below wages in many major industries such as mining, construction, transportation, wholesale trade, and finance. As a sector, manufacturing sector wages ranked 6<sup>th</sup> among the nine benchmarked industries. In other words, while average manufacturing wages are higher than those of the average employee, they are below those of the average *sector*.

Disaggregating the manufacturing sector into individual industries within the sector shows that wages in the “high-tech” or “knowledge-intensive” manufacturing areas pay high wages relative to other industries. For example, mean wages in the instrument & machinery manufacturing and advanced materials manufacturing industries averaged \$20.38 and \$17.32 per hour, respectively. In comparison, mean wages in “traditional” manufacturing industries, such as food & tobacco product manufacturing and textile manufacturing, averaged \$14.15 and \$12.18 per hour, respectively.

A comparison of high-technology and low-technology industries overall (including manufacturing, services, and other sectors) provides some interesting insights. When U.S. employment is segregated into two broad categories – high-tech industries vs. low-tech industries – the results indicate that high-tech industries account for merely 7.9 percent of total U.S. employment, or 9.3 million jobs. However, high-tech employment increased by 5.8 percent over the 1997-2001 period, as compared with the low-tech industries, which grew by only 4.3 percent during the same period. In 2001, wages in high-tech industries averaged \$24.73 per hour. This represents a 26 percent wage increase from 1997. Low-tech industries averaged only \$15.38 per hour and experienced only a 18 percent wage increase from 1997.

Looking more specifically at high-tech manufacturing industries, these sectors represented 3 million employees in 2001, or about 18 percent of all manufacturing employment. With an average hourly wage of \$23.24, wages in high-tech manufacturing are significantly higher than wages in low-tech manufacturing (at \$16.19). However, wages in *non-manufacturing* high-tech industries, at \$25.43 per hour, are higher than wages in *manufacturing* high-tech industries (\$23.24). The situation reverses itself for low-tech industries, with manufacturing paying higher wages than non-manufacturing.

**Wages by Occupational Category.** Looking at wages among various occupational groupings provides additional insight into the comparison of wages in manufacturing and non-manufacturing firms. With the exception of line-level workers in manufacturing, all other occupational groups (managers, supervisors, professional business support, non-professional business support, community/professional service, and agricultural support) in the manufacturing sector earn more than their counterparts in the non-manufacturing industries. Wage differentials

in 2001 between manufacturing and non-manufacturing occupational groups vary from -6 percent for line-level workers to 55 percent for agriculture support services workers

Managers in the manufacturing industries were the highest paid of all the occupational groups, with a mean hourly rate of \$39.65, while workers providing agricultural services in the non-manufacturing industries were the lowest paid, with a mean hourly rate of \$7.84.

**Non-Wage Compensation.** Although manufacturing sector workers do not necessarily enjoy a high level of pay as compared to those in other industries, analysis of non-wage compensation shows that manufacturing workers do receive relatively higher levels of benefits as compared to other sectors. In 2001, total benefits for manufacturing workers, as measured by employer cost per employee hour worked, averaged \$7.64 per hour worked. Total benefits for workers in non-manufacturing and service-producing industries were \$5.23 and \$5.06, respectively. Measured as a percentage of total compensation, total benefits for workers in the manufacturing industries accounted for 31.4 percent of the total compensation package, compared to 26.0 percent and 25.6 percent for non-manufacturing and service-producing industries, respectively.

## II. COMPARISON OF WAGES IN MANUFACTURING AND NON-MANUFACTURING INDUSTRIES

### A. Data Analysis Methodology

Using the Bureau of Labor Statistics' *National Industry-Specific Occupational Employment and Wage Estimates (OES)* survey, the SRI team collected data on employment and wages for nine SIC-based major industry divisions. These industries cover virtually all non-farm private sector economic activity in the United States.

- Agricultural Services (SIC 07) (agricultural production, forestry, fishing, and related industries are excluded from the OES data series);
- Mining (SIC 10-14);
- Construction (SIC 15-17);
- Manufacturing (20-39);
- Transportation, communication, electric, gas and sanitary services (SIC 40-49);
- Wholesale trade (SIC 50-51);
- Retail trade (SIC 52-59);
- Finance (SIC 60-67); and
- Services (SIC 70-89).

The OES data series includes data on *total employment*, as well as four wage indicators: *mean hourly wage*, *mean annual wage*, *median hourly wage*, and *median annual wage*.

