

Commission on Professionals in Science and Technology
STEM Workforce Data Project: White Paper No. 3

Effects of Recent Revisions in Federal Standard Occupational Classification (SOC) Categories on Counts of the Employment of STEM Professionals

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April 2007



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INTRODUCTION

Major revisions have been adopted during the last several years in the systems used by U.S. federal agencies to classify occupations. The updated job titles provide a much improved fit to the U.S. economy, but they also create inconsistencies in time series data for years before and after the changes in occupational categories. To obtain accurate information on recent trends, allowances must be made for the effects of these changes in the way that occupations are classified. Tools are now available, created by the Census Bureau and the Bureau of Labor Statistics (BLS), that help identify and assess these effects.

This paper includes detailed information on changes in the federal Standard Occupational Classification (SOC) categories for 61 professions:

- 4 non-STEM comparison occupations (chief executives, lawyers, physicians, and secondary school teachers);
- 3 STEM-related management occupations;
- 12 occupations in mathematical and computer science;
- 21 occupations in engineering, including 4 technician's positions; and
- 21 occupations in the life, physical, and social sciences, including technician professions.

With this information, observers such as policy analysts, professional and technical societies, and media can make informed adjustments of data on trends, creating more consistent information across the years when these changes in occupational assignments were made.

Users should be aware that implementations of the SOC vary among specific applications. Smaller-size databases (for example, any one monthly edition of the Current Population Survey, or CPS) lack sufficient depth to support estimates for all of the 61 fields covered below; larger databases (such as the one assembled from multiple sources for BLS' biennial projections of employment by industries and occupations) are able to utilize more complete versions of the SOC that include additional detailed occupational groups as well as those covered by the analysis in this document. For an example, see Report No. 7 in the STEM Workforce Data Project series, *STEM Employment Forecasts and Distributions Among Employment Sectors* (Washington, DC: Commission on Professionals in Science and Technology, 2006.)

Two Sources of Information

"Crosswalk" tables are a standard method for assessing changes in the makeup of multi-year survey items like occupational assignments. A single representative population is classified into both old and new occupational categories and the results are then cross-tabulated, producing the identification of every case where assignments have changed. Two separate crosswalks are available for the recent changes in U.S. occupational classification systems, one from the Census Bureau and another from BLS.

These two crosswalks are products of independent projects, done by separate teams and at different points in time, and so their results are not directly comparable. The Census analysis was carried out first. It takes 1990 census results and shows what those numbers would have looked like if the newer SOC revisions used 10 years later had been in place. In contrast, BLS created a dataset for the start of the 21st century by averaging results from three annualized mergers of CPS data for 2000, 2001, and 2002. All these cases were coded to Census occupational classification standards for both 1990 and 2002. One immediate result is that the Census numbers are for a point in time that is a decade older than the time period applicable to the data from BLS. During the intervening years, there was significant growth in much of the STEM workforce, particularly in information technology (IT) and telecommunications, and so data for the first years of the 21st century are not going to always resemble those for 1990.

There are other differences in the two crosswalk projects. Census used the 2000 edition of the revised SOC; BLS used a modified 2002 edition. Both crosswalks are comprehensively reported; that is, numbers for the reassigned groups of people — the distribution of those from a particular set of persons defined by one set of standards into their equivalents in a different system — add up to the totals for their source categories. However, BLS made many more small adjustments, which could reflect experience and improvements in implementation of the new SOC during the past several years. It found and corrected many specific errors in occupational assignments (which are made by coders working from open-ended responses about employment) than did the Census project (which used Census, not CPS, data). This result suggests that the more recent numbers may also be likely to be the more accurate ones. It will be interesting to see what experts in the source agencies have to say about this possibility and about some of the other implications raised by comparisons of the two federal crosswalk projects, below.

These facts mean that numbers in these two crosswalks should not be expected to match unless an occupation has not grown, been redefined, or changed in other ways between 1990 and 2000-2002. It is still possible to compare the two projects if one makes reasonable allowances for the difference in their timing. Here are four examples:

- The number of those treated as “Electrical and electronic engineers” in the 1990 Census (467,023) who remained in the same category when Census 2000 versions of the SOC were used is **245,802, or 52.6 percent** of the original number. The comparable figure from BLS, for a three-year averaged sample of CPS data from 2000-2002, classified to both Census 1990 and Census 2002 categories, is **48.0 percent** of the number of people in this category as it was defined by the older versions of the SOC (718,000), or approximately **344.6 thousand persons**. The boldfaced data in the preceding text are reasonably close to other estimates of the numbers of electrical and electronic engineers at these points in time, if allowance is made for the reclassification of workers who are primarily IT specialists and are now assigned to more appropriate occupational titles in computer science.
- Similarly, the number of those treated as “Computer systems analysts and scientists” in the 1990 Census (471,290) who are also counted in the almost identically titled, but nevertheless extensively revised, set of “Computer scientists and systems analysts” when Census 2000 versions of the SOC are applied is **214,605, or 45.5 percent** of the original number. The comparable figure from BLS, for the dataset of three-year averaged CPS data from 2000-2002, is **25.0 percent**, but this result is based on a dataset more than ten years after 1990, grown much, much larger (to 1,802,000) because of the dot-com/telecommunications boom. The resulting number of actual employed people in the new “Computer scientists and systems analysts” category would then be 25 percent of 1,802,000 or **450,500 persons**, or better than twice the size of the same group in 1990, which seems reasonable for the group in the 2000-2002 period. Actual annualized CPS results for this same population in 2003, when the SOC revisions were applied to these surveys, were for 722,000 people; similar results were obtained

in 2004 (700,000). The reason for the large decline in the numbers of people who used to be grouped in this field is that the definition of "computer scientists and systems analysts" has become much more precise, and many of the people who might have been included in the more broadly defined profession during the 1990s are now grouped elsewhere under numerous new occupational titles for specialized types of information technology people, such as software engineers, network analysts, and database administrators.

