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ABSTRACT

Statistical data on scientists, engineers, and technicians (SET) in trade and regulated industries in 1982 are provided in three sections: (1) SET in trade and regulated industries by major occupational group and detailed industry of employment; (2) SET in trade and regulated industries by detailed occupation and broad industry group of employment; and (3) SET in each trade and regulated industry, as a percent of total employment in the industry, and the relative error. These data, obtained from the Occupational Employment Statistics Survey, represent reliable estimates of the utilization of SET by private industry. Analysis of this information provides insight into the dynamics of the labor market as SET requirements respond to variations in growth among industries, and to the impact of technology and other factors upon industry, wage and salary workers. (All data are in Standard Industrial Classification codes 40 through 59.) (JN)



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section a

general

This report presents information on scientists, engineers, and technicians (SET's) in Trade and Regulated Industries in 1982. The data come from the Occupational Employment Statistics (OES) Survey, a Federal/State program producing national, State, and local data on occupational employment by industry for nonfarm wage and salary workers. The Bureau of Labor Statistics (BLS) has primary responsibility for developing survey procedures and providing technical guidance. State Employment Security Agencies implement the survey at State and local levels and prepare current and projected employment statistics for these labor markets. BLS also conducts supplemental surveys in nonparticipating States, and then combines the data from all States into national estimates.

The National Science Foundation (NSF) has enhanced the BLS effort since 1977 by financing full coverage of SET occupations and data collection in nonparticipating States. Thus, the data yield reliable national estimates of the utilization of SET's by private industry. Analysis of this information provides insight into the dynamics of the labor market as SET requirements respond to variations in growth among industries, and to the impact of technology, and other factors, upon industry. Section C of this publication lists analytical reports and statistical data from OES surveys.





section b

technical notes

scope of the survey

The OES survey! is conducted in 3-year cycles: manufacturing industries are surveyed the first year; mining, construction, financial, and various service industries in the nonmanufacturing sector are surveyed in the second; and trade, communications, transportation, and public utilities (Trade and Regulated Industries in this report) in the third year. Data in this report, from the 1982 surveys of Trade and Regulated industries, are in Standard Industrial Classification (SIC) codes 40 through 59. The reference dates of the survey were the weeks that included April 12, May 12, or June 12, depending on the SIC of the sample unit. The survey covered all 50 States and the District of Columbia.

method of collection

Schedules for the OES survey were mailed to personnel offices of most sample establishments. Nonrespondents received two additional mailings at 6-week intervals, with telephone follow-ups thereafter. Field personnel visited those companies essential to the survey because such companies have large absolute or relative employment within their industry.

Each industry surveyed received a questionnaire in which occupational detail was limited to primary work activities. Abbreviated survey forms, in which fields of specialization were combined, were sent to small establishments to diminish the reporting burden and to encourage participation. On the questionnaires the specific occupations were grouped under broad Census headings, each with a residual category for work functions not explicitly listed on the survey form. Each respondent was asked to identify any occupations in the residual categories for which employment levels were significant, surveys in subsequent years will be revised to include such jobs explicitly.

Condescription of the OES Survey can be found in Department of Labor, Bureau of Lacor Statistics. Occupational Employment Statistics Handbook (Washington, D.C., Supt of Documents U.S. Government Printing Office, April 1979).

limitations on analysis

Data collection methodology in the OES survey introduces several problems that should be taken into account when interpreting these data. First, the OES survey tends to understate requirements in specific fields. Second, this same survey characteristic can be expected to overstate cross-industry differences in staffing patterns: the finer the detail, the more serious the problem. This occurs because an occupation will be listed explicitly on an industry's questionnaire only if it is judged to be a major job class; otherwise, it is put into a residual category.

occupational and industrial classification

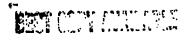
The OES survey collects data for approximately 110 SET occupations and uses two classifications systems—the Dictionary of Occupational Titles (DOT) and the 1980 Census of Population. The DOT system is used to develop occupational categories and definitions because its classification scheme is detailed. Summary categories and residual groups are comparable to the broader categories used in the Census.

Industries surveyed were classified according to the 1972 SIC codes. Reporting establishments were categorized on the basis of major product or activity for the previous calendar year.

concepts

An establishment, such as a factory, is the primary sampling unit in the survey. In general, it represents a single physical location and engages primarily in one type of economic activity. When several distinct activities are performed in one location, each is construed as being performed in an individual establishment, assuming that separate payroll records and other criteria are met.





This report covers several types of personnel: Full- and parttime workers; workers on paid vacation or on other types of leave; workers on unpaid short-term absence; salaried officers, executives, and staff of unincorporated firms; employees temporarily-assigned to other units; and employees for whom the unit is their permanent duty station. Excluded from coverage are proprietors (owners and partners of unincorporated firms), unpaid family workers, and workers on extended leave.

Occupation means the work employees do, rather than the field for which they trained. Skilled personnel are an exception when engaged in the sale of scientific and engineering (S/E) equipment: such personnel are categorized in terms of their fields of specialization. To categorize one as a scientist or engineer requires work at a level of knowledge equivalent to that acquired by completion of a 4-year college course with a major in that field, regardless of whether a college degree was ever obtained. Employees who perform multiple functions are reported only in the job believed to require the highest skill level. Supervisors who spend more than one-fifth of their time doing work similar to that of individuals under their supervision are classified in the occupation most closely related to their work duties.

sampling procedures

The OES survey is a probability sample with a sampling frame based on lists of establishments covered by State Unemployment Insurance (U.I.) systems. Because each cooperating State selects its own sample, the reference date of the sampling frame varies by date when the last sample frame was updated and the survey was conducted. The reference date for sampling in the three States surveyed by BLS for the 1982 survey was the first quarter of 1982.

The survey universe is stratified by industry and size of establishment unit since these characteristics are believed to be primary determinants of occupational staffing patterns. Nine size classes were represented, based on the numbers of people employed: 1 to 3, 4 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 249, 250 to 499, 500 to 999, and 1,000 and over.