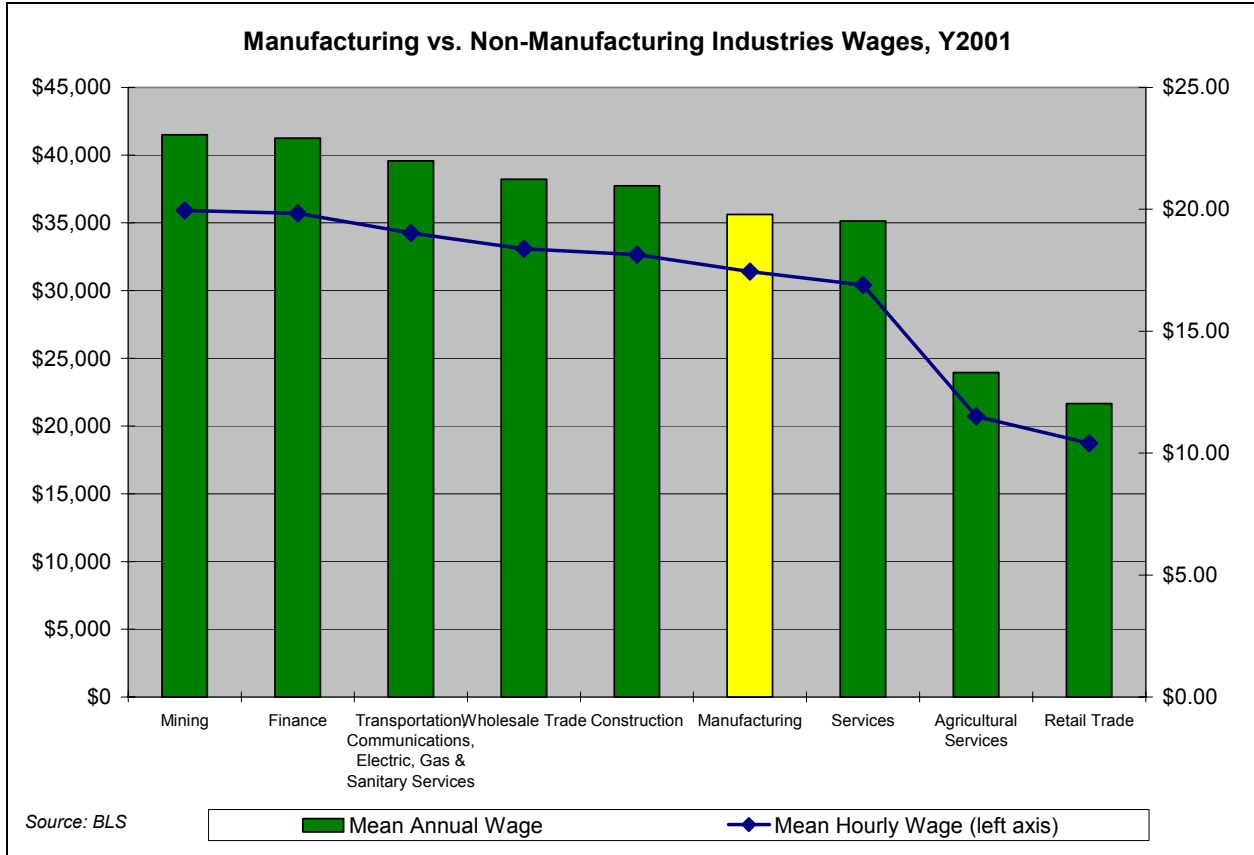
### B. Findings

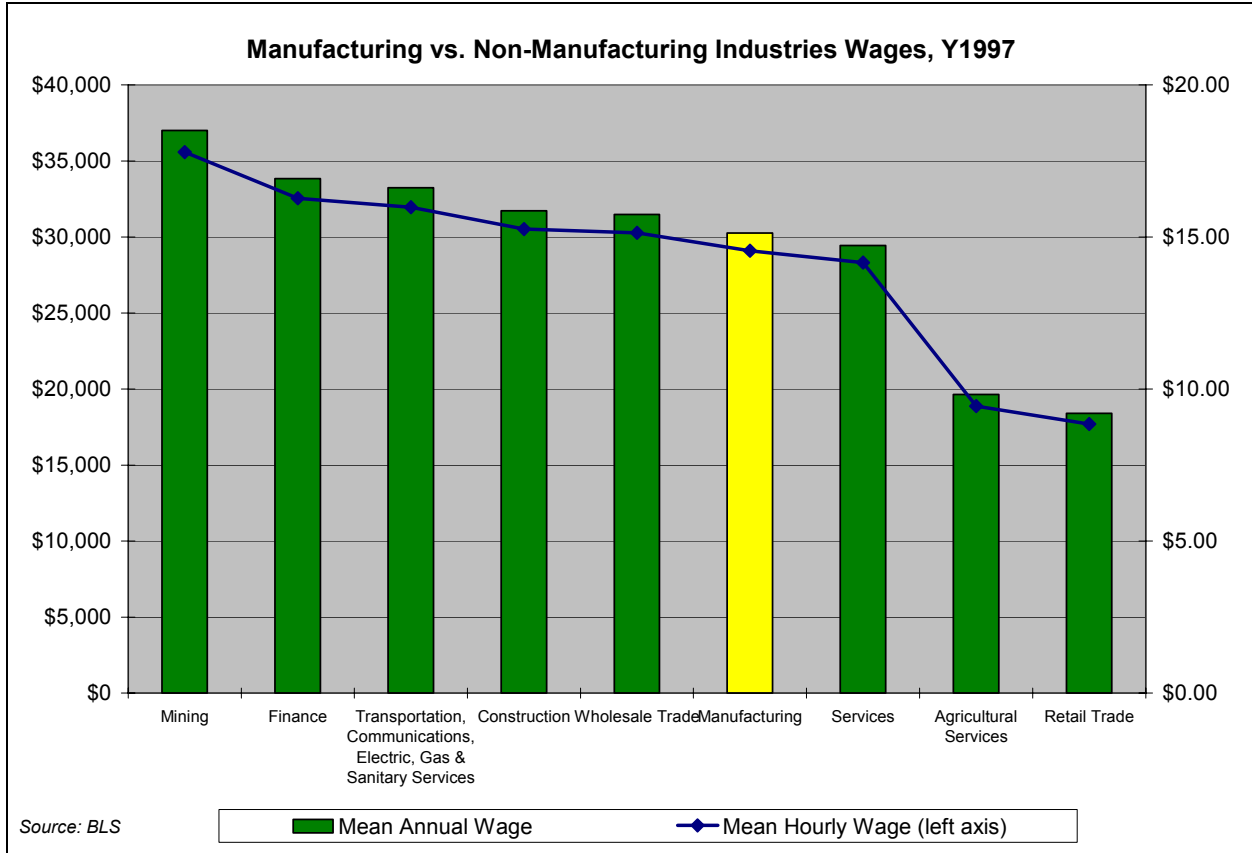
In terms of employment, manufacturing represents a very important component of the U.S. economy. In 2001, manufacturing was the third largest employer among the nine major industry divisions, with a total employment of nearly 17 million workers. Manufacturing represented 13 percent of total U.S. employment in 2001, behind the services sector (48 million jobs, 37 percent of total jobs) and retail trade (23 million jobs, 18 percent of total jobs).

In 1997, the manufacturing was also the third largest employer sector in the country, with 19 million workers, or 15 percent of total employment. Manufacturing was the only sector to have a major net decrease of jobs from 1997 to 2001. Manufacturing lost 2 million jobs, falling by 11 percent during this time period. At the same time, other industries experienced net increases in jobs — with the exception of wholesale trade and mining, which fell by 1.6 and 7.6 percent, respectively. This decline in manufacturing employment has been attributed to many factors, including continued productivity improvements and an increase in outsourcing and off-shoring activities to foreign countries.

<b>EMPLOYMENT &amp; WAGE DATA</b>				
<b>MANUFACTURING VS. NON-MANUFACTURING INDUSTRIES</b>				
<b>2001</b>				
<b>Industry</b>	<b>SIC Code</b>	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
Agricultural Services	07	1,178,000	11.51	23,940
Mining	10-14	558,560	19.95	41,502
Construction	15-17	6,812,440	18.14	37,727
<b>Manufacturing</b>	<b>20-39</b>	<b>16,893,660</b>	<b>17.45</b>	<b>35,620</b>
Transportation, Communication, et al	40-49	6,964,850	19.03	39,571
Wholesale Trade	50-51	6,670,700	18.38	38,226
Retail Trade	52-59	23,329,010	10.41	21,651
Finance	60-67	7,583,490	19.83	41,253
Services	70-89	47,951,940	16.89	35,132
<b>All Private, Non-Manufacturing</b>	<b>07, 10-17, 40-89</b>	<b>101,048,990</b>	<b>15.90</b>	<b>33,069</b>
<b>National Total*</b>		<b>127,980,410</b>	<b>16.35</b>	<b>34,020</b>
<b>1997</b>				
<b>Industry</b>	<b>SIC Code</b>	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
Agricultural Services	07	991,190	9.44	19,635
Mining	10-14	604,210	17.79	37,008
Construction	15-17	5,973,680	15.26	31,733
<b>Manufacturing</b>	<b>20-39</b>	<b>18,929,180</b>	<b>14.55</b>	<b>30,263</b>
Transportation, Communication, et al	40-49	6,573,250	15.98	33,241
Wholesale Trade	50-51	6,777,790	15.14	31,488
Retail Trade	52-59	22,208,490	8.85	18,402
Finance	60-67	7,050,340	16.27	33,842
Services	70-89	43,858,420	14.16	29,445
<b>All Private, Non-Manufacturing</b>	<b>07, 10-17, 40-89</b>	<b>94,037,370</b>	<b>13.30</b>	<b>27,670</b>
<b>National Total*</b>		<b>122,749,530</b>	<b>13.72</b>	<b>28,535</b>
* National totals are for all employees in all industries (including the government sector) and in all occupations.				

It is often stated that manufacturing is important to the U.S. economy because manufacturing sector jobs pay higher wages than jobs in other sectors. In the aggregate, the wage data collected supports this finding. The 2001 data show that manufacturing pays higher wages than those of non-manufacturing industries. The mean hourly wage of \$17.45 in manufacturing is above the average wage for non-manufacturing private industries of \$15.90, and also above the national average wage of \$16.35. When benchmarked against eight other key sectors, manufacturing ranks 6<sup>th</sup> for its average wages. Wages are highest in the mining sector (with a mean hourly wage of \$19.95 and a mean annual salary of \$41,502), followed by the finance and transportation/communication sectors. In 1997, the picture was similar, with average wages in manufacturing ranking 6<sup>th</sup> out of the nine sectors.





All of the sectors experienced a net increase in average wages from 1997 to 2001. Wage growth ranged from a low of 12 percent for mining, to a high of 22 percent for agricultural services and finance. The manufacturing sector experienced wage growth of 19.9 percent, ranking it 4<sup>th</sup> overall, ahead of services, transportation/communications, construction, retail trade, and mining. Manufacturing wage growth was slightly higher than wage growth for non-manufacturing industries overall (at 19.5 percent).

CHANGES IN AVERAGE WAGES, 1997-2001 MANUFACTURING VS. NON-MANUFACTURING INDUSTRIES					
Industry	SIC Code	Mean Hourly Wage (2001)	Mean Hourly Wage (1997)	Wage Growth Rate	Rank
Agricultural Services	07	11.51	9.44	21.9%	1
Mining	10-14	19.95	17.79	12.1%	9
Construction	15-17	18.14	15.26	18.9%	7
<b>Manufacturing</b>	<b>20-39</b>	<b>17.45</b>	<b>14.55</b>	<b>19.9%</b>	<b>4</b>
Transportation, Communication, et al	40-49	19.03	15.98	19.1%	6
Wholesale Trade	50-51	18.38	15.14	21.4%	3
Retail Trade	52-59	10.41	8.85	17.6%	8
Finance	60-67	19.83	16.27	21.9%	2
Services	70-89	16.89	14.16	19.3%	5
<b>Non-Manufacturing Total</b>	<b>07, 10-17, 40-89</b>	<b>15.9</b>	<b>13.3</b>	<b>19.5%</b>	

### III. COMPARISON OF WAGES AMONG MANUFACTURING SUB-SECTORS

#### A. Data Analysis Methodology

Using 2-digit SIC-based industry data from the Bureau of Labor Statistics' *National Industry-Specific Occupational Employment and Wage Estimates (OES)* survey, the SRI team collected data on employment and wages for the six manufacturing sub-sector industries listed below. These sub-sectors were created by grouping the 2-digit SIC data into sub-sector "clusters" or categories.