- The number of those treated as "Biological and life scientists" in the 1990 Census (62,137) who would have also been counted in the new category of "Biological scientists" if the Census 2000 version of the SOC was used is **57,618, or 92.7 percent**. The comparable figure from BLS for Census 2002 categories applied to the STEM population in 2000-2001, is approximately **81,000 people, or 66.9 percent** of a considerably larger count of 121,000 persons for the biological and life science aggregate; the rise is a reflection of growth in this profession between 1990 and 2000-2002.
- The number of those treated as "Economists" in the 1990 Census (152,237) who would also be counted in this category if Census 2000 versions of the SOC were used is **33,302, or 21.9 percent**. The comparable BLS figure, for averaged CPS data for 2000-2002, is **18,000, or 13.6 percent** of a base number of 133,000. Numerous persons other than classical economists were included in this group under older SOC conventions. The revisions include the creation of a new group for market and survey researchers, which accounts for over three quarters of the cases categorized as "economists" by the older SOC standards used in the 1990 data examined by Census, and 38.9 percent of those cases in the CPS dataset for 2000-2002 assembled by BLS, which assigns another 25.5 percent of the cases to the category of market and sales managers.

For more information about the Census project, see <http://www.census.gov/hhes/www/ioindex/crosswalks.html>. For more information about the BLS project, see <http://www.bls.gov/cps/cpsoccind.htm>. Both of these sites treat changes in industry categories as well as those for the SOC; for more information on the new North American Industry Classification System (NAICS), see <http://www.census.gov/epcd/www/naics.html>. We would like to thank Ms. Mary Bowler of the Bureau of Labor Statistics and Ms. Marisa C. Tegler of the U.S. Census Bureau for helping us locate and understand these sources.

DETAILS FROM THE CENSUS CROSSWALK PROJECT

We have used the Census crosswalk project to present data on how the reclassification of STEM occupations to current SOC standards would have affected 1990 Census results for scientific and technical professions. The data provided below are taken from Table 2 of a report by Thomas Scopp.¹ Table 9 in this same report was used to check the accuracy of this work.²

All data are for the entire U.S. civilian labor force. Often federal statistical tabulations may omit specific details for smaller STEM fields, or may include them only as a part of aggregated subgroups (e.g., combined sets such as "Life, physical, and social science occupations"). As noted above, users should not expect to always obtain information on every one of the occupations covered below, and in some cases, additional details will be available. For

¹ "1990 Census Occupation Classification System and Its Redistribution into the Census 2000 Occupation Classification System," *The Relationship Between the 1990 Census and Census 2000 Industry and Occupation Classification Systems*, Technical Paper #65, U.S. Bureau of the Census, October 30, 2003, http://www.census.gov/hhes/www/ioindex/tp65_report.html.

² "1990 Census Redistributed Occupation Data Compared to Census 2000 Occupation Data, Using the Census 2000 Occupation Classification"

example, the most recent versions of the federal tabulations used by the STEM Workforce Data Project do not provide breakdowns of postsecondary educators by discipline, but those details are available in the most recent releases of BLS' Occupational Employment Statistics (OES) program.

The STEM Workforce Data Project's definition of scientific and technical professions excludes a number of occupations, such as architects and designers (covered elsewhere in work done by the National Endowment for the Arts on the economics of the arts professions). Another gray area consists of health professions. Only medical science is included here, but other health professions might merit coverage, such as clinical laboratory or medical diagnostic technicians, occupations that employ substantial numbers of people with training in biology or chemistry. In general, health and medical professions are the largest science-related area that is not covered by this examination of STEM occupations.

Older versions of the SOC included identification of postsecondary teachers with STEM specialties, such as professors of physics. In at least its initial versions, the revised SOC collapsed all postsecondary teachers into a single group that includes professors of non-STEM disciplines such as the arts and business, and so counts of those practitioners could no longer be taken from the time series tabulations which our project had been using. In turn, this required us to note that the most current data included some significant shortfalls in estimates of the size of the more academic STEM professions. As noted above, the reappearance of these details in BLS' occupational employment statistics may be a signal that this difficulty can be resolved.

In addition, this treatment does not deal directly with numerous group aggregates commonly used in presentations of occupational data (such as the example, cited above, of combined data on "Life, physical, and social science occupations"). However, aggregate adjustments can be computed from weighted data on their components.

Using the Census Information

Like most federal statistical operations, the Census must deal with the entire economy and cannot always match the kind of intensive analysis of data that is possible when one can give focused attention to a portion of the whole. A consequence of this fact is that Scopp's own reports cannot be expected to have included the more detailed inspection of his data that has been assembled here for a much more limited set of occupations. We have drawn upon Scopp's results to assemble information both on reassignments of people out of older definitions of particular scientific and technical occupational categories, and on new assignments of people into updated categories, including some that have not been used before. To provide a couple of illustrations:

- Section 4.12, below, shows that in the new SOC, some persons who were formerly classed as "other" kinds of engineers are now included in the group of mechanical engineers, while some other persons who had been counted as mechanical engineers in the past are now classed as either industrial engineers or as computer hardware specialists.
- Section 5.12 shows that while the occupational title of "psychologist" is used in both the old and new versions of the SOC, in the new revision many of the people in two relatively lower-paid types of psychological practice have been reclassified out of that group and into counseling and social work, respectively — a result that helps to explain a jump in time series estimates of psychologists' base salaries between CPS data using the old SOC (up to 2002) and data from the same source, but using the new SOC (2003 and beyond).