U.L. reporting units with 1 to 3 employees were not sampled in every State. In this instance, units with 4 to 9 employees received larger weights to represent employment in the 1 to 3 size class. Reporting units with 250 or more employees were included in the sample with certainty. Samples for noncertainty size classes were developed to produce State estimates with target relative errors of 10 percent, 15 percent, and 20 percent at one standard deviation for the noncertainty size classes. This was done for groups of SIC's based on averages of occupational rates and coefficients of variation (CV's) from the previous survey of those SICs for a set of typical occupations. This SIC sample size was allocated to the size classes proportional to size class employment. The sample was selected systematically with equal probability within each State/SIC/area/size class cell.

The States chose from any of three target relative errors in designing their samples. Some States varied the target relative error by SIC. This decreased the survey's cost by decreasing the sample size.

The sample size for the States surveyed by BLS was developed by first determining the sample size required for national estimates in each 2-digit SIC with a target relative error of 10 percent. This was done by averaging CV's and occupational rates for a set of occupations from the previous survey of those SIC's. This national sample size was then allocated to the three nonparticipating States' size class cells proportionally by employment. Such allocation produced a total initial sample size of 239,580 U.L. reporting units.

response

Of the reporting units selected, 228,244 were eligible (i.e., excluding those out of business and out of scope). Usable responses were obtained from 170,698 units. The response rates were 74.8 percent based on units and 73.8 percent based on weighted employment. After the closeout date for national estimates, additional data were received by States and used in preparing State estimates. Response rates in most States were much higher than the response rate used to develop national estimates.

estimation

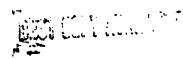
Weights were determined for the sample units from which usable responses were received. Each weight was composed of two factors. The first was the inverse of the probability of selection. The second was the nonresponse adjustment factor. For questionnaires that were not returned or were otherwise not usable, a reponse adjustment was made to impute for the nonrespondents. For each of the 3-digit State/SIC/size class sampling cells, a nonresponse factor was calculated that was equal to:

Weighted sample employment of all eligible units in sample Weighted sample employment of all responding eligible units

The sample employments were taken from the sampling frame. If the nonresponse factor in a cell was greater than a predetermined maximum factor—which increased as the number of respondents in a cell increased -the cell was collapsed with other homogeneous cells within an SIC until the factor for the combined cells was not greater than the appropriate maximum factor. If the collapsing procedure terminated (i.e., no more cells were available for collapse) before satisfying the constraint, then the appropriate maximum factor was used. For size classes 1 through o, homogeneous cells were determined to be other size cells within the SIC and State. For size classes 7 through 9, homogeneous cells were determined to be other State cells within the 5IC and size class. The weight for each unit was the product of the nonresponse adjustment factor and probability of selection.

A combined ratio estimate of occupational employment was used to develop the national estimates. The auxiliary variable used was total employment. The estimating formula was:

$$|P| = \Sigma \left(\frac{\sum \sum_{i=1}^{N} ||\sigma_{i}|| |P_{i}||}{\sum \sum_{i=1}^{N} ||\sigma_{i}|| |\sigma_{i}||} \right) M$$



Where P = 2-digit industry occupational employment esti-

= 3-digit industry within a 2-digit industry,

i = size class,

 $k = -\pi$ establishment,

weight after nonresponse adjustment in *i*th industry, *j*th size class and *k*th establishment,

 P_{nk} = occupational employment in *i*th industry, *j*th size class and *k*th establishment,

e_{rk} total employment in *i*th industry, *j*th size class and *k*th establishment, and

M_i = population total value of employment in *i*th industry

The population value of total employment (Mi) was obtained from the BLS Survey of Employment, Hours, and Earnings.

The standard formula for the sampling variance for a combined ratio estimate is:

$$V(\hat{P}) = \sum_{i} \sum_{n} \left(\frac{N_{n}^{2}(1-f_{n})}{n_{n}} \right) \left(S_{pn}^{2} + R_{i}^{2} S_{en}^{2} - 2K_{n}S_{pn}S_{en} \right)$$

where $V(\vec{P})$ variance of \vec{P}

i – 3-digit industry within 2-digit industry,

j = size class,

 N_{μ} = total number of units in the *i*th industry and *j*th size class,

t, sampling fraction in the *i*th industry and *j*th size class,

n number of sample units in the *i*th industry and *j*th size class,

 S_{pri} = standard deviation of p within ith industry and jth size class,

$$R = (\sum_{i} \sum_{i} w_{i}, p_{i}) (\sum_{i} \sum_{i} w_{i}, e_{i}),$$

standard deviation of *c* within *i*th industry and *j*th size class, and

 $K = e^{-\epsilon}$ correlation coefficient between p and e within ith industry and jth size class.

The variances for the occupational estimates were estimated using the following formula

$$Var(\hat{P}) = \Sigma \Sigma I \cdot V_n^2$$

where.

$$I = \left(\frac{M_{\infty}(e^2)}{M_{\infty}}\right) \cdot \left(\frac{\left(\frac{\Sigma_{\infty}(e^2)}{\Sigma_{\infty}(e^2)}\right) \left(\frac{\Sigma_{\infty}(e^2)}{\Sigma_{\infty}(e^2)}\right) \cdot \left(\frac{M_{\infty}(e^2)}{\Sigma_{\infty}(e^2)}\right)^2}{\left(\frac{\Sigma_{\infty}(e^2)}{\Sigma_{\infty}(e^2)}\right)^2}$$

$$|V|^2 = \sum_{i} |a_{i+i}| (ip_{i+i} - R(e_{i+i}) - (p_{i+i} - R(e_{i+i}))|^2$$

where M benchmark total employment in the *i*th industry and *i*th size class.

 $R = (\sum \sum_{i=1}^{n} a_i - p_i) + (\sum \sum_{i=1}^{n} a_i, e_i)$ and

 $v = \sum_{i=1}^{n} v_{i,i}$

and all other terms are as defined previously. This formula is almost a computational form of the standard formula, V(P), already given. One simplifying assumption has been made:

$$W_{ijk} = c_{ij}$$
 for all k in a given ij cell

That is, the weights are equal to a constant C within a given 3-digit industry/size class cell. The total effect of this assumption on the variance estimates was not measured.

reliability of estimates

The estimates developed from the sample may differ from the results of a census of all the establishments in the sample frame. There are two types of errors, sampling and nonsampling, possible in an estimate based on sample data. Sampling error occurs because observations are made only on a sample, not on the entire population. Nonsampling error can be attributed to many sources, e.g., inability to obtain information about all cases in a sample, differences in the respondent's interpretation of questions, inability of respondents to provide correct information, errors made in recording, coding, or processing the data, errors made in estimating values for missing data, and failure to represent all units in the population.