- Food and Tobacco Product Manufacturing (SIC 20-21);
- Textile and Leather Manufacturing (SIC 22-23, 31);
- Wood and Wood Product Manufacturing (24-27);
- Advanced Materials Manufacturing (SIC 28-34, exc. 31)
- Instrument and Machinery Manufacturing (SIC 35-38); and
- Miscellaneous Manufacturing (SIC 39)

#### B. Findings

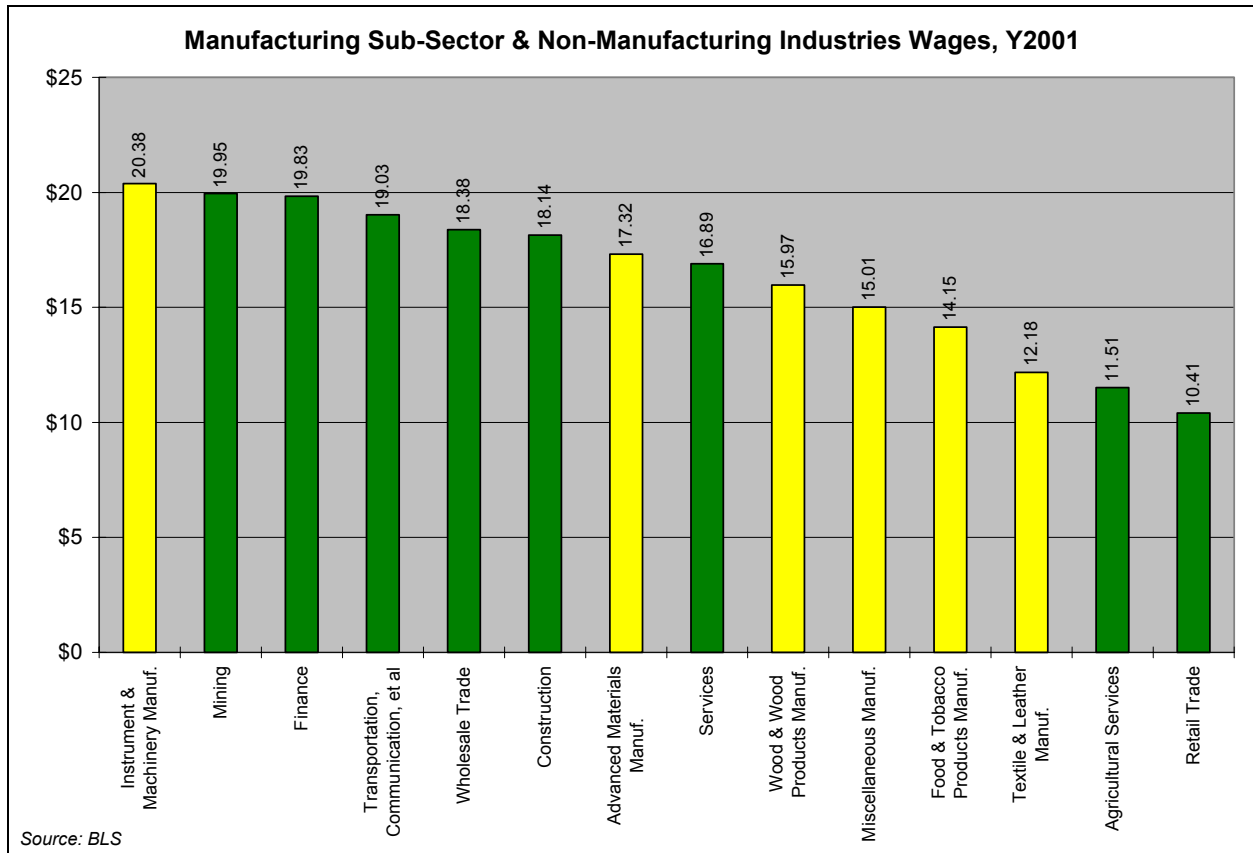
A more detailed breakdown of manufacturing sub-sectors reveals that the wages in "high-tech" or "knowledge-intensive" manufacturing areas pay higher wages than other industries. In 2001, instruments & machinery and advanced materials had the highest wages among manufacturing industries, with mean hourly wages of \$20.38 and \$17.32, respectively. These rankings were the same in 1997: instruments & machinery manufacturing and advanced materials manufacturing ranked first and second, with hourly wages of \$16.79 and \$14.68, respectively.<sup>4</sup>

<b>EMPLOYMENT &amp; WAGE DATA</b>				
<b>MANUFACTURING SUB-SECTOR INDUSTRIES</b>				
<b>2001</b>				
<b>Manufacturing Sub-Sector Industry</b>	<b>SIC Code</b>	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
Food & Tobacco Products Manuf.	20-21	1,717,910	14.15	29,412
Textile & Leather Manuf.	22-23, 31	1,006,690	12.18	25,320
Wood & Wood Products Manuf.	24-27	3,303,530	15.97	33,231
Advanced Materials Manuf.	28-30, 32-34	4,590,220	17.32	36,015
Instrument & Machinery Manuf.	35-38	5,911,650	20.38	42,395
Miscellaneous Manuf.	39	363,660	15.01	31,220

<sup>4</sup> It should be noted that the Advanced Materials Manufacturing sub-sector is led by the more traditional petroleum refining and related industry (with an hourly average wage of \$23.5) and the higher tech chemicals and allied products industry, which includes pharmaceuticals (hourly average wage of \$21.3).

1997				
Manufacturing Sub-Sector Industry	SIC Code	Total Employment	Mean Hourly Wage	Mean Annual Wage
Food & Tobacco Products Manuf.	20-21	1,744,190	12.13	25,224
Textile & Leather Manuf.	22-23, 31	1,524,420	10.03	20,856
Wood & Wood Products Manuf.	24-27	3,570,310	13.49	28,061
Advanced Materials Manuf.	28-30, 32-34	4,999,950	14.68	30,540
Instrument & Machinery Manuf.	35-38	6,692,620	16.79	34,921
Miscellaneous Manuf.	39	397,690	12.65	26,312

As the chart below shows, “knowledge-intensive” manufacturing sub-sectors also have fairly high average wages compared to the non-manufacturing major sectors from the previous section. The following chart plots 2001 average hourly wages in manufacturing sub-sectors against those of major non-manufacturing sectors. The manufacturing sub-sectors (in yellow) tend to rank in the middle, or below middle, when compared to non-manufacturing sectors — only two sub-sectors, instruments and machinery and advanced materials, have hourly wages above the national average of \$16.35. Nevertheless, these two segments represent the majority of manufacturing employment (62 percent of total).



Looking in more detail at the 2-digit SICs that comprise the manufacturing sub-sectors (see table below), one finds a wide range in average wages. For example, in 2001, the values for mean hourly wage ranged from a low of \$11.48 for apparel manufacturing (SIC 23) to a high of \$23.52 for petroleum refining (SIC 29). The lowest average wages are concentrated in the textiles and apparel-related sectors. Not surprisingly, most of the higher wages are found within industries that require greater skills – such as chemicals; measuring, analyzing, and controlling instruments; and transportation equipment.

The following table also shows how average wages have changed from 1997 to 2001 in the manufacturing sub-sectors. Overall, wage growth ranges from a low of 12 percent (tobacco products) to a high of 27 percent (leather and leather products). The 2-digit SICs with the fastest growth in wages over this time period were: leather and leather products (SIC 31) at 27.3 percent growth; electronic and other electrical equipment and components (SIC 36) at 25.6 percent growth; and measuring, analyzing and controlling instruments (SIC 38) at 23.6 percent growth. Surprisingly, although the textile & leather manufacturing sub-sector had low average wages, it was tied for the highest rate of wage growth among the six sub-sectors during over time period.

<b>CHANGES IN AVERAGE WAGES, 1997-2001 MANUFACTURING SUB-SECTOR INDUSTRIES</b>				
<b>Industry Type</b>	<b>SIC Code</b>	<b>Mean Hourly Wage (2001)</b>	<b>Mean Hourly Wage (1997)</b>	<b>Wage Growth Rate</b>
<b>FOOD &amp; TOBACCO PRODUCTS MANUF.</b>	<b>20-21</b>	<b>14.15</b>	<b>12.13</b>	<b>16.7%</b>
Food & Kindred Products	20	14.03	11.99	17.0%
Tobacco Products	21	20.00	17.78	12.5%
<b>TEXTILE &amp; LEATHER MANUF.</b>	<b>22-23, 31</b>	<b>12.18</b>	<b>10.03</b>	<b>21.4%</b>
Textile Mill Products	22	12.92	10.67	21.1%
Apparel & Other Finished Products	23	11.48	9.55	20.2%
Leather & Leather Products	31	12.73	10.00	27.3%
<b>WOOD &amp; WOOD PRODUCTS MANUF.</b>	<b>24-27</b>	<b>15.97</b>	<b>13.49</b>	<b>18.4%</b>
Lumber & Wood Products	24	13.55	11.55	17.3%
Furniture & Fixtures	25	13.94	11.55	20.7%
Paper & Allied Products	26	17.43	14.90	17.0%
Printing, Publishing, & Allied Industries	27	17.34	14.52	19.4%
<b>ADVANCED MATERIALS MANUF.</b>	<b>28-30, 32-34</b>	<b>17.32</b>	<b>14.68</b>	<b>17.9%</b>
Chemicals & Allied Products	28	21.35	17.99	18.7%
Petroleum Refining & Related Industries	29	23.52	19.44	21.0%
Rubber & Misc. Plastic Products	30	14.92	12.64	18.0%
Stone, Clay, Glass, & Concrete Products	32	15.61	13.33	17.1%
Primary Metal Industries	33	17.19	14.79	16.2%
Fabricated Metal Products	34	16.18	13.73	17.8%
<b>INSTRUMENT &amp; MACHINERY MANUF.</b>	<b>35-38</b>	<b>20.38</b>	<b>16.79</b>	<b>21.4%</b>
Industrial & Commercial Machinery & Computer Equipment	35	19.51	16.34	19.4%
Electronic & Other Electrical Equipment & Components	36	19.21	15.30	25.6%
Transportation Equipment	37	21.65	18.26	18.6%
Measuring, Analyzing, & Controlling Instruments	38	21.87	17.70	23.6%
<b>MISCELLANEOUS MANUF.</b>	<b>39</b>	<b>15.01</b>	<b>12.65</b>	<b>18.7%</b>

## IV. COMPARISON OF WAGES BY OCCUPATIONAL CATEGORY

### A. Data Analysis Methodology

Data from the BLS *National Industry Specific Occupational Employment and Wage Estimates* were used in this analysis to compare salary compensation of workers by occupational category in the manufacturing versus non-manufacturing sectors.