Where feasible, Scopp provides measures of the fit between old and new SOC categories. These “comparability scores” are included here and take on the following values:

- 1 = 100% agreement between old and new approaches
- 2 = 95.0-99.9% agreement
- 3 = 90.0-94.9% agreement
- 4 = less than 90% agreement

Scopp’s original scores apply only to matched components and may not apply to 2000 groups as a whole. Where comparability is still reasonable, additional scores have been assigned that flag the status of larger 2000 datasets. For an example, see section 4.1 on aerospace engineers.

For many years, federal category labels have used the abbreviation “n.e.c.” (“not elsewhere classified”) to denote residual groups of miscellaneous cases not covered by other values of an occupational (or other) variable. The new SOC adopts the simpler and more straightforward use of the designation “Other.”

In instances where changes in the SOC categories have caused some persons in a detailed occupational category to be removed from the group, these are noted as “DROPPED,” reassignments are specified, and the same cases should appear elsewhere in the listings, as components of other new or revised categories. In some cases more than one 1990 source occupation applies to people in a newly defined occupational group, and in such cases, if the sources of reassignments are not obvious, they too are also specified.

In general, the material below follows Scopp’s approach, parsing the assignment of 1990 data into 2000 categories. To minimize confusion, SOC versions are designated as “old” and “new” or “revised” (and, more rarely, “unchanged”), rather than by the year associated with their adoption. The order of presentation of the separate occupational categories generally follows that for the Census 2000 (newer) classification. The complete list of comparisons between the older and newer STEM categories (without including academic cases, as noted above) is provided in the table on the following pages.

**CORRESPONDENCE BETWEEN OLDER AND NEWER
SOC CATEGORIES FOR STEM PROFESSIONS**

(SOC codes are stated in brackets)

SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
<u>1: NON-STEM COMPARISON GROUPS</u>			
<u>1.1: Derivation of new SOC category [001]: Chief executives (no equivalent in old SOC)</u>			
Old category [004]: Chief executives & general administrators, public administration 77.143% reassigned to new category [001]: Chief executives	19,023	14,675	4
Old category [005]: Administrators and officials, public administration 1.571% reassigned to new category [001]: Chief executives	506,683	7,958	
Old category [014]: Administrators, education and related fields 1,031% reassigned to new category [001]: Chief executives	623,612	6,429	
Old category [021]: Managers, service organizations, n.e.c. 1.190% reassigned to new category [001]: Chief executives	404,073	4,810	
Old category [022]: Managers and administrators, n.e.c. 8.626% reassigned to new category [001]: Chief executives	5,345,993	461,131	
Total in new category [001]: Chief executives		495,003	
<u>1.2: Derivation of revised SOC category [210]: Lawyers</u>			
Old category [178]: Lawyers 93.333% reassigned to revised category [210]: Lawyers	747,077	697,272	3
Total in revised category [210]: Lawyers		697,272	3
DROPPED from the old category are a variety of related workers including judges and paralegals. Group is for comparison purposes only, so all of these non-STEM details are omitted here.			
<u>1.3: Derivation of revised SOC category [232]: Secondary school teachers</u>			
Old category [157]: Teachers, secondary school 75.945% reassigned to revised category [232]: Secondary school teachers	624,400	474,201	
Old category [159]: Teachers, n.e.c. 3.473% reassigned to revised category [232]: Secondary school teachers	579,391	20,125	
Total in revised category [232]: Secondary school teachers		494,326	
DROPPED from each of the two old categories are a variety of other types of teachers including those in middle schools, special education teachers, teaching assistants, and coaches. Group is for comparison purposes only, so all of those non-STEM details are omitted here.			
<u>1.4: Derivation of revised SOC category [306]: Physicians and surgeons</u>			
Old category [084]: Physicians 97.345% reassigned to revised category [306]: Physicians and surgeons	586,715	571,138	2
Old category [045]: Metallurgical and materials engineers 0.943% reassigned to revised category [306]: Physicians and surgeons	19,230	181	
Total in revised category [306]: Physicians and Surgeons		571,319	2
DROPPED from the old category [084]: Physicians and reassigned to [353]: Miscellaneous health technologists and technicians (a group not otherwise treated here).			