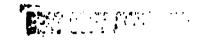
The particular sample used in this survey is one of a large number of possible samples of the same size that could have been selected using the same sample design. Estimates derived from the different samples would differ from each other. The deviation of a sample estimate from the average of all possible samples is called the sampling error. The standard error of a survey estimate is a measure of the variation among the estimates from all possible samples and thus is a measure of the precision with which an estimate from a particular sample approximates the average results of all possible samples. The relative standard error is defined as the standard error of the estimate divided by the value being estimated. The variance is the standard error squared. (In the OES Survey, the term "relative error" is used synonymously with the term "relative standard error.")

The sample estimate and an estimate of its standard error enables one to construct interval estimates with prescribed confidence that the interval includes the average result of all possible samples that could be obtained from the sample design for this survey.

To illustrate, if all possible samples were selected, and each of these were surveyed under essentially the same conditions, and an estimate and its estimated standard error were calculated from each sample, then:

- 1. Approximately 68 percent of the intervals from one standard error below to one standard error above the derived estimate would include the average value of all possible samples. This interval is called a 68 percent confidence interval.
- 2. Approximately 90 percent of the intervals from Lo standard errors below to 1 o standard errors above the derived estimate would include the average of all possible samples. This interval is called a 90 percent confidence interval.





- 3. Approximately 95 percent of the intervals from two standard errors below to two standard errors above the derived estimate would include the average of all possible samples. This interval is called the 95-percent confidence interval.
- 4. Almost all intervals from three standard errors below to three standard errors above the derived estimate would include the average of all possible samples.

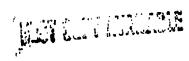
An inference that the complete coverage would be within the indicated ranges would be correct in approximately the relative frequencies shown.

For example, suppose an estimated employment total is shown as 5,000 with an associated relative error (relative standard error) of 2 percent. Based on these data, the two-thirds confidence interval is from 4,900 to 5,100 employment, and a conclusion that the

average estimate of total employment lies within a range computed in this way would be correct for roughly two-thirds of all possible samples.

The relative errors indicate primarily the magnitude of the sampling error, but do not measure biases in the data resulting from nonsampling error. Efforts were made to reduce the biases arising from errors in recording, coding, and processing the data. The adjustments made for nonrespondents assumed that their characteristics were the same as those of the respondents at a given level. To the extent that this is not true, bias is introduced into the data. The magnitude of these biases is unknown.

Particular care should be exercised in the interpretation of estimates based on a small number of cases, or on small differences between estimates, because of relatively large sampling errors and the unknown magnitude of the biases.



section c

detailed statistical tables

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	HIGHBU V. BUG HERBUNG CHOEL 1982.		



TABLE C-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1982 [Numbers in thousands]

	Scientists, engineers, and technicians									
Industry	Total	Percent	Scien- tists	Percent	Engi-	Percent	Tech- nicians	Percent		
Total trade and regulated industries. Transportation, communications, and utilities. Transportation	425.1 217.5 16.13 217.5 16.13 21.1 (1) 22.4 21.3 21.3 21.3 21.3 21.3 21.3 21.3 21.3	100.28 100.28 (11) (1	47.83 17.83	100.69 	117.23 81.6 752 941 26653 1333 1 17322 73.2 7532.4412	10948 10948	260.85 118.23 1 (1) (1) 31.2 (1) (1)2.4 5.22 1.1 116.1.2 1.1 116.1.2	**************************************		

See footnotes at end of table.



TABLE C-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1982--con.
[Numbers in thousands]

		Sc	ientists,	engi neer :	, and te	chnicians	5	
Industry	Total	Percent	Scien- tists	Percent	Engi- nears	Percent	Tech- nicians	Percent
Utilities and sanitary services. Electric services. Gas production and distribution. Combination electric and gas, and other utilities. Water supply. Sanitary services. Steam supply. Irrigation systems. Wholesale and retail trade. Wholesale trade. Wholesale trade. Wholesale trade. Wholesale trade. Wholesale trade, durable goods. Motor vehicles and auto parts and supplies. Furniture and home furnishings. Lumber and other construction materials. Sporting, toy, photographic, and hobby goods. Miscellaneous durable goods. Wholesale trade, nondurable goods. Wholesale trade, nondurable goods. Wholesale trade, nondurable goods. Paper and paper products. Apparel, piece goods, and notions. Groceries and related products. Petroleum and petroleum products. Beer, wine, and distilled alcoholic beverages. Miscellaneous nondurable goods. Retail trade. Building materials, garden supplies, mobile homes Lumber and other building materials dealers. Paint, glass, and wallpaper stores. Retail nurseries, lawn and garden supply stores. Retail nurseries, lawn and garden supply stores. General merchandise stores.	96.41.658 98.24.658 124.658 127.34.658829 11.23.988.41.47.486.39.27.86 11.23.988.41.47.486.39.27.86 11.33.43.33.33.31.31.31.31.47.486.39.27.86 11.33.43.33.33.33.31.31.31.31.31.31.31.31.31.31	778812) 8600134722846332821828221)))) 2325 (1 85.00134722846332821828221)))) 211	766411 465611 30301111328499428 4	18935	4263.1592832213130 1011 4263.1592832213130 1011 11592832213130 1011	3239	427 61.022 34.394975.6869.089534446.8975 11 122.8 7 11 2 21 19 7 11 2 2 1 19 7 11 2 2 2 1 19 7 11 2 2 2 1 19 7 11 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2	17 68571476512323329195278 11 3 4



TABLE C-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1982--con. [Numbers in thousands]