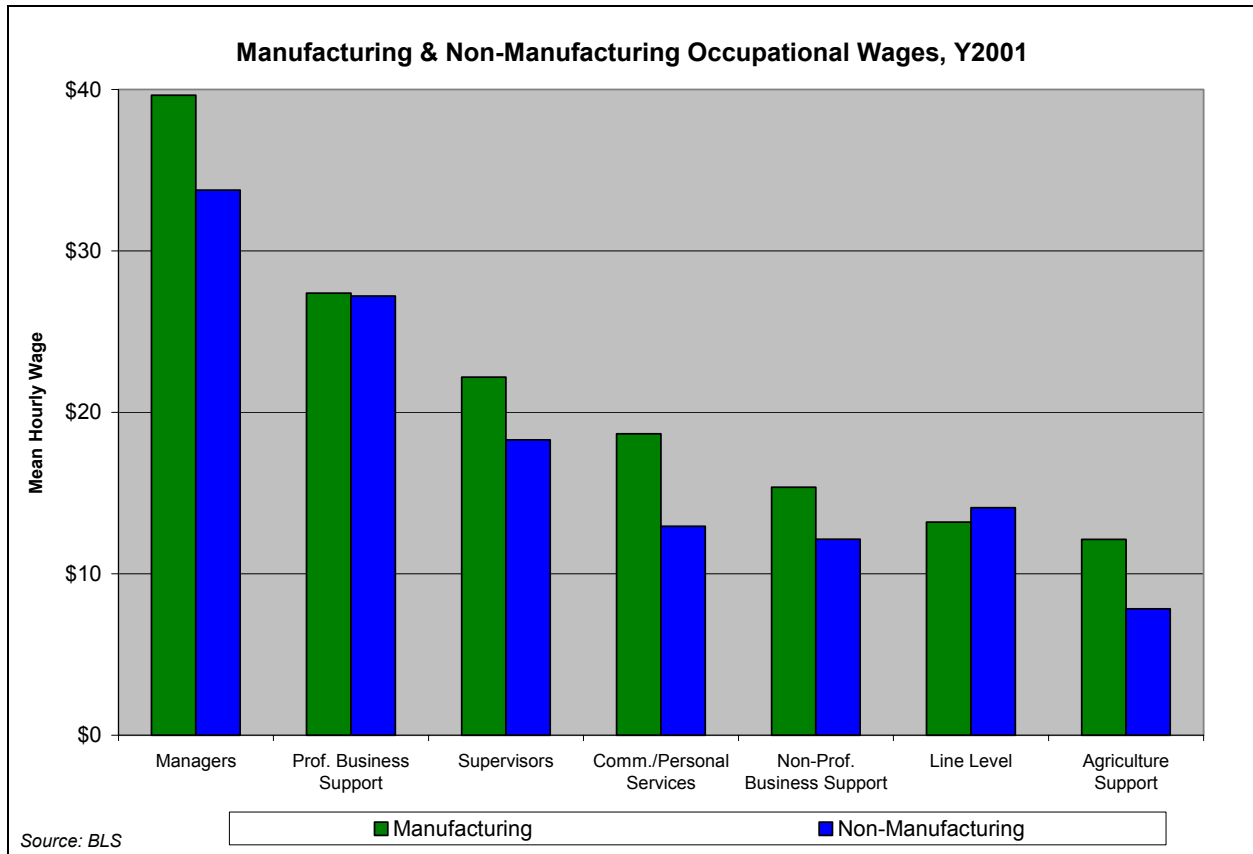
Occupational-level data is organized by the Standard Occupational Classification (SOC) system. The SOC system consists of 821 detailed occupations in 23 major occupational groups. Data for 1998 and earlier is based on the old Occupational Employment Statistics (OES) classification system, which utilized 7 major occupational groups and 770 detailed occupations. About half of the occupations changed slightly in the conversion from the OES to the SOC system. For this reason, the data after 1998 is not always directly comparable to data from 1998 and earlier. In order to make the most accurate time series comparisons possible, the SRI team utilized an OES-to-SOC crosswalk table to make conversions between the two systems.

In the plan submitted to NIST, SRI originally proposed to analyze three occupational groupings: line-level, supervisors, and managers. However, upon further examination of the 24 SOC major groups classified by the BLS, the SRI team felt that three occupational categories were inadequate and too general to accurately capture occupation-based data. Therefore, the SOC codes were grouped into seven occupational categories: managers, supervisors, line-level, professional business support, non-professional business support, community/personal services, and agricultural support. Employment and other numbers presented here do not add up to the totals presented elsewhere in this report because BLS does not report full figures for categories where there are very few employees and because there are some occupations/sectors where BLS does not report hourly wage. The table in Appendix II provides details on the SOC codes included in each grouping.

For each occupational group, the data was divided into two categories: manufacturing and non-manufacturing. Manufacturing includes SIC codes 20-39. Non-manufacturing includes all remaining SIC codes. Government employment is excluded from the data set.

### B. Findings

Looking at wages among various occupational groupings provides additional insight into the comparison of wages in manufacturing and non-manufacturing firms. With the exception of line-level workers in manufacturing, all other occupational groups (managers, supervisors, professional business support, non-professional business support, community/professional service, and agricultural support) in the manufacturing sector earn more than their counterparts in non-manufacturing industries. Wage differentials in 2001 between manufacturing and non-manufacturing occupational groups vary from -6 percent for line-level workers to 55 percent for agriculture support services workers.



It is not surprising to see that managers are the highest paid occupational group in both the manufacturing and non-manufacturing sectors. In 2001, managers in the manufacturing sector had mean hourly wages of \$39.65, while managers in non-manufacturing industries on average made \$33.76, or about 17 percent less. It is important to note that the ratio of line-level employees per manager is much greater in manufacturing (9.8:1) than in non-manufacturing industries (2.6:1). This may partially explain the higher wages: with responsibilities for a larger number of employees, manufacturing managers may command higher salaries as a result.

Professional business support occupations are the second highest paid group among both manufacturing and non-manufacturing sectors, with average hourly wages of \$27.38 and \$27.21, respectively. Rounding out the top three highest paid occupational groups are supervisors. Supervisors in manufacturing industries earned on average \$22.18 hourly, while supervisors in non-manufacturing industries earned an average wage of \$18.29 hourly. The lowest paid workers are in the agricultural support occupational group, with average hourly wages of \$12.13 in manufacturing and \$7.84 in non-manufacturing.

Line level workers account for a major portion of employment in the manufacturing sector, with 9.3 million workers, representing about 60 percent of total manufacturing employment. That manufacturing line-level workers earn slightly less than their non-manufacturing counterparts (six percent less in 2001) partially explains why manufacturing wages are not further above average non-manufacturing wages.

Breaking down the line level wages by 2-digit SIC code for manufacturing sectors provides additional insight into the comparison between manufacturing and non-manufacturing wages (see chart at the end of this chapter). For several of the more “knowledge-intensive” manufacturing sectors, such as instruments & machinery manufacturing and advanced materials manufacturing, line level wages are actually higher than those of non-manufacturing industries.

<b>WAGES BY OCCUPATIONAL CATEGORY MANUFACTURING VS. NON-MANUFACTURING INDUSTRIES</b>			
<b>2001</b>			
<b>Industry Type</b>	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
<b>MANAGERS</b>			
Manufacturing	944,210	39.65	82,463
Non-Manufacturing	5,043,330	33.76	70,220
Wage Differential		17%	
<b>SUPERVISORS</b>			
Manufacturing	843,570	22.18	46,136
Non-Manufacturing	5,084,750	18.29	38,036
Wage Differential		21%	
<b>LINE LEVEL</b>			
Manufacturing	9,268,310	13.19	27,441
Non-Manufacturing	13,586,980	14.10	29,324
Wage Differential		-6%	
<b>PROFESSIONAL BUSINESS SUPPORT</b>			
Manufacturing	1,628,940	27.38	56,950
Non-Manufacturing	6,909,710	27.21	56,597
Wage Differential		0.6%	
<b>NON-PROFESSIONAL BUSINESS SUPPORT</b>			
Manufacturing	2,496,960	15.36	31,998
Non-Manufacturing	34,791,000	12.14	25,248
Wage Differential		27%	
<b>COMMUNITY/PERSONAL SERVICES</b>			
Manufacturing	285,040	18.67	38,985
Non-Manufacturing	22,974,630	12.94	26,926
Wage Differential		44%	
<b>AGRICULTURAL SUPPORT</b>			
Manufacturing	68,220	12.13	25,239
Non-Manufacturing	301,900	7.84	16,302
Wage Differential		55%	