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
<u>2: STEM-RELATED MANAGEMENT OCCUPATIONS</u>			
<u>2.1: Derivation of new SOC category [011]: Computer and information systems managers (no equivalent in 1990)</u>			
Old category [005]: Administrators and officials, public administration	506,683		
1.571% reassigned to new category [011]: Computer and information systems managers		7,958	
Old category [021]: Managers, service organizations, n.e.c.	404,073		
1.190% reassigned to new category [011]: Computer and information systems managers		4,810	
Old category [022]: Managers and administrators, n.e.c.	5,345,993		
2.193% reassigned to new category [011]: Computer and information systems managers		117,237	
Old category [064]: Computer systems analysts and scientists	471,290		
1.190% reassigned to new category [011]: Computer and information systems managers		5,611	
Total in new category [011]: Computer and information systems managers		135,616	
<u>2.2: Derivation of new SOC category [030]: Engineering managers (no equivalent in 1990)</u>			
Old category [005]: Administrators and officials, public administration	506,683		
0.524% reassigned to new category [030]: Engineering managers		2,653	
Old category [022]: Managers and administrators, n.e.c.	5,345,993		
1.023% reassigned to new category [030]: Engineering managers		54,710	
Old category [047]: Petroleum engineers	24,565		
0.990% reassigned to new category [030]: Engineering managers		243	
Old category [048]: Chemical engineers	64,320		
1.460% reassigned to new category [030]: Engineering managers		939	
Old category [053]: Civil engineers	252,808		
0.763% reassigned to new category [030]: Engineering managers		1,930	
Old category [055]: Electrical and electronics engineers	467,023		
0.877% reassigned to new category [030]: Engineering managers		4,097	
Old category [059]: Engineers, n.e.c.	341,963		
3.067% reassigned to new category [030]: Engineering managers		10,490	
Total in new category [030]: Engineering managers		75,062	
<u>2.3: Derivation of new SOC category [036]: Natural sciences managers (no equivalent in 1990)</u>			
Old category [005]: Administrators and officials, public administration	506,683		
0.524% reassigned to new category [036]: Natural sciences managers		2,653	
Old category [022]: Managers and administrators, n.e.c.	5,345,993		
0.292% reassigned to new category [036]: Natural sciences managers		15,632	
Total in new category [036]: Natural science managers		18,285	
<u>3: MATHEMATICAL AND COMPUTER SCIENCES</u>			
<u>3.1: Derivation of revised category [100]: Computer scientists and systems analysts</u>			
Old category [064]: Computer systems analysts and scientists	471,290		
45.536% reassigned to revised category [100]: Computer scientists and systems analysts		214,605	
Old category [065]: Operations and systems researchers and analysts	251,818		
40.171% reassigned to revised category [100]: Computer scientists and systems analysts		101,158	

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
Old category [213]: Electrical and electronic technicians	401,463		
7.042% reassigned to revised category [100]: Computer scientists and systems analysts		28,272	
Total in revised category [100]: Computer scientists and systems analysts		344,035	
DROPPED, from old category [064]: Computer systems analysts and scientists:			
30.952% (145,875 cases) reassigned to new category [102]: Computer software engineers			
6.548% (30,858 cases) reassigned to new category [104]: Computer support specialists			
5.357% (25,248 cases) reassigned to new category [111]: Network systems and data communications analysts			
3.571% (16,832 cases) reassigned to new category [110]: Network and computer systems administrators			
2.679% (12,624 cases) reassigned to new category [140]: Computer hardware engineers			
2.679% (12,624 cases) reassigned to revised category [101]: Computer programmers			
1.190% (5,611 cases) reassigned to new category [011]: Computer and information systems managers			
0.893% (4,208 cases) reassigned to new category [106]: Database administrators			
0.595% (2,805 cases) reassigned to new category [071]: Management analysts (Note: group not otherwise treated here)			
<u>3.2: Derivation of revised category [101]: Computer programmers</u>			
Old category [022]: Managers and administrators, n.e.c.	5,345,993		
0.585% reassigned to revised category [101]: Computer programmers		31,263	
Old category [064]: Computer systems analysts and scientists	471,290		
2.679% reassigned to revised category [101]: Computer programmers		12,624	
Old category [229]: Computer programmers	662,759		
100.0% reassigned to revised category [101]: Computer programmers		662,759	1
Total in revised category [101]: Computer programmers		706,646	3
<u>3.3: Derivation of new category [102]: Computer software engineers (no equivalent in 1990)</u>			
Old category [055]: Electrical and electronics engineers	467,023		
20.614% reassigned to new category [102]: Computer software engineers		96,272	
Old category [064]: Computer systems analysts and scientists	471,290		
30.952% reassigned to new category [102]: Computer software engineers		145,875	
Old category [036]: Inspectors and compliance officers, except construction	161,277		
1.261% reassigned to new category [102]: Computer software engineers		2,033	
Total in new category [102]: Computer software engineers		244,180	
<u>3.4: Derivation of new category [104]: Computer support specialists (no equivalent in 1990)</u>			
Old category [064]: Computer systems analysts and scientists	471,290		
6.548% reassigned to new category [104]: Computer support specialists		30,858	
Old category [323]: Information clerks, n.e.c.	184,254		
0.752% reassigned to new category [104]: Computer support specialists		1,385	
Total in new category [104]: Computer support specialists		32,243	
<u>3.5: Derivation of new category [106]: Database administrators (no equivalent in 1990)</u>			
Old category [064]: Computer systems analysts and scientists	471,290		
0.893% reassigned to new category [106]: Database administrators		4,208	
Total in new category [106]: Database administrators		4,208	