	Scientists, engineers, and technicians									
Industry	Total	Percent	Scien- tists	Percent	Engi- neers	Percent	Tech- nicians	Percen		
Department stores	4.1	1.0	1.2	2.6	0.4	0.3	2.5	0.9		
Variety stores	. 5		. 1	.2	- ' ' '	- 1	.4	. 2		
Miscellaneous general merchandise stores	!!	(1)	. 1	. 1	- [-	. 1	(1)		
ood stores	2.0	.5	.6	1.3	. 3	2	1.1	. 4		
Grocery stores	1.8	.4	.6	1.3	.3	.2	. 9	. 3		
Fruit stores and vegetable markets	-	[- !	- [-	-	-	-		
andy, nut, and confectionery stores	.2	(1)	-	- !	- (-		- ,		
airy products stores	<		_	-	-	-	.2	. 1		
etail bakeries	_		_	_	_ [- !	- !	-		
iscellaneous food stores	_	_	_ [_		_	_		
tomotive dealers and gasoline service stations	. 7	.2	_	_		_ 1	7	-,		
otor vehicle dealers (new and used)	11	(1)	_	_	_	_	• 41	(1)		
otor vehicle dealers (used only)	_ ''	`-'	- 1	_	_ 1	_ }	_ ''	(1)		
uto and home supply stores	.2	.1	- 1	-	- 1	_	.2	- 1		
asoline service stations	. 11	(1)	- 1	- 1	- 1	- 1	11	• ;		
oat dealers	. 11	(1)	- 1	- 1	- 1	- [. ii	(i)		
ecreational and Utility trailer dealers	-	-	- 1	-	- 1	- 1	- 1	`-'		
otorcvcle dealers	- !	- (- 1	- 1	- 1	- i	- 1	_		
utomotive dealers, n.e.c	. 1	(1)	- !	- 1	- 1	- i	. 1	. 1		
parel and accessories stores	.61	. 1	.2	.4	- 1	-	. 4	. 2		
len's and boy's clothing stores	(1)	(1)	- 1		-	!	(1)	(1)		
lomen's ready-to-wear stores	.3	.1		. 2	- 1	-	1	. 1		
omen's accessory and specialty stores	7.		Į.	- 1	-	-		-		
amily clothing stores	(1)	(1)			-	-	(1)	(1)		
hoe stores	.2	(1)	_ • 1	. 2	_	- [- 1	(1)		
urriers and fur shops	'!	(1)	_	_	_ [_ [_ • • • •	(1)		
iscellaneous apparel and accessories stores	_	_ 1	_	_	_	_	_	_		
rniture and home furnishings stores	i.8	.4	_	_		_	1.8	_ 7		
urniture and home furnishings, except appliances!	.2	(i)	_	_		_	.2	• '1		
ousehold appliance stores	.71	iii l	- i	-	_	_ !		(i)		
ladio, television, and music stores	1.5	.4	- i	- 1	_ }		1.5			
ting and drinking places	. 5	. 1	-	-	- ì		. 5	. 6 . 2		
ating and drinking places	. 5	. 1	- 1	- 1	- i	-	.51	. 2		
scellaneous retail stores	2.6	.6	.6	1.3	.21	.2	1.7	. 5		
Drug stores and proprietary stores	.2	(1)	. 1	.1	-	- ì	. 1	(i)		
Liquor stores	. 11	(1)	-	-	-	- i	. 1 أ	(1)		

See footnotes at end of table.

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TABLE C-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1982--con.
[Numbers in thousands]

and the control of the property of the control of t

		Scientists, engineers, and technicians										
Industry	Total	Percent	Scien- tists	Percent	Engi- neers	Percent	Tech- nicians	Percent				
Used merchandise stores	(1) 0.4 1.0 .2 .7	(1) 0.1 .2 (1)	0.2 .4 -	0.4 .8 -	0.1	0.1 .1	(1) 0.3 .4 .1 .7	(1) 0.1 .2 (1)				

No amount available
 (1) Value is less than .05 for numbers and less than .005 for percents.
 NOTE: Because of rounding, components may not add to totals.
 SOURCES: Bureau of Labor Statistics and the National Science Foundation.





TABLE C-2. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES, By Detailed Occupation and Broad Industry Group of Employment: 1982 [Numbers in thousands]

			Scientists							Engineers				
Industry	All fields	Total	Phys- ical	Math- emat- ical	Life	Soc- ial	Com- puter ana- lyst	Other	Total	Aero- nau- tical	Chem- ical	Civi1	Elec/ Elec- tron- ic	Me- chan- i cal
Total trade and regulated industries	.35 2.05 2.05 2.05 2.05 2.05 2.05 2.05 2.0	47.2 17.3 17.3 14.3 14.5 14.6 15.8 14.6 15.8 16.5 16.5 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6	2.0	1.4 	1.0	0	39.0 13.0 2.292 105.7 220.7 1.6 	3.42 11 21.0 2.10	117.2 81.6.7953371.6.996.30 143 732543333 3.0 143 	5 55 5	1.3 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5 . 3	5 4 1 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	15.6

See footnotes at end of table.



TABLE C-2. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES, BY DETAILED OCCUPATION AND BROAD INDUSTRY GROUP OF EMPLOYMENT: 1982--con.
[Numbers in thousands]

· · · · · · · · · · · · · · · · · · ·	Engir	eers			Tec	hnician	5		
Industry	Indus- tri a l	Oth- er	Total	Pro- gram- m e r	Draft- er	Engi- neer- ing	Sci- ence	Un- spe- ci- fied	Other
Total trade and regulated industries	6.4	35.7	260.8	40.4	19.6	171.5	6.1	1.8	21,3
Transportation, communications, and utilities	6.4 .3	20.5 3.1	118.5 7.2	16.3 3.2		63.6 3.2	2.8	. 5 . 5	21.3
Local and interurban transit Trucking and warehousing Water transportation	-	- .7 1.4	.3 1.3 1.0	1.1	- - -	.2	-	. 3 (1)	=
Air transportation	. 3 -	.5 .2 .3	2.9 1.2 .5	1.5	- 3	1.3	-	- - .2	- -
Communications and utilities Communications Utilities and sanitary services	6.1 3.9 2.2	17.4 5.7 11.6	111.3 66.1 45.1	13.1 8.1 5.1	13.6	60.4 30.4 30.0	2.8	(1)	21. 21.
Wholesale trade	- - -	15.2 14.3 11.6	142.3 132.4 121.3	24.1 19.5 15.4	5.7 5.0	107.9 104.5 100.1	3.3 3.3 1.0	1.2 - -	- - -
Wholesale trade, nondurable goods	-	2.6 1.0	11.0 9.9	4.1 4.6	.2	4.5 3.4	2.3	- 1.2	- -
Building materials, garden supplies, mobile homes	-	. 1	.7 2.9	.2 2.0	.4	6	-	_ , 1	- -
Food stores	-	. 3	1.1	.6	-	. 3	-	.2	-
service stations	-	-	. 4	. 1	-	-	-	. 1	-
stores	- - -	- - .2	1.8 .5 1.7	. 1 . 5 . 7	-	1.6	- -	- · 1 2	- -