<b>1997</b>			
<b>Industry Type</b>	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
<b>MANAGERS</b>			
Manufacturing	1,182,050	31.19	64,878
Non-Manufacturing	6,581,690	25.72	53,500
Wage Differential		21%	
<b>SUPERVISORS</b>			
Manufacturing	1,014,580	18.45	38,382
Non-Manufacturing	3,983,360	16.20	33,693
Wage Differential		14%	
<b>LINE LEVEL</b>			
Manufacturing	11,173,240	11.45	23,824
Non-Manufacturing	12,307,930	12.17	25,318
Wage Differential		-6%	
<b>PROFESSIONAL BUSINESS SUPPORT</b>			
Manufacturing	2,052,330	22.74	47,302
Non-Manufacturing	6,988,830	21.22	44,147
Wage Differential		7%	
<b>NON-PROFESSIONAL BUSINESS SUPPORT</b>			
Manufacturing	3,076,160	12.69	26,405
Non-Manufacturing	35,164,280	10.12	21,240
Wage Differential		25%	
<b>COMMUNITY/PERSONAL SERVICES</b>			
Manufacturing	305,020	15.36	31,981
Non-Manufacturing	28,539,000	9.22	25,946
Wage Differential		67%	
<b>AGRICULTURAL SUPPORT</b>			
Manufacturing	73,480	10.55	21,951
Non-Manufacturing	309,850	6.98	14,513
Wage Differential		51%	

The occupations with the highest growth in wages from 1997 to 2001 were managers, community/personal services, and professional business support. For these occupations, wages grew by over 20 percent in both the manufacturing and non-manufacturing sectors. Agricultural support occupations experienced the lowest rate of growth in average wages.

The wage differentials between manufacturing and non-manufacturing industries remained steady in most occupational categories from 1997 to 2001 (see table below). For supervisors, however, the wage gap widened significantly, from 14 percent in 1997 to 21 percent in 2001. This is because wages for manufacturing supervisors grew at a much higher rate than for non-manufacturing supervisors during this time period. The wage gap for community/personal services encountered the opposite effect, narrowing from 67 percent in 1997 to 44 percent in 2001; this is because non manufacturing wages grew much faster than manufacturing wages for community/personal services workers from 1997 to 2001.

**CHANGES IN AVERAGE OCCUPATIONAL WAGES, 1997-2001  
MANUFACTURING VS. NON-MANUFACTURING INDUSTRIES**

<b>Occupation</b>	<b>Industry Type</b>	<b>Mean Hourly Wage (2001)</b>	<b>Differential 2001</b>	<b>Mean Hourly Wage (1997)</b>	<b>Differential 1997</b>	<b>Wage Growth Rate</b>
<b>Managers</b>	Manufacturing	39.65	17%	31.19	21%	27%
	Non-Manufacturing	33.76		25.72		31%
<b>Supervisors</b>	Manufacturing	22.18	21%	18.45	14%	20%
	Non-Manufacturing	18.29		16.20		13%
<b>Line Level</b>	Manufacturing	13.19	-6.4%	11.45	-5.9%	15%
	Non-Manufacturing	14.10		12.17		16%
<b>Professional Business Support</b>	Manufacturing	27.38	1%	22.74	7%	20%
	Non-Manufacturing	27.21		21.22		28%
<b>Non-Professional Business Support</b>	Manufacturing	15.36	27%	12.69	25%	21%
	Non-Manufacturing	12.14		10.12		20%
<b>Community/ Personal Services</b>	Manufacturing	18.67	44%	15.36	67%	22%
	Non-Manufacturing	12.94		9.22		40%
<b>Agricultural Support</b>	Manufacturing	12.13	55%	10.55	51%	15%
	Non-Manufacturing	7.84		6.98		12%

## V. COMPARISON OF WAGES IN HIGH-TECH VS. LOW TECH INDUSTRIES

### A. Data Analysis Methodology

With the growing focus on the potential of “high-tech” industries in recent years, there has also been growing debate about how to define what is, in fact, “high-tech.” The term “high tech” is used very broadly to describe not only industries, but also occupations and products. The Congressional Office of Technology Assessment describes high-technology firms as those “that are engaged in the design, development, and introduction of new products and innovative manufacturing processes, or both, through the systematic application of scientific and technical knowledge.”<sup>5</sup> While there is little controversy about the high-tech nature of computers, software, the Internet, and the like, there is little consensus on whether to include other technology-based industries such as electronics, telecommunications, biotech and pharmaceuticals, and advanced manufacturing. Often the decision about which industries to include, or not include, is highly subjective and based on the interests and perspective of the person or institution conducting the analysis.

An industry-based definition of “high-tech” can sometimes be too narrow and limiting. Firms and institutions in every industry sector, throughout the economy, are increasingly applying technology-based products and processes to streamline their operations and increase their competitiveness. High-tech is not simply a type of product or service produced by an industry, but a process of innovation and application of research-based and technology-based ideas and processes throughout the economy.

For the purposes of this study, the SRI team has chosen to define high-tech based on occupations, rather than industries. The occupation-based methodology avoids the bias of many studies toward a narrowly-defined concept of “high-tech,” and it enables the analysis to capture the degree to which high-tech activities have permeated throughout all industry sectors. Our methodology is based on a study conducted by the Humphrey Institute of Public Affairs at the University of Minnesota.<sup>6</sup> In this study, high-tech industries are defined based on the concentration of science & technology and information technology-related occupations employed in each industry at the national level.

The SRI team first developed a list of high-tech occupations using the Bureau of Labor Statistics’ Standard Occupational Classification (SOC) system. We used the Humphrey Institute’s list of 36 five-digit occupational titles, which is based on the old Occupational Employment Survey definitions, and converted and updated each occupational code into the new SOC system.<sup>7</sup> Our final list of high-tech occupations includes 54 six-digit occupational categories across five broad groups: science & engineering managers (SOC 11), computer

<sup>5</sup> *Technology, Innovation, and Regional Economic Development* (U.S. Congress, Office of Technology Assessment, Sept. 9, 1982).

<sup>6</sup> Ann Markusen, Karen Chapple, Greg Schrock, Daisaku Yamamoto, and Pingkang Yu, *High-Tech and I-Tech: How Metros Rank and Specialize* (Minneapolis, MN: Humphrey Institute of Public Affairs, University of Minnesota, 2001).

<sup>7</sup> The Markusen study used 1997 employment data. The SRI team updated the study, using the same methodology, with 2000 data from the BLS *Occupational Employment and Statistics Survey*.

scientists & math scientists (SOC 15), engineers (SOC 17-2000), life scientists (SOC 19-1000), and physical scientists (SOC 19-2000). We excluded a few occupational titles from the computer & mathematical sciences group that were considered to be assistants (i.e., computer support specialists), technicians (i.e., mathematical technicians), or unrelated to the high-tech processes (i.e., actuaries). We added one additional category related to programming of machinery in the manufacturing (metals & plastics) industries.

Using this list of high-tech occupations, we calculated the percentage of employment in each 3-digit SIC code represented by these high-tech jobs. Industries that exceed the economy-wide average by three times (at least 9 percent of employees are in high-tech occupations) are defined as “High-Tech.” A total of 24 industry sectors (by 3-digit SIC code) were defined as “high-tech,” shown in the table below. All remaining 3-digit SIC codes were defined as “low-tech.”

<b>HIGH TECH INDUSTRIES</b>	
<b>SIC Classification</b>	<b>Industry Sector</b>
131	Crude Petroleum & Natural Gas
281	Industrial Organic Chemicals
283	Drugs
286	Industrial Organic Chemicals
291	Petroleum Refining
351	Engines & Turbines
355	Special Industry Machinery, except Metalworking
357	Computer & Office Equipment
366	Communications Equipment
367	Electronic Components & Accessories
372	Aircraft & Parts
376	Guided Missiles, Space Vehicles, & Parts
381	Search, Detection, & Navigation Equipment
382	Measuring & Controlling Devices
386	Photographic Equipment & Supplies
482	Telegraph & Other Message Communications
504	Professional & Commercial Equipment & Supplies
601	Central Reserve Depository Institutions
631	Life Insurance
737	Computer Programming, Data Processing, & Other Computer Services
871	Engineering, Architectural, & Surveying Services
873	Research & Development Testing Services
874	Management & Public Relations Services
899	Other Business Services

## **B. Findings**

In 2001, high-tech industries accounted for 7.9 percent of total employment or 9.3 million jobs. High-tech employment increased by 5.8 percent over the 1997-2001 period. For the same period, low-tech occupations grew at a slightly slower pace at 4.3 percent.

A number of studies have stated that high-tech jobs pay better than those in low-tech industries.<sup>8</sup> In 2001, wages in high-tech industries averaged \$24.73 per hour; 61 percent higher than the average hourly wage in low-tech industries, at \$15.38 per hour.