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
<u>3.6: Derivation of new category [110]: Network and computer systems administrators (no equivalent in 1990)</u>			
Old category [022]: Managers and administrators, n.e.c.	5,345,993		
0.292% reassigned to new category [110]: Network and computer systems administrators		15,632	
Old category [064] Computer systems analysts and scientists	471,290		
3.571% reassigned to new category [110]: Network and computer systems administrators		16,832	
Total in new category [110]: Network and computer systems administrators		32,464	
<u>3.7: Derivation of new category [111]: Network systems and data communications analysts (no equivalent in 1990)</u>			
Old category [055]: Electrical and electronics engineers	467,023		
0.877% reassigned to new category [111]: Network systems/data communications analysts		4,097	
Old category [064]: Computer systems analysts and scientists	471,290		
5.357% reassigned to new category [111]: Network systems/data communications analysts		25,248	
Total in new category [111]: Network systems and data communications analysts		29,345	
<u>3.8: Derivation of new category [121]: Mathematicians</u>			
Old category [068]: Mathematical scientists, n.e.c.	5,815		
87.500% reassigned to new category [121]: Mathematicians		5,088	
Total in new category [121]: Mathematicians		5,088	
<u>3.9: Derivation of revised category [122]: Operations research analysts</u>			
Old category [005]: Administrators and officials, public administration	506,683		
5.759% reassigned to revised category [122]: Operations research analysts		29,181	
Old category [065]: Operations and systems researchers and analysts	251,818		
47.863% reassigned to revised category [122]: Operations research analysts		120,528	
Total in revised category [122]: Operations research analysts		149,709	
DROPPED, from old category [065]: Operations and systems researchers and analysts: 40.171% (101,158 cases) reassigned to [100]: Computer scientists and systems analysts; 11.966% (30,132 cases) reassigned to [070]: Logisticians (Note: group not otherwise treated here)			
<u>3.10: Derivation of unchanged category [120]: Actuaries</u>			
Old category [066]: Actuaries	18,732		
100.0% reassigned to unchanged category [120]: Actuaries		18,732	1
Total in unchanged category [120]: Actuaries		18,732	1
<u>3.11: Derivation of revised category [123]: Statisticians</u>			
Old category [067]: Statisticians	31,852		
88.525% reassigned to revised category [123]: Statisticians		28,197	
Total in revised category [123]: Statisticians		28,197	
DROPPED: 11.475% (3,655 cases) reassigned to revised category [124]: Miscellaneous mathematical science occupations			
<u>3.12: Derivation of revised category [124]: Miscellaneous mathematical science occupations</u>			
Old category [067]: Statisticians	31,852		
11.475% reassigned to revised category [124]: Misc. mathematical science occupations		3,655	

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
Old category [068]: Mathematical scientists, n.e.c.	5,815		
8.553% reassigned to revised category [124]: Misc. mathematical science occupations		497	
Total in revised category [124]: Miscellaneous mathematical science occupations		4,152	
DROPPED, from old category [068]: Mathematical scientists, n.e.c: 87.500% (5,088 cases) reassigned to new category [121]: Mathematicians; 3.289% (191 cases) reassigned to [132]: Aerospace engineers; 0.658% (38 cases) reassigned to [153]: Engineers, all other			
<u>4. ENGINEERS AND ENGINEERING TECHNICIANS</u>			
<u>4.1: Derivation of revised category [132]: Aerospace engineers</u>			
Old category [044]: Aerospace engineers	143,434		
100.0% reassigned to revised category [132]: Aerospace engineers		143,434	1
Old category [068]: Mathematical scientists, n.e.c.	5,815		
3.289% reassigned to revised category [132]: Aerospace engineers		191	
Total in revised category [132]: Aerospace engineers		143,625	2
<u>4.2: Derivation of unchanged category [133]: Agricultural engineers</u>			
Old category [054]: Agricultural engineers	2,148		
100.0% reassigned to unchanged category [133]: Agricultural engineers		2,148	1
Total in unchanged category [133]: Agricultural engineers		2,148	1
<u>4.3: Derivation of new category [134]: Biomedical engineers (no equivalent in 1990)</u>			
Old category [059] Engineers, n.e.c.	341,963		
1.840% reassigned to new category [134]: Biomedical engineers		6,294	
Total in new category [134]: Biomedical engineers		6,294	
<u>4.4: Derivation of revised category [135]: Chemical engineers</u>			
Old category [048]: Chemical engineers	64,320		
95.620% reassigned to revised category [135]: Chemical engineers		61,503	2
Total in revised category [135]: Chemical engineers		61,503	2
DROPPED from old category: 2.920% (1878 cases) reassigned to revised category [145]: Materials engineers; 1.460% (939 cases) reassigned to new category [030]: Engineering managers			
<u>4.5: Derivation of revised category [136]: Civil engineers</u>			
Old category [053]: Civil engineers	252,808		
96.183% reassigned to revised category [136]: Civil engineers		243,159	2
Total in revised category [136]: Civil engineers		243,159	2
DROPPED from old category: 3.053% (7,719 cases) reassigned to new category [142]: Environmental engineers; 0.763% (1,930 cases) reassigned to new category [030]: Engineering managers			
<u>4.6: Derivation of new category [140]: Computer hardware engineers (no equivalent in 1990)</u>			
Old category [055]: Electrical and electronics engineers	467,023		
6.579% reassigned to new category [140]: Computer hardware engineers		30,725	