No amount available
 (1) Value is less than .05.
 NOTE: Because of rounding, components may not add to totals.
 SOURCES: Bureau of Labor Statistics and the National Science Foundation.



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982

Taxicabs (SIC 4120)

Field	Total	Percent of industry em- ploy- ment	Relativ e error
Total Technicians Field unspecified	160	0.37	(1)
	160	.37	(1)
	160	.37	(1)

Intercity and rural highway transportation (SIC 4130)

Field	Total	Percent of industry em- ploy- ment	
Total Technicians Field unspecified	100 100 100		(1) (1) (1)

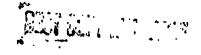




TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Trucking, local and long distance (SIC 4210)

Field	Total	Percent of industry em- ploy- ment	Relative
Total. Engineers. Field unspecified. Scientists. Systems analysts. Technicians. Computer programmer Engineering technicians.	480 480 490 490 1,080 930	0.17 .04 .04 .04 .09 .08	(1) (1) 14.07 (1) 12.69 (1) 11.63 28.12

Public warehousing (SIC 4220)

Field	Total	Percent of industry em- ploy- ment	i
Total Engineers Field unspecified Technicians Computer programmer Engineering technicians	190 190 230	0.50 .23 .23 .27 .18 .09	(1) (1) 47.93 (1) 28.66

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Deep sea foreign transportation (SIC 4410)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Marine Other, n.e.c. Scientists Systems analysts Technicians Computer programmer	640 390 300 90 130 120	1.93 1.18 .91 .27 .39 .39	(1) (1) 16.43 .00 (1) 26.43 (1) 16.66

Deep sea domestic transportation (SIC 4420)

Field	Total	Percent of industry em- ploy- ment	Relativ e error
Total	130	0.97	(1)
Engineers	130	.97	(1)
Marine	130	.97	17,19

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Transportation on rivers and canals (SIC 4440)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Marine Mechanical	170 170 90 80	i .98 .52	(1) (1) 14.26 46.48

Local water transportation (SIC 4450)

Field	Total	Percent of industry em- ploy- ment	Relative
Total Engineers Marine Other, n.e.c.	640 640 310 330		(1) (1) 18.21 .00

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Water transportation services (SIC 4460)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Marine Mechanical Technicians Computer programmer Surveyor	1,390 570 170 400 820 90 730	1.18 .48 .14 .34 .70 .07	(1) (1) 33.55 23.15 (1) 23.75 30.05

Certificated air transportation (SIC 4510)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Aeronautical Electrical/electronic Industrial Other, n.e.c. Scientists Field unspecified Systems analysts Technicians Computer programmer. Electrical/electronic technicians. All other engineering technicians.	1,340 550 180 250 360 2,110 140 1,970	1.56 .34 .15 .04 .06 .57 .03 .54 .65 .43	(1) (1) 17.15 22.21 18.67 .00 (1) 17.31 17.24 (1) 18.60 23.03 (1)

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Air transportation facilities and services (SIC 4580)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified Technicians Electrical/electronic technicians	670	1.31	(1)
	150	.29	(1)
	150	.29	0.00
	520	1.02	(1)
	520	1.02	23.49

Pipelines, except natural gas (SIC 4600)

Field	Total	Percent of industry em- ploy- ment	Relativ e error
Total. Engineers. Civil. Electrical/electronic. Mechanical. Safety. Other, n.e.c. Scientists. Field unspecified. Systems analysts. Technicians. Drafter. Electrical/electronic technicians.	2,780 1,290 240 280 520 60 190 300 80 220 1,190 250 710	12.26 5.69 1.06 1.23 2.30 .26 .84 1.32 .35 .97 5.25 1.10 3.14	(1) (1) 16.10 14.48 10.53 16.07 (1) 44.15 23.16 (1) 10.64 9.44

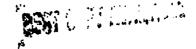


TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Freight forwarding (SIC 4710)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Scientists Systems analysts Technicians Computer programmer	150	0.61 .28 .28 .33 .33	(1) (1) 27.36 (1) 19.69

Arrangement of transportation (SIC 4720)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified. Scientists Systems analysts. Technicians Computer programmer.	340 120 120 80 80 140	0.22 .08 .08 .05 .05	(1) (1) 0.00 (1) 26.34 (1) 15.47



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Miscellaneous transportation services (SIC 4780)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified Technicians Field unspecified	270	1.51	(1)
	150	.84	(1)
	150	.84	34.09
	120	.67	(1)
	120	.67	(1)

Telephone communication (SIC 4810)

Field	Total	Percent of industry em- ploy- ment	Relative
Total. Engineers. Civil. Electrical/electronic. Industrial. Mechanical. Other, n.e.c. Scientists. Field unspecified. Economists. All other social scientists. Systems analysts. Technicians. Computer programmer. Drafter. Electrical/electronic technicians. Industrial engineering technicians. All other engineering technicians.	1,210 12,600 3,750 4,160 5,100 5,100 4,510 25,190 7,260 5,840 8,670	2.05 .11 1.16 .34 .06 .38 .46 .01 .03 .01 .41 2.32 .67 .54	(1) (1) 22.33 10.81 18.22 21.23 .00 (1) 29.53 39.56 .00 16.75 (1) 17.07 10.53 12.23 27.95 (1)

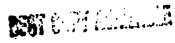




TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Radio and television broadcasting (SIC 4830)