<b>AVERAGE WAGES HIGH-TECH VS. LOW-TECH INDUSTRIES</b>			
<b>2001</b>			
	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
High-Tech Industries	9,330,820	24.73	51,428
Low-Tech Industries	108,609,790	15.38	31,993
<b>1997</b>			
	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
High-Tech Industries	8,820,290	19.66	40,886
Low-Tech Industries	104,142,360	12.99	27,023

In 2001, mean hourly wages in the 24 industries classified as high-tech ranged from a low of \$19.37 (for engines & turbines manufacturing) to a high of \$28.72 (for computer programming, data processing, & related services). The table below ranks the 24 industries. The top three highest paying high-tech industries are computer programming, data processing, & related services (SIC 737); search detection, & navigation equipment (SIC 381); and telegraph & other message communications (SIC 482).

Computer programming, data processing, & related services (SIC 737) also has the highest employment of all the high-tech industries. The approximately 2 million jobs in this industry account for roughly 21 percent of all jobs in the high-tech area. The next two largest employers, management & public relations (SIC 874) and engineering, architectural, & surveying services (SIC 871) account for 13 percent and 11 percent of high-tech jobs, with 1.2 million and 1.0 million jobs, respectively. These top three industries account for 45 percent of total employment in high tech industries.

Several high-tech industries have experienced very high rates of wage growth from 1997 to 2001. The average hourly wage grew by over 30 percent in the following industries: telegraph & other message communications; communications equipment; photographic equipment & supplies; central reserve depository institutions; computer programming, data processing, & related services; and computer & office equipment.

<sup>8</sup> For example, see *Science and Engineering Indicators*, pp.6-5, 6-16 (NSF); *Cyberstates 3.0* p.7 (AEA, 1999).

<b>CHANGES IN AVERAGE HOURLY WAGES, 1997-2001 HIGH-TECH INDUSTRIES</b>					
<b>High-Tech Industry Name</b>	<b>SIC Code</b>	<b>Total Employment (2001)</b>	<b>Mean Hourly Wage (2001)</b>	<b>Mean Hourly Wage (1997)</b>	<b>Wage Growth Rate</b>
Computer Programming, Data Processing, & Computer Related Services	737	1,987,460	28.72	21.96	30.78%
Search, Detection, & Navigation Equipment	381	153,710	27.67	22.53	22.81%
Telegraph & Other Message Communications	482	13,260	27.65	20.14	37.29%
Computer & Office Equipment	357	318,940	27.38	21.05	30.07%
Guided Missiles & Space Vehicles & Parts	376	78,990	26.94	22.20	21.35%
Crude Petroleum & Natural Gas	131	125,370	26.41	23.86	10.69%
Petroleum Refining	291	81,790	26.31	21.29	23.58%
Engineering, Architectural, & Surveying	871	1,033,220	25.38	20.81	21.96%
Industrial Organic Chemicals	286	110,590	24.43	21.45	13.89%
Research, Development, & Testing Services	873	669,700	24.33	19.84	22.63%
Aircraft & Parts	372	450,470	23.82	20.58	15.74%
Photographic Equipment & Supplies	386	63,840	23.50	17.63	33.30%
Management & Public Relations Services	874	1,173,700	23.36	19.37	20.60%
Communications Equipment	366	242,230	23.28	17.37	34.02%
Services, not elsewhere classified	899	50,510	23.12	20.26	14.12%
Industrial Inorganic Chemicals	281	91,260	23.11	19.36	19.37%
Professional & Commercial Equipment and Supplies	504	897,990	22.87	17.94	27.48%
Life Insurance	631	341,670	22.69	19.15	18.49%
Measuring & Controlling Instruments	382	282,450	22.15	17.61	25.78%
Drugs	283	324,740	22.08	17.93	23.15%
Central Reserve Depository Institutions	601	25,700	21.25	16.06	32.32%
Electronic Components & Accessories	367	584,060	20.67	16.02	29.03%
Special Industry Machinery, Except Metalworking	355	146,360	20.24	16.93	19.55%
Engines & Turbines	351	82,810	19.37	16.95	14.28%
<b>Total High-Tech</b>		<b>9,330,820</b>	<b>24.73</b>	<b>19.66</b>	<b>25.79%</b>
<b>Total Low-Tech</b>		<b>108,609,790</b>	<b>15.38</b>	<b>12.99</b>	<b>18.40%</b>

*Note: Manufacturing industries are shaded in the table.*

Out of the 24 high-tech industries, slightly over half can be classified as manufacturing industries. The following table provides a comparison of wages in high- and low-tech manufacturing industries with those in non-manufacturing industries. In 2001, there were 3 million employees in high-tech manufacturing industries, representing about 18 percent of all manufacturing employment. With an average hourly wage of \$23.24, wages in high-tech manufacturing are significantly higher than wages in low-tech manufacturing (at \$16.19).

However, *non-manufacturing* high-tech industries pay slightly higher wages than *manufacturing* high-tech industries.

From 1997 to 2001, employment in high-tech manufacturing fell by 11 percent; employment in high-tech non-manufacturing grew by 17 percent during the same time period. Wages for manufacturing high-tech industries grew by 24 percent over the 1997-2001 period, while wages for non-manufacturing high-tech industries grew by 26 percent.

<b>AVERAGE HIGH-TECH AND LOW-TECH WAGES MANUFACTURING VS. NON-MANUFACTURING INDUSTRIES</b>			
<b>2001</b>			
	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
High-Tech Manufacturing	3,012,240	23.24	48,343
Low-Tech Manufacturing	13,881,440	16.19	33,678
High-Tech Non-Manufacturing	6,318,580	25.43	52,898
Low-Tech Non-Manufacturing	94,728,350	15.26	31,746
<b>1997</b>			
	<b>Total Employment</b>	<b>Mean Hourly Wage</b>	<b>Mean Annual Wage</b>
High-Tech Manufacturing	3,397,210	18.76	39,021
Low-Tech Manufacturing	15,530,670	13.63	28,346
High-Tech Non-Manufacturing	5,423,080	20.22	42,055
Low-Tech Non-Manufacturing	88,611,690	12.88	26,792

## VI. COMPARISON OF NON-WAGE/NON-SALARY COMPENSATION IN MANUFACTURING VS. OTHER INDUSTRIES

### A. Data Analysis Methodology

Any analysis of compensation levels would be deficient and perhaps misleading without the inclusion of employee benefits, which typically make up 25 percent to 35 percent of a worker's total compensation package. To measure this component, the SRI team utilized the BLS *Employer Costs for Employee Compensation* (ECEC) survey. The ECEC is an annual survey that shows the average cost to employers, per employee hour worked, for wages and salaries and benefits. It provides data on compensation costs for the following categories:

- Wages and salaries;
- Total benefit costs;
- Separate benefit costs for broad benefit categories, such as paid leave, supplemental pay, insurance, retirement and savings, legally required benefits, and other benefits;
- Separate benefit costs for detailed benefits, such as paid holidays, health insurance, defined benefit pension, and workers' compensation.

According to the ECEC, wages and salaries are defined as the hourly straight-time wage rate, or for workers not paid on an hourly basis, straight-time earnings divided by corresponding hours. Straight-time wage and salary rates are total earnings before payroll deductions, including production bonuses, incentive earnings, commission payments, and cost-of-living adjustments. Premium pay for overtime and for work on weekends and holidays, shift differentials, and non-production bonuses are included in the benefits component.

Benefits are defined as follows:

- **Paid leave:** vacations, holidays, sick leave, and other leave
- **Insurance benefits:** life, health, short-term disability, and long-term disability insurance
- **Retirement and savings benefits:** defined benefit and defined contribution plans
- **Legally required benefits:** Social Security (OASDI and Medicare), federal and state unemployment insurance, and workers' compensation
- **Supplemental pay:** premium pay (such as overtime, weekend, and holiday pay), shift differentials, and non-production bonuses (lump-sum payments provided in lieu of wage increases)
- **Other benefits:** severance pay and supplemental unemployment plans