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
Old category [057]: Mechanical engineers	185,872		
0.415% reassigned to new category [140]: Computer hardware engineers		771	
Old category [064]: Computer systems analysts and scientists	471,290		
2.679% reassigned to new category [140]: Computer hardware engineers		12,624	
Total in new category [140]: Computer hardware engineers		44,120	
<u>4.7: Derivation of revised category [141]: Electrical and electronic engineers</u>			
Old category [055]: Electrical and electronic engineers	467,023		
52.632% reassigned to revised category [141]: Electrical and electronic engineers		245,802	
Total in revised category [141]: Electrical and electronic engineers		245,802	
DROPPED from old category [055]: Electrical and electronic engineers:			
20.614% (96,272 cases) reassigned to new category [102]: Computer software engineers			
14.474% (67,595 cases) reassigned to revised category [153]: Engineers, all other			
6.579% (30,725 cases) reassigned to new category [140]: Computer hardware engineers			
3.947% (18,435 cases) reassigned to revised category [290]: Broadcast and sound engineering technicians and radio operators (Note: group not otherwise treated here)			
0.877% (4,097 cases) reassigned to new category [111]: Network systems and data communications analysts			
0.877% (4,097 cases) reassigned to new category [030]: Engineering managers			
(Note: The STEM Workforce Data Project has preferred IEEE spelling conventions when referring to EE occupations, and treats electronics as a plural term in its other publications, but federal SOC categories use the singular form of this word)			
<u>4.8: Derivation of new category [142]: Environmental engineers (no equivalent in 1990)</u>			
Old category [049]: Nuclear engineers	10,801		
1.802% reassigned to new category [142]: Environmental engineers		195	
Old category [053]: Civil engineers	252,808		
3.053% reassigned to new category [142]: Environmental engineers		7,719	
Old category [059]: Engineers, n.e.c.	341,963		
11.656% reassigned to new category [142]: Environmental engineers		39,861	
Old category [075]: Geologists and geodesists	53,129		
0.581% reassigned to new category [142]: Environmental engineers		309	
Total in new category [142]: Environmental engineers		48,084	
<u>4.9: Derivation of revised category [143]: Industrial engineers, including health and safety</u>			
Old category [047]: Petroleum engineers	24,565		
0.990% reassigned to revised category [143]: Industrial engineers, inc. health and safety		243	
Old category [056]: Industrial engineers	176,333		
89.781% reassigned to revised category [143]: Industrial engineers, inc. health and safety		158,314	
Old category [057]: Mechanical engineers	185,872		
3.320% reassigned to revised category [143]: Industrial engineers, inc. health and safety		6,170	
Old category [059]: Engineers, n.e.c.	341,963		
4.908% reassigned to revised category [143]: Industrial engineers, inc. health and safety		16,783	
Total in revised category [143]: Industrial engineers, including health and safety		181,510	2

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
DROPPED from old category [056]: industrial engineers:			
6.204% (10,940 cases) reassigned to revised category [043] Managers, all other (NOTE: group not otherwise treated here)			
2.920% (5,148 cases) reassigned to revised category [145]: Materials engineers			
1.095% (1,931 cases) reassigned to revised category [354]: Other healthcare practitioners and technical occupations (Note: group not otherwise treated here)			
<u>4.10: Derivation of revised category [144]: Marine engineers and naval architects</u>			
Old category [058]: Marine engineers and naval architects	13,269		
89.011% reassigned to revised category [144]: Marine engineers and naval architects		11,811	
Total in revised category [144]: Marine engineers and naval architects		11,811	
DROPPED: 10.989% (1,458 cases) reassigned to revised category [933]: Ship engineers			
<u>4.11: Derivation of revised category [145]: Materials engineers:</u>			
Old category [045]: Metallurgical and materials engineers	19,230		
99.057% reassigned to revised category [145]: Materials engineers		19,049	2
Old category [048]: Chemical engineers	64,320		
2.920% reassigned to revised category [145]: Materials engineers		1,878	
Old category [056]: Industrial engineers	176,333		
2.920% reassigned to revised category [145]: Materials engineers		5,148	
Total in revised category [145]: Materials engineers		26,075	
DROPPED from old category [045]: Metallurgical and materials engineers: 0.943% (181 cases) reassigned to revised category [306]: Physicians and surgeons			
<u>4.12: Derivation of revised category [146]: Mechanical engineers</u>			
Old category [057]: Mechanical engineers	185,872		
96.266% reassigned to revised category [146]: Mechanical engineers		178,931	2
Old category [059]: Engineers, n.e.c.	341,963		
4.294% reassigned to revised category [146]: Mechanical engineers		14,686	
Total in revised category [146]: Mechanical engineers		193,617	2
DROPPED from old category [057]: Mechanical engineers:			
0.415% (771 cases) reassigned to new category [140]: Computer hardware engineers			
3.320% (6,170 cases) reassigned to revised category [056]: Industrial engineers, including health and safety			
<u>4.13: Derivation of revised category [150]: Mining and geological engineers, including mining safety engineers</u>			
Old category [046]: Mining engineers	6,478		
97.222% reassigned to revised category [150]: Mining/geological engineers, inc. safety		6,298	2
Total in revised category [150]: Mining and geological engineers, including mining safety engineers		6,298	2
DROPPED: 2.778% (180 cases) reassigned to [062] Human resources, training, and labor relations specialists (Note: group not otherwise treated here)			
<u>4.14: Derivation of revised category [151]: Nuclear engineers</u>			
Old category [049]: Nuclear engineers	10,801		
98.198% reassigned to revised category [151]: Nuclear engineers		10,606	2
Total in revised category [151]: Nuclear engineers		10,606	2
DROPPED: 1.802% (195 cases) reassigned to new category [142]: Environmental engineers			