Field	Total	Percent of industry em- ploy- ment	 Relative
Total. Engineers. Electrical/electronic. Other, n.e.c. Scientists. Systems analysts. Technicians. Computer programmer. Electrical/electronic technicians. Sound recording and reproduction technician. Video-recording engineer. Broadcast technician. Light technician. All other engineering technicians.	6,120 1,000 390 390 21,850 290 1,180 520 1,100 18,140	3.24 2.79 .45 .17 .17 9.94 .13 .53 .23 .50 8.28	(1) (1) 6.25 .00 (1) 38.97 (1) 31.70 18.49 21.29 27.27 6.46 18.97 (1)

Telegraph communication (SIC 4820)

Field	Total	Percent of industry em- ploy- ment	1
Total Engineers Field unspecified Technicians Electrical/electronic technicians All other engineering technicians	4,340 370 370 3,970 3,830 140	1.89 1.89 20.35	(1) (1) 0.00 (1) 37.81 (1)



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Communication services, n.e.c. (SIC 4890)

Field	Total	Percent of industry æm- ploy- ment	Relative error
Total Engineers Electrical/electronic Industrial Other, n.e.c Scientists Systems analysts Technicians Computer programmer Drafter Electrical/electronic technicians. Broadcast technician. All other engineering technicians.	18,600 3,170 2,810 160 200 290 15,140 520 500 12,680 1,210 230	17.66 3.01 2.67 .15 .19 .27 .27 14.38 .49 .47 12.06 1.15	(1) (1) 13.75 45.10 .00 (1) 32.93 (1) 29.67 17.19 9.27 27.83 (1)

Electric services (SIC 4910)

Field	Total	Percent of industry em- ploy- ment	Relative
Total. Engineers. Chemical. Civil. Electrical/electronic. Industrial. Mechanical. Nuclear. Other, n.e.c. Scientists. Field unspecified. Systems analysts. Technicians. Computer programmer Drafter. Electrical/electronic technicians. Surveyor. Mechanical engineering technicians. Estimator and drafter, utilities. All other engineering technicians. Science technicians.	26,760	13.93 6.38 6.35 3.44 6.37 1.00 1.10 6.45 8.120 8.89 1.50 1.50	(1) (1) 16.44 9.53 6.97 9.60 12.17 (1) 9.01 11.10 (1) 11.06 10.24 74.50 22.52 7.57 (1) 9.35



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Gas production and distribution (SIC 4920)

Field	Total		Xelative error
Total. Engineers. Chemical. Civil. Electrical/electronic. Industrial. Mechanical. Other, n.e.c. Scientists. Field unspecified. Systems analysts. Technicians. Computer programmer. Drafter. Electrical/electronic technicians. Surveyor. Mechanical engineering technicians. Estimator and drafter, utilities. All other engineering technicians. Science technicians.	3,850 280 1,1280 310 6,70 1,1590 1,590 1,620 1,890 1,220 1,890 1,220 1,890 1,200 280	2.19 .16 .64 .17 .38 .90 .30 .60 3.75 1.08 .16 .14 .08	(1) (1) 25.93 9.89 18.27 17.755 .00 (1) 15.93 9.68 (1) 10.28 6.76 14.36 12.06 21.00 19.23 (1)

Combination electric and gas, and other utilities (SIC 4930)

Field	Total	Percent of industry em- ploy- ment	Relative
Total. Engineers. Chemical. Civil. Electrical/electronic. Industrial. Mechanical. Nuclear. Other, n.e.c. Scientists. Field Unspecified. Systems analysts. Technicians. Computer programmer. Drafter. Electrical/electronic technicians. Surveyor. Mechanical engineering technicians. Estimator and drafter, utilities. All other engineering technicians. Science technicians.	11,210 240 9,320 460 1,400 590 3,260 2,370 1,860 11,000 1,390 1,470 3,060	.29 1.63 1.18 .25 .93 5.48 .69 .73 1.53 .153	(1) 23.36 18.57 11.23 22.57 19.15 16.11 (1) 16.41 14.91 (1) 12.90 18.77 13.53 12.80 35.81 14.67 (1)

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Water supply (SIC 4940)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total. Engineers. Civil Scientists. Field unspecified. Technicians. Drafter. All other engineering technicians. Science technicians.	520 210 210 60 60 250 100 90 60	2.48 1.01 1.01 .28 .28 1.19 .48 .43	(1) (1) 16.62 (1) 15.22 (1) 14.19 (1) 19.69

Sanitary services (SIC 4950)

Field	Total	of industry em- ploy- ment	Relativ e error
tal iqineers Field unspecified Field unspecified Prield unspecified Science technicians Science technicians	800 530 530 110 110 160 70	1.56 1.05 1.05 .21 .21 .30	(1) (1) 0.00 (1) 23.12 (1) 37.68

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Motor vehicles and auto parts and supplies (SIC 5010)

Field	Total	Percent of industry em- ploy- ment	Relative
Total Engineers Mechanical Other, n.e.c. Scientists Mathematical scientists Systems analysts Technicians Computer programmer. Electrical/electronic technicians All other engineering technicians	4,280 1,740 1,390 350 640 80 560 1,900 600 1,100 200	1.00 .42 .34 .08 .14 .01 .13 .44 .14	(1) (1) 26.66 (1) (1) (1) 16.72 (1) 13.12. 27.32

Furniture and home furnishings (SIC 5020)

Field	Total	Percent of industry em- ploy- ment	Relativ e erro r
Total Scientists Systems analysts Technicians Computer programmer Engineering technicians	430 70 70 360 130 230	0.37 .06 .06 .31 .11	(1) (1) 43.36 (1) 31.26



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Lumber and other construction materials (SIC 5030)

Field	Total	Percent of industry em- ploy- ment	Relativ e
Total Engineers Field unspecified. Scientists Physical scientists. Systems analysts. Technicians Computer programmer. Drafter All other engineering technicians	1,460 370 370 140 70 950 290 490	0.78 .20 .20 .06 .03 .53 .52 .16 .27	(1) (1) 0.00 (1) (1) 35.88 (1) 22.44 30.05 (1)

Sporting, toy, photographic, and hobby goods (SIC 5040)