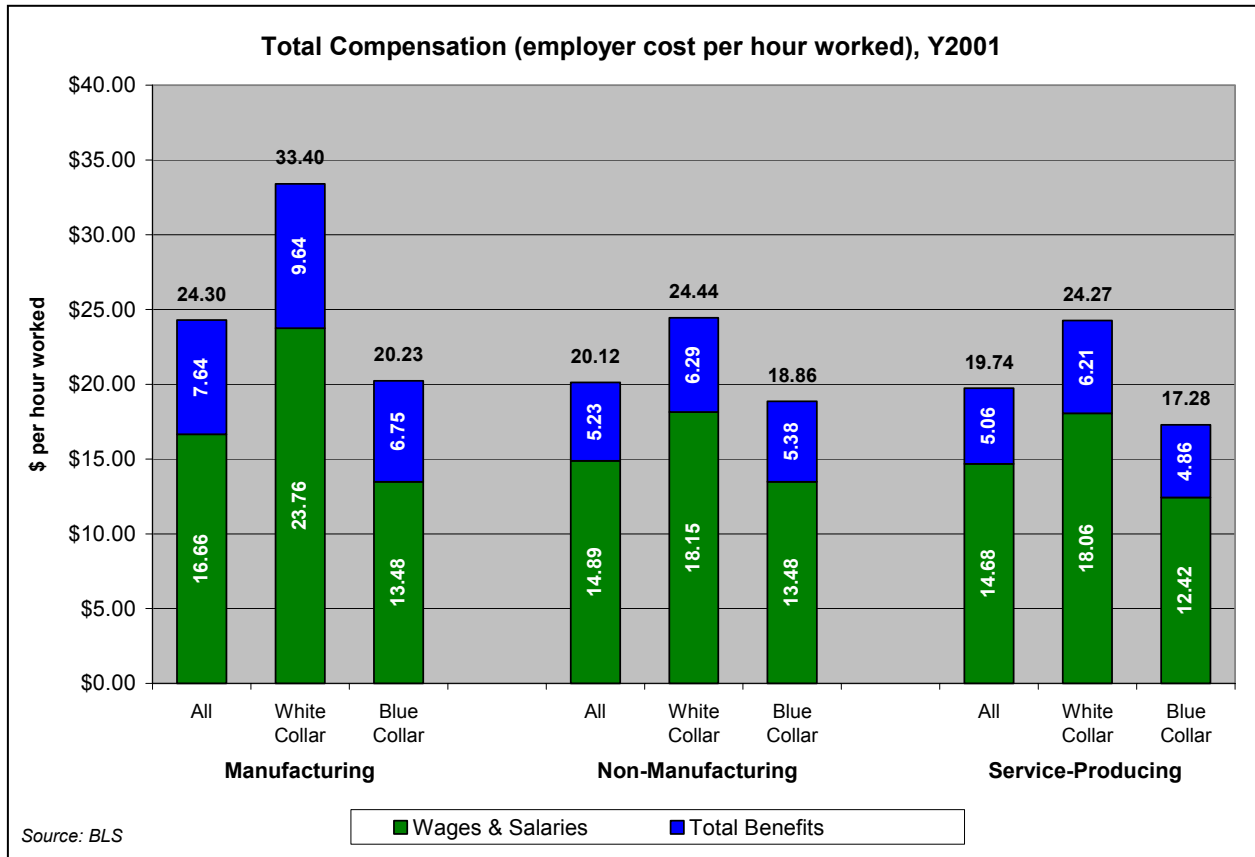
For the purposes of this study, the data set was limited to private industry only. The self-employed, farm workers, and household workers are excluded from private industry in the ECEC survey.

The SRI team collected 2001 and 1997 ECEC data for three major industry groups: manufacturing, non-manufacturing, and service producing. Manufacturing includes SIC 20-39. Non-manufacturing is defined as all industries with the exception of SIC 20-39. Service producing is a sub-set of the non-manufacturing category, and includes transportation, communication, and public utilities; wholesale and retail trade; finance, insurance, and real estate; and other service industries. For more detailed analysis, the three industry groupings were further sub-divided into all workers, white collar workers, and blue collar workers.

**B. Findings**

**Total Compensation.** Total compensation in 2001 for workers in manufacturing was \$24.30. As shown in the chart below, total manufacturing compensation was higher than that of non-manufacturing and service producing industries, at \$20.12 and \$19.74, respectively. Across all three industries, white collar workers had significantly higher compensation than blue collar workers. The wage gap was the highest in the manufacturing industry, with white collar workers making 65 percent higher total compensation than blue collar workers. The white collar-blue collar wage gap was 30 percent for non-manufacturing and 40 percent for service-producing industries.

Total compensation has two components: wages & salaries, and total benefits. These will be analyzed in the following sections.



TOTAL WAGE & BENEFIT COMPENSATION (COST PER HOUR WORKED) MANUFACTURING VS. NON-MANUFACTURING INDUSTRIES									
2001									
	Manufacturing			Non-Manufacturing			Service Producing		
	All	White Collar	Blue Collar	All	White Collar	Blue Collar	All	White Collar	Blue Collar
Total Compensation	24.30	33.40	20.23	20.12	24.44	18.86	19.74	24.27	17.28
Wages & Salaries	16.66	23.76	13.48	14.89	18.15	13.48	14.68	18.06	12.42
% of Total Comp.	68.6%	71.1%	66.6%	74.0%	74.3%	71.5%	74.4%	74.4%	71.9%
Total Benefits	7.64	9.64	6.75	5.23	6.29	5.38	5.06	6.21	4.86
% of Total Comp.	31.4%	28.9%	33.4%	26.0%	25.7%	28.5%	25.6%	25.6%	28.1%
1997									
	Manufacturing			Non-Manufacturing			Service Producing		
	All	White Collar	Blue Collar	All	White Collar	Blue Collar	All	White Collar	Blue Collar
Total Compensation	21.84	29.79	18.28	17.10	20.56	16.47	16.73	20.44	14.85
Wages & Salaries	14.79	21.10	11.96	12.64	15.29	11.69	12.44	15.21	10.67
% of Total Comp.	67.7%	70.8%	65.4%	73.9%	74.3%	71.0%	74.3%	74.4%	71.8%
Total Benefits	7.05	8.68	6.32	4.46	5.27	4.78	4.29	5.23	4.18
% of Total Comp.	32.3%	29.2%	34.6%	26.1%	25.7%	29.0%	25.7%	25.6%	28.2%
<i>Note: Numbers may not add, due to rounding.</i>									

**Wages and salaries.** Wages and salaries for all manufacturing workers in 2001 were higher than those of non-manufacturing and service producing workers.<sup>9</sup> White-collar workers in manufacturing, with wages & salaries of \$23.76, were significantly higher than those in non-manufacturing (\$18.15) and service-producing (\$18.06). For blue-collar workers, the wages & salaries were more even across the three industries; manufacturing and non-manufacturing were the same, at \$13.48, and service producing was slightly lower, at \$12.42.

**Total Benefits.** Manufacturing workers also receive higher benefits than workers in other industries. In 2001, the total benefit cost for all workers in manufacturing was \$7.64, as compared to \$5.23 and \$5.06 for workers in non-manufacturing and service producing industries, respectively. Across all industries, white-collar workers receive higher benefits than blue-collar workers. It is interesting to note that while wages & salaries for blue collar workers were the same for both manufacturing and non-manufacturing industries, the total benefits for blue collar manufacturing workers were 32 percent higher than for those in non-manufacturing.

In manufacturing, benefits represent 31.4 percent of the total compensation package for all workers. The ratio of benefits to total compensation is lower in non-manufacturing industries (26.0 percent) and service-producing industries (25.6 percent).

<sup>9</sup> Data and results for hourly wage compensation in this section of the report may be different from the data and results for average hourly wages presented in sections II and III of this report. Data in this section were drawn from the BLS ECEC survey (part of the *National Compensation Survey*), while data in sections II and III were drawn from the BLS *Occupational Employment Statistics* survey. The data collection and measurement methodologies used by BLS are different across these two surveys, so the results will be slightly different.

The following table breaks down worker benefits into six subcategories of benefits. Across all industries and categories of workers, paid leave, insurance, and legally-required benefits (social security, unemployment insurance, workers' comp.) represent the largest share of employee benefits. Almost across the board, manufacturing workers receive higher benefits than their counterparts in non-manufacturing industries. The only exception is for blue collar workers, who receive lower benefits than non-manufacturing workers in a few categories.

The cost of employee benefits rose in almost every category from 1997 to 2001. The only category that declined slightly was retirement & savings benefits for manufacturing workers. In the manufacturing industry, supplemental pay experienced the highest rate of increase. Paid leave grew the fastest in the non-manufacturing and service-producing industries.

<b>COMPONENTS OF TOTAL BENEFITS (COST PER HOUR WORKED) MANUFACTURING VS. NON-MANUFACTURING INDUSTRIES</b>									
<b>2001</b>									
	<b>Manufacturing</b>			<b>Non-Manufacturing</b>			<b>Service Producing</b>		
	<b>All</b>	<b>White Collar</b>	<b>Blue Collar</b>	<b>All</b>	<b>White Collar</b>	<b>Blue Collar</b>	<b>All</b>	<b>White Collar</b>	<b>Blue Collar</b>
Total Benefits	7.64	9.64	6.75	5.23	6.29	5.38	5.06	6.21	4.86
Paid Leave	1.85	2.88	1.39	1.28	1.77	0.91	1.30	1.77	0.96
Supplemental Pay	1.09	1.05	1.11	0.52	0.64	0.57	0.48	0.59	0.52
Insurance	1.93	2.28	1.77	1.15	1.34	1.28	1.11	1.32	1.17
Retirement & Savings	0.75	1.04	0.61	0.59	0.72	0.68	0.55	0.72	0.53
Legally Required Benefits	1.95	2.30	1.80	1.68	1.80	1.93	1.60	1.79	1.68
Other Benefits	0.07	0.09	0.06	<0.01	0.02	<0.01	<0.01	0.02	<0.01
<b>1997</b>									
	<b>Manufacturing</b>			<b>Non-Manufacturing</b>			<b>Service Producing</b>		
	<b>All</b>	<b>White Collar</b>	<b>Blue Collar</b>	<b>All</b>	<b>White Collar</b>	<b>Blue Collar</b>	<b>All</b>	<b>White Collar</b>	<b>Blue Collar</b>
Total Benefits	7.05	8.68	6.32	4.46	5.27	4.78	4.29	5.23	4.18
Paid Leave	1.66	2.60	1.23	1.04	1.39	0.74	1.04	1.39	0.78
Supplemental Pay	0.88	0.78	0.92	0.43	0.53	0.47	0.42	0.53	0.42
Insurance	1.70	1.88	1.63	0.95	1.11	1.07	0.92	1.10	0.95
Retirement & Savings	0.79	1.09	0.65	0.49	0.60	0.60	0.45	0.59	0.43
Legally Required Benefits	1.94	2.24	1.81	1.55	1.62	1.89	1.46	1.60	1.59
Other Benefits	0.08	0.10	0.07	<0.01	0.02	<0.01	<0.01	0.02	<0.01