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
<u>4.15: Derivation of revised category [152]: Petroleum engineers</u>			
Old category [047]: Petroleum engineers	24,565		
94.059% reassigned to revised category [152]: Petroleum Engineers		23,106	3
Total in revised category [152]: Petroleum Engineers		23,106	3
DROPPED: 3.960% (973 cases) reassigned to new category [193]: Geological and petroleum technicians; 0.990% (243 cases) reassigned to revised category [143]: Industrial engineers, including health and safety; 0.990% (243 cases) reassigned to new category [030]: Engineering managers			
<u>4.16: Derivation of revised category [153]: Engineers, all other</u>			
Old category [055]: Electrical and electronic engineers	467,023		
14.474 reassigned to revised category [153]: Engineers, all other		67,595	
Old category [059]: Engineers, n.e.c.	341,963		
74.233% reassigned to revised category [153]: Engineers, all other		253,850	
Old category [068]: Mathematical scientists, n.e.c.	5,815		
0.658% reassigned to revised category [153]: Engineers, all other		38	
Total in revised category [153]: Engineers, all other		321,483	3
DROPPED from old category [059]: Engineers, n.e.c.: 11.656% (39,861 cases) reassigned to new category [142]: Environmental engineers; 4.908% (16,783 cases) reassigned to revised category [143]: Industrial engineers, including health and safety; 4.294% (14,686 cases) reassigned to revised category [146]: Mechanical engineers; 3.067% (10,490 cases) reassigned to new category [030]: Engineering managers; 1.840% (6,294 cases) reassigned to new category [134]: Biomedical engineers			
<u>4.17: Derivation of unchanged category [493]: Sales engineers</u>			
(Note: not treated by either the 1990 or 2000 SOC as a profession, but included in STEM Workforce Data Project reports because sales engineering typically requires senior technical skills to advise customers on appropriate solutions to their needs)			
Old category [258]: Sales engineers	43,616		
100.0% reassigned to unchanged category [493]: Sales Engineers		43,616	1
Total in unchanged category [493]: Sales Engineers		43,616	1
<u>4.18: Derivation of revised category [131]: Surveyors, cartographers, and photogrammetrists</u>			
Old category [022]: Managers and administrators, n.e.c.	5,345,993		
0.146% reassigned to revised category [131]: Surveyors/cartographers/photogrammetrists		7,816	
Old category [063]: Surveyors and mapping scientists	11,405		
97.802% reassigned to revised category [131]: Surveyors/cartographers/photogrammetrists		11,154	2
Old category [079]: Forestry and conservation scientists	34,815		
0.840% reassigned to revised category [131]: Surveyors/cartographers/photogrammetrists		293	
Old category [216]: Engineering technicians, n.e.c.	239,680		
1.527% reassigned to revised category [131]: Surveyors/cartographers/photogrammetrists		3,659	
Old category [217]: Drafting occupations	324,764		
4.430% reassigned to revised category [131]: Surveyors/cartographers/photogrammetrists		14,388	
Old category [218]: Surveying and mapping technicians	93,095		
19.553% reassigned to revised category [131]: Surveyors/cartographers/photogrammetrists		18,203	
Total in revised category [131]: Surveyors, cartographers, and photogrammetrists		55,513	
DROPPED from old category [063]: Surveyors and mapping scientists: 2.198% (251 cases) reassigned to revised category [155]: Engineering technicians, except drafters			

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
<u>4.19: Derivation of revised category [155]: Engineering technicians, except drafters</u>			
Old category [063]: Surveyors and mapping scientists	11,405		
2.198% reassigned to revised category [155]: Engineering technicians, except drafters		251	
Old category [213]: Electrical and electronics technicians	401,463		
89.437% reassigned to revised category [155]: Engineering technicians, except drafters		359,055	
Old category [214]: Industrial engineering technicians	15,324		
100.0% reassigned to revised category [155]: Engineering technicians, except drafters		15,324	1
Old category [215]: Mechanical engineering technicians	30,109		
100.0% reassigned to revised category [155]: Engineering technicians, except drafters		30,109	1
Old category [216]: Engineering technicians, n.e.c.	239,680		
76.336% reassigned to revised category [155]: Engineering technicians, except drafters		182,962	
Old category [224]: Chemical technicians	76,639		
2.878% reassigned to revised category [155]: Engineering technicians, except drafters		2,205	
Old category [225]: Science technicians, n.e.c.	75,626		
64.167% reassigned to revised category [155]: Engineering technicians, except drafters		48,527	
Old category [235]: Technicians, n.e.c.	527,799		
4.918% reassigned to revised category [155]: Engineering technicians, except drafters		25,957	
Old category [867]: Helpers, surveyor	4,675		
0.962% reassigned to revised category [155]: Engineering technicians, except drafters		45	
Total in revised category [155]: Engineering technicians, except drafters		664,435	
DROPPED, from old category [213]: Electrical and electronics technicians:			
7.042% (28,272 cases) reassigned to revised category [100]: Computer scientists and systems analysts			
1.408% (5,654 cases) reassigned to revised category [286]: Miscellaneous media and communication workers (Note: group not otherwise treated here)			
2.113% (8,482 cases) reassigned to revised category [743]: Precision instrument and equipment repairers (Note: group not otherwise treated here)			
DROPPED, from old category [216]: Engineering technicians, n.e.c.:			
11.450% (27,444 cases) reassigned to new category [196]: Other life, physical, and social science technicians			
8.396% (20,126 cases) reassigned to revised category [290]: Broadcast and sound engineering technicians and radio operators (Note: group not otherwise treated here)			
1.527% (3,659 cases) reassigned to revised category [131]: Surveyors, cartographers, and photogrammetrists			
1.527% (3,659 cases) reassigned to revised category [292] Television, video, and motion picture camera operators and editors (Note: group not otherwise treated here)			
0.763% (830 cases) reassigned to revised category [284]: Technical writers (Note: group not otherwise treated here)			
<u>4.20: Derivation of revised category [154]: Drafters</u>			
Old category [217]: Drafting occupations	324,764		
88.608% reassigned to revised category [154]: Drafters		287,766	
Total in revised category [154]: Drafters		287,766	
<u>4.21: Derivation of revised category [156]: Surveying and mapping technicians</u>			
Old category [217]: Drafting occupations	324,764		
0.633% reassigned to revised category [156]: Surveying and mapping technicians		2,055	