Field	Total	Percent of industry em- ploy- ment	Relativo
Total Engineers Field unspecified Technicians Computer programmer Electrical/electronic technicians	1,770	2.42	(1)
	70	.09	(1)
	70	.09	0.00
	1,700	2.33	(1)
	200	.27	23.05
	1,500	2.06	26.99

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Metals and minerals, except petroleum (SIC 5050)

Field	Total	Percent of incustry em- ploy- ment	Relative error
Total. Engineers. Mechanical. Other, n.e.c. Scientists. Systems analysts. Technicians. Computer programmer. Drafter. Electrical/electronic technicians. All other engineering technicians.	2,800 1,060 170 890 260 260 1,480 700 370 70	.11 .62 .18 .18 1.02 .23 .49	(1) (1) 35.36 .00 (1) 19.20 (1) 17.01 23.58 24.04 (1)

Electrical goods (SIC 5060)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	43,160	9.94	(1)
Engineers	9,520	2.19	(1)
Electrical/electronic	6,600	1.52	18.19
Mechanical	960	.22	31.79
Other, n.e.c	1,960	. 45	.00
Scientists	1,000	.22	(1)
Mathematical scientists	240	.05	(1)
Systems analysts	760	. 17	25.71
Technicians	32,640	7.53	(1)
Computer programmer	1,210	. 27	31.29
Drafter	800	. 18	29.35
Electrical/electronic technicians	30,100	6.96	8.04
All other engineering technicians	530	. 12	(1)

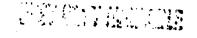


TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Hardware/plumbing/heating equipment and supplies (SIC 5070)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers	4,910 1,860 1,230 630 280 2,770 410 230 1,930 200	2.04 .78 .52 .26 .11 .11 1.15 .17 .09 .81	(1) (1) 29.71 .00 (1) 15.04 (1) 14.26 35.81 23.20 (1)

Machinery, equipment, and supplies (SIC 5080)

Field	Total	Percent of industry em- ploy- ment	Relativ e error
Total. Engineers. Electrical/electronic Mechanical. Other, n.e.c. Scientists. Mathematical scientists. Chemists. Systems analysts. Technicians. Computer programmer Drafter. Electrical/electronic technicians Mechanical engineering technicians All other engineering technicians Science technicians	113,850 16,180 4,930 4,700 6,550 19,040 280 140 18,620 78,630 12,090 2,610 59,810 1,110 1,990 1,020	8.37 1.18 .36 .34 .48 1.40 .02 .01 1.37 5.79 .89 .19 4.42 .08	(1) (1) 18.06 16.00 .00 (1) (1) 38.31 15.55 (1) 16.30 14.15 7.10 31.45 (1)



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Miscellaneous durable goods (SIC 5090)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified Scientists Systems analysts Technicians Computer programmer. Electrical/electronic technicians All other engineering technicians	1,820 820 820 120 120 880 130 670	.44	(1) (1) 0.00 (1) 27.36 (1) 25.61 48.50 (1)

Paper and paper products (SIC 5110)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	1,070	0.66	(1)
Engineers	190 190	. 12	(1)
Field unspecified	90	.05	(1)
Systems analysts	90	.05	30.96
Technicians	790	.49	(1)
Computer programmer	250	. 15	21.22
Electrical/electronic technicians	540	.34	32.13

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Drugs, proprietaries, and sundries (SIC 5120)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified. Scientists Chemists Systems analysts. Technicians Computer programmer. Electrical/electronic technicians. All other engineering technicians. Science technicians.	1,380 180 180 300 150 150 900 390 220 200		(1) (1) 0.00 (1) 39.94 16.17 (1) 15.95 45.55 (1)

Apparel, piece goods, and notions (SIC 5130)

Field	Total	Percent of industry em· ploy- ment	Relative error
Total Engineers Field unspecified. Scientists Systems analysts. Technicians Computer programmer. Engineering technicians	730 90 90 160 160 480 280 200	0.41 .05 .05 .09 .09 .27 .16	(1) (1) 0.00 (1) 20.52 (1) 26.46

See footnotes at end of table.



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Groceries and related products (SIC 5140)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Mechanical Other, n.e.c.	3,430 340 190 150 770	0.47 .04 .02 .02	(1) (1) 47.64 .00
Physical scientists	160 100 510 2,320	.02 .01 .07	(1) (1) 30.26 (1)
Computer programmer	1,240 90 570 420	.18 .01 .08 .06	24.90 45.49 31.04 .00

Farm-product raw materials (SIC 5150)

Field	Total	Percent of incustry em- ploy- ment	Relative error
Total Engineers Field unspecified Scientists Life scientists Computer programmer Electrical/electronic technicians All other engineering technicians	840 80 80 400 400 360 170 130 60	.05 .05 .29 .29	(1) (1) 0.00 (1) (1) (1) 34.36 21.59 (1)

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Chemicals and allied products (SIC 5160)

Field	Total	Percent of industry em- ploy- ment	Relativ e error
Total Engineers Mechanical Other, n.e.c Scientists Chemists Systems analysts. Technicians Computer programmer. Electrical/electronic technicians. All other engineering technicians. Science technicians.	1.340	3.35 .98 .17 .81 .64 .56 .08 1.73 .11 .56 .17	(1) (1) 44.44 .00 (1) 19.95 20.61 (1) 19.41 24.92 (1) 34.84

Petroleum and petroleum products (SIC 5170)

Field	Total	Percent of industry em- ploy- ment	Relative
Total. Engineers. Chemical. Mechanical. Other, n.e.c. Scientists. Mathematical scientists. Chemists. All other physical scientists. Systems analysts. Technicians. Computer programmer. Drafter. Electrical/electronic technicians. All other engineering technicians. Science technicians.	3,260 970 120 140 710 880 140 130 330 1,410 630 180	1.37 .42 .05 .36 .37 .12 .06 .05 .14 .58 .14 .27 .07	(1) 30.71 24.11 .00 (1) (1) 39.93 .00 22.43 (1) 21.02 26.54 22.45 (1) 33.93



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Beer, wine, and distilled alcoholic beverages (SIC 5180)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Scientists Chemists Systems analysts Technicians Computer programmer	930 360 190 170 570 570	0.61 .23 .12 .11 .38	(1) (1) 41.02 38.97 (1) 26.41