*Note: Numbers may not add, due to rounding.*

## APPENDICIES

**APPENDIX I: LIST OF STANDARD OCCUPATIONAL CODES (SOC),  
GROUPED BY OCCUPATIONAL CATEGORY**

<b>OCCUPATIONAL CATEGORIES, BY SOC</b>	
<b>Managers</b>	
11-0000	Management Occupations
<b>Supervisors</b>	
33-1000	First-Line Supervisors/Managers, Protective Service Workers
35-1000	Supervisors, Food Preparation and Serving Workers
37-1000	Supervisors, Building and Grounds Cleaning and Maintenance Workers
39-1000	Supervisors, Personal Care and Service Workers
41-1000	Supervisors, Sales Workers
43-1000	Supervisors, Office and Administrative Support Workers
45-1000	Supervisors, Farming, Fishing, and Forestry Workers
47-1000	Supervisors, Construction and Extraction Workers
49-1000	Supervisors of Installation, Maintenance, and Repair Workers
51-1000	Supervisors, Production Workers
53-1000	Supervisors, Transportation and Material Moving Workers
<b>Line Level</b>	
47-2000	Construction Trades Workers
47-3000	Helpers, Construction Trades
47-4000	Other Construction and Related Workers
47-5000	Extraction Workers
49-2000	Electrical and Electronic Equipment Mechanics, Installers, and Repairers
49-3000	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers
49-9000	Other Installation, Maintenance, and Repair Occupations
51-2000	Assemblers and Fabricators
51-3000	Food Processing Workers
51-4000	Metal Workers and Plastic Workers
51-5000	Printing Workers
51-6000	Textile, Apparel, and Furnishings Workers
51-7000	Textile, Apparel, and Furnishings Workers
51-8000	Plant and System Operators
51-9000	Other Production Occupations
<b>Professional Business Support</b>	
13-0000	Business and Financial Operations Occupations
15-0000	Computer and Mathematical Occupations
17-0000	Architecture and Engineering Occupations
19-0000	Life, Physical, and Social Science Occupations
23-0000	Legal Occupations
<b>Non-Professional Business Support</b>	
37-2000	Building Cleaning and Pest Control Workers
37-3000	Grounds Maintenance Workers
41-2000	Retail Sales Workers
41-3000	Sales Representatives, Services
41-4000	Sales Representatives, Wholesale and Manufacturing
41-9000	Other Sales and Related Workers
43-2000	Communications Equipment Operators
43-3000	Financial Clerks
43-4000	Information and Record Clerks
43-5000	Material Recording, Scheduling, Dispatching, and Distributing Workers
43-6000	Secretaries and Administrative Assistants
43-9000	Other Office and Administrative Support Workers
53-2000	Air Transportation Workers

53-3000	Motor Vehicle Operators
53-4000	Rail Transportation Workers
53-5000	Water Transportation Workers
53-6000	Other Transportation Workers
53-7000	Material Moving Workers
<b>Community/Personal Services</b>	
21-0000	Community and Social Services Occupations
25-0000	Education, Training, and Library Occupations
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations
29-0000	Healthcare Practitioners and Technical Occupations
31-0000	Healthcare Support Occupations
33-2000	Fire Fighting and Prevention Workers
33-3000	Law Enforcement Workers
33-9000	Other Protective Service Workers
35-2000	Cooks and Food Preparation Workers
35-3000	Food and Beverage Serving Workers
35-9000	Other Food Preparation and Serving Related Workers
39-2000	Animal Care and Service Workers
39-3000	Entertainment Attendants and Related Workers
39-4000	Funeral Service Workers
39-5000	Personal Appearance Workers
39-6000	Transportation, Tourism, and Lodging Attendants
39-9000	Other Personal Care and Service Workers
<b>Agricultural Support</b>	
45-2000	Agricultural Workers
45-3000	Fishing and Hunting Workers
45-4000	Forest, Conservation, and Logging Workers

**APPENDIX II: DETAILED DATA FOR HIGH-TECH INDUSTRIES**

2001						
	SIC Code	Total Employment	Mean Hourly Wage	Mean Annual Wage	Median Hourly Wage	Median Annual Wage
Crude Petroleum & Natural Gas	131	125,370	26.41	54,930	22.19	46,140
Industrial Inorganic Chemicals	281	91,260	23.11	48,080	20.81	43,280
Drugs	283	324,740	22.08	45,930	18.10	37,650
Industrial Organic Chemicals	286	110,590	24.43	50,820	22.77	47,360
Petroleum Refining	291	81,790	26.31	54,730	24.75	51,480
Engines & Turbines	351	82,810	19.37	40,280	17.51	36,420
Special Industry Machinery, Except Metalworking	355	146,360	20.24	42,100	17.11	35,590
Computer & Office Equipment	357	318,940	27.38	56,950	24.23	50,400
Communications Equipment	366	242,230	23.28	48,420	19.16	39,860
Electronic Components & Accessories	367	584,060	20.67	42,990	15.99	33,260
Aircraft and Parts	372	450,470	23.82	49,540	22.33	46,440
Guided Missiles & Space Vehicles & Parts	376	78,990	26.94	56,040	25.43	52,890
Search, Detection, & Navigation Equipment	381	153,710	27.67	57,560	25.61	53,270
Measuring & Controlling Instruments	382	282,450	22.15	46,070	18.15	37,750
Photographic Equipment & Supplies	386	63,840	23.50	48,870	20.54	42,720
Telegraph & Other Message Communications	482	13,260	27.65	57,520	25.26	52,540
Professional & Commercial Equipment & Supplies	504	897,990	22.87	47,580	18.25	37,950
Central Reserve Depository Institutions	601	25,700	21.25	44,200	17.09	35,550
Life Insurance	631	341,670	22.69	47,190	18.66	38,800
Computer Programming, Data Processing, & Related Services	737	1,987,460	28.72	59,740	26.48	55,080
Engineering, Architectural, & Surveying	871	1,033,220	25.38	52,790	22.36	46,500
Research, Development, & Testing Services	873	669,700	24.33	50,600	20.15	41,920
Management & Public Relations Services	874	1,173,700	23.36	48,580	18.36	38,190
Services, not elsewhere classified	899	50,510	23.12	48,090	18.22	37,900

1997						
	SIC Code	Total Employment	Mean Hourly Wage	Mean Annual Wage	Median Hourly Wage	Median Annual Wage
Crude Petroleum & Natural Gas	131	145,030	23.86	49,629	21.40	44,512
Industrial Inorganic Chemicals	281	117,140	19.36	40,269	17.99	37,419
Drugs	283	294,410	17.93	37,294	15.33	31,886
Industrial Organic Chemicals	286	136,840	21.45	44,616	19.70	40,976
Petroleum Refining	291	93,550	21.29	44,283	20.77	43,202
Engines & Turbines	351	76,240	16.95	35,256	15.81	32,885
Special Industry Machinery, Except Metalworking	355	182,490	16.93	35,214	14.65	30,472
Computer & Office Equipment	357	379,740	21.05	43,784	18.25	37,960
Communications Equipment	366	278,670	17.37	36,130	14.18	29,494
Electronic Components & Accessories	367	675,670	16.02	33,322	12.59	26,187
Aircraft and Parts	372	523,710	20.58	42,806	18.41	38,293
Guided Missiles & Space Vehicles & Parts	376	90,930	22.20	46,176	21.00	43,680
Search, Detection, & Navigation Equipment	381	157,080	22.53	46,862	20.51	42,661
Measuring & Controlling Instruments	382	306,940	17.61	36,629	14.57	30,306
Photographic Equipment & Supplies	386	83,800	17.63	36,670	15.22	31,658
Telegraph & Other Message Communications	482	8,570	20.14	41,891	16.99	35,339
Professional & Commercial Equipment & Supplies	504	882,600	17.94	37,315	14.44	30,035
Central Reserve Depository Institutions	601	22,340	16.06	33,405	12.93	26,894
Life Insurance	631	384,040	19.15	39,832	15.91	33,093
Computer Programming, Data Processing, & Related Services	737	1,451,030	21.96	45,677	19.52	40,602
Engineering, Architectural, & Surveying	871	888,740	20.81	43,285	18.37	38,210
Research, Development, & Testing Services	873	596,530	19.84	41,267	16.77	34,882
Management & Public Relations Services	874	992,820	19.37	40,290	15.37	31,970
Services, not elsewhere classified	899	51,380	20.26	42,141	16.54	34,403