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
Old category [218]: Surveying and mapping technicians	93,095		
80.447% reassigned to revised category [156]: Surveying and Mapping Technicians		74,892	
Old category [867]: Helpers, surveyor	4,675		
88.462% reassigned to revised category [156]: Surveying and mapping technicians		4,136	
Total in revised category [156]: Surveying and Mapping Technicians		81,083	
DROPPED from old category [218]: Surveying and mapping technicians: 19.553% (18,203 cases) reassigned to revised category [131]: Surveyors, cartographers, and photogrammetrists			
<u>5: LIFE, PHYSICAL, AND SOCIAL SCIENCES (INCLUDING TECHNICIANS)</u>			
<u>5.1: Derivation of revised category [160]: Agricultural and food scientists</u>			
Old category [077]: Agricultural and food scientists	34,842		
82.883% reassigned to revised category [160]: Agricultural and food scientists		28,878	
Old category [078]: Biological and life scientists	62,137		
0.606% reassigned to revised category [160]: Agricultural and food scientists		377	
Total in revised category [160]: Agricultural and food scientists		29,255	
DROPPED from old category [077] Agricultural and: food scientists:			
9.910% (3,453 cases) reassigned to revised category [161]: Biological scientists			
4.505% (1,569 cases) reassigned to revised category [602]: Animal breeders (Note: group not otherwise treated here)			
2.703% (942 cases) reassigned to [020]: Farm, ranch, and other agricultural managers (Note: group not otherwise treated here)			
<u>5.2: Derivation of revised category [161]: Biological scientists</u>			
Old category [078]: Biological and life scientists	62,137		
92.727% reassigned to revised category [161]: Biological scientists		57,618	3
Old category [079]: Forestry and conservation scientists	34,815		
7.563% reassigned to revised category [161]: Biological scientists		2,633	
Old category [083]: Medical scientists	27,519		
5.422% reassigned to revised category [161]: Biological scientists		1,492	
Total in revised category [161]: Biological scientists		65,196	2
DROPPED, all from old category [078]: Biological and life scientists:			
6.667% (4,142 cases) reassigned to revised category [165]: Medical scientists			
0.606% (377 cases) reassigned to revised category [160]: Agricultural and food scientists			
<u>5.3: Derivation of revised category [164]: Conservation scientists and foresters</u>			
Old category [079]: Forestry and conservation scientists	34,815		
86.555% reassigned to revised category [164]: Conservation scientists and foresters		30,134	
Old category [076]: Physical scientists, n.e.c.	18,782		
1.481% reassigned to revised category [164]: Conservation scientists and foresters		278	
Old category [005]: Administrators and officials, public administration	506,683		
0.524% reassigned to revised category [164]: Conservation scientists and foresters		2,653	
Total in revised category [164]: Conservation scientists and foresters		33,065	3
DROPPED from old category [079]: Conservation scientists and foresters:			
7.563% (2,633 cases) reassigned to revised category [161]: Biological scientists			
3.361% (1,170 cases) reassigned to revised category [196]: Other life, physical, and social science technicians			

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
1.681% (585 cases) reassigned to revised category [176]: Physical scientists, all other			
0.840% (293 cases) reassigned to revised category [131]: Surveyors, cartographers, and photogrammetrists			
<u>5.4: Derivation of revised category [165]: Medical scientists</u>			
Old category [083]: Medical scientists	27,519		
94.578% reassigned to revised category [165]: Medical scientists		26,027	3
Old category [078]: Biological and life scientists	62,137		
6.667% reassigned to revised category [165]: Medical scientists		4,142	
Old category [069]: Physicists and astronomers	27,842		
1.575% reassigned to revised category [165]: Medical scientists		438	
Total in revised category [165]: Medical scientists		30,607	
DROPPED from old category [083]: Medical scientists: 5.422% (1,492 cases) reassigned to revised category [161]: Biological scientists			
<u>5.5: Derivation of revised SOC category [170]: Astronomers and physicists</u>			
Old category [069]: Physicists and astronomers	27,842		
98.425% reassigned to revised category [170]: Astronomers and physicists		27,404	2
Total in revised category [170]: Astronomers and physicists		27,404	2
DROPPED: 1.575% (438 cases) reassigned to [165]: Medical scientists			
<u>5.6: Derivation of unchanged SOC category [171]: Atmospheric and space scientists</u>			
Old category [074]: Atmospheric and space scientists	8,354		
100.0% reassigned to unchanged category [171]: Atmospheric and space scientists		8,354	1
Total in unchanged category [171]: Atmospheric and space scientists		8,354	1
<u>5.7: Derivation of revised SOC category [172]: Chemists and materials scientists</u>			
Old category [073]: Chemists, except biochemists	141,255		
100.0% reassigned to revised category [172]: Chemists and materials scientists		141,255	1
Old category [076]: Physical scientists, n.e.c.	18,782		
2.222% reassigned to revised category [172]: Chemists and materials scientists		417	
Old category [224]: Chemical technicians	76,639		
4.317% reassigned to revised category [172]: Chemists and materials scientists		3,308	
Total in revised category [172]: Chemists and materials scientists		144,980	2
<u>5.8: Derivation of revised SOC category [174]: Environmental scientists and geoscientists</u>			
Old category [075]: Geologists and geodesists	53,129		
99.419% reassigned to revised category [174]: Environmental scientists and geoscientists		52,820	2
Old category [076]: Physical scientists, n.e.c.	18,782		
71.852% reassigned to revised category [174]: Environmental scientists and geoscientists		13,495	
Total in revised category [174]: Environmental scientists and geoscientists		66,315	
DROPPED: 0.581% (309 cases) from old category [076]: Physical scientists, n.e.c. reassigned to revised category [142]: Environmental engineers			

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
<u>5.9: Derivation of revised category [176]: Physical scientists