Miscellaneous nondurable goods (SIC 5190)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified Scientists Mathematical scientists Chemists Life scientists Systems analysts Technicians Computer programmer Electrical/electronic technicians. Science technicians.	3,200 120 120 1,230 160 240 500 330 1,850 680 740 430	0.78 .03 .03 .30 .04 .06 .12 .08 .45 .17	(1) (1) 0.00 (1) (1) 45.49 (1) 30.83 (1) 18.43 33.97 43.81



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Lumber and other building materials dealers (SIC 5210)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified Technicians Computer programmer Drafter	580	0.18	(1)
	100	.03	(1)
	100	.03	0.00
	480	.15	(1)
	100	.03	20.50
	380	.12	27.46

Department stores (SIC 5310)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total. Engineers. Field unspecified. Scientists. Statistician. Systems analysts. Technicians. Computer programmer. Drafter. Electrical/electronic technicians.	4,060 390 390 1,210 200 1,010 2,460 1,790 340 330	0.19 .02 .02 .06 .01 .05 .11 .09	(1) (1) 0.00 (1) 17.07 20.98 (1) 9.76 21.56 27.48



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Variety stores (SIC 5330)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Scientists Systems analysts Technicians Computer programmer Engineering technicians	520 110 110 410 170 240	0.21 .04 .04 .17 .07	(1) (1) 48.79 (1) 48.88 .00

Miscellaneous general merchandise stores (SIC 5390)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Scientists Systems analysts Technicians Computer programmer	150 70 70 80 80	0.12 .06 .06 .06	(1) (1) 28.65 (1) 48.84

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Grocery stores (SIC 5410)

Field	Total	Percent of industry em- ploy- ment	Relative
Total Engineers Field unspecified. Scientists Systems analysts. Technicians Computer programmer. Engineering technicians	1,770 260 260 600 600 910 610 300	0.06 .01 .01 .02 .02 .03 .02	(1) (1) 0.00 (1) 27.95 (1) 17.43

Candy, nut, and confectionery stores (SIC 5440)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Technicians Field unspecified	200	0.80	(1)
	200	.80	(1)
	200	.80	(1)

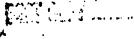


TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Motor vehicle dealers (new and used) (SIC 5510)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Technicians Field unspecified	100	0.01	(1)
	100	.01	(1)
	100	.01	(1)

Auto and home supply stores (SIC 5530)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Technicians Field unspecified	240	0.09	(1)
	240	.09	(1)
	240	.09	(1)

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Gasoline service stations (SIC 5540)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Technicians Computer programmer	140	0.02	(1)
	140	.02	(1)
	140	.02	29.84

Automotive dealers, n.e.c. (SIC 5590)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Technicians Engineering technicians	150	1.45	(1)
	150	1.45	(1)
	150	1.45	0.00

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Women's ready-to-wear stores (SIC 5620)

Field	Total	Percent of industry em- ploy- ment	Relative
Total Scientists Systems analysts Technicians Computer programmer	280	0.07	(1)
	90	.02	(1)
	90	.02	20.92
	190	.05	(1)
	190	.05	19.89

Family clothing stores (SIC 5650)

Field	Total	Percent of industry em- ploy- ment	Relative
Total Scientists Systems analysts Technicians Computer programmer	220 110 110 110 110	0.12 .06 .06 .06	(1) (1) 44.98 (1) 36.30

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Furniture and home furnishings, except appliances (SIC 5710)

Field	Total	Percent of industry em- play- ment	Relative error
Total Technicians Computer programmer Engineering technicians	170	0.04	(1)
	170	.04	(1)
	70	.02	41.73
	100	.02	.00

Household appliance stores (SIC 5720)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Technicians Field unspecified	130	0.17	(1)
	130	.17	(1)
	130	.17	(1)



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Radio, television, and music stores (SIC 5730)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Technicians Electrical/electronic technicians	1,500 1,500 1,500	.99	(1) (1) 35.23

Eating and drinking places (SIC 5800)

Field	Total	Percent of industry em- ploy- ment	Relative
Total Technicians Computer programmer	520	0.01	(1)
	520	.01	(1)
	520	.01	48.83



TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Drug stores and proprietary stores (SIC 5910)

Field	Total	Percent of industry em- ploy- ment	İ
Total Scientists Systems analysts Technicians Computer programmer	180	0.03	(1)
	60	.01	(1)
	60	.01	30.68
	120	.02	(1)
	120	.02	33.79

Liquor stores (SIC 5920)

Field	[™] otal	Percent of industry em- ploy- ment	Relative error
Total Technicians Field unspecified	100	0.07	(1)
	100	.07	(1)
	100	.07	(1)





TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Miscellaneous shopping goods stores (SIC 5940)

Field	Total	Percent of industry em- ploy- ment	Relative
Total Scientists	440	0.06	(1)
	180	.02	(1)
	180	.02	32.02
	260	.04	(1)
	260	.04	28.88

Nonstore retailers (SIC 5960)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified Scientists Statistician Systems analysts Technicians Computer programmer Engineering technicians	190 200	0.38 .05 .05 .15 .07 .08 .18 .14	(1) (1) 0.00 (1) 25.20 13.66 (1) 12.43

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

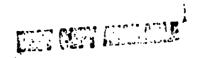
Fuel and ice dealers (SIC 5980)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Engineers Field unspecified Technicians Field unspecified	170 70 70 100 100	0.17 .07 .07 .10	(1) (1) 0.00 (1) (1)

Retail stores, n.e.c. (SIC 5990)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total Technicians Electrical/electronic technicians	670	0.24	(1)
	670	.24	(1)
	670	.24	37.19

1/ Relative error was not computed.
NOTE: Because of rounding, components may not add to totals.
SOURCES: Bureau of Labor Statistics and the National Science Foundation.





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"Doctorate Production in 1982 Stable in Science/Engineering Fields, But Down			Nondefense Needs: 1982-84	84-304	
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"No Change in Science and Engineering Student Quality Seen by 60% of Academic Officials: At Least 25% Improvement	83-322		Composite		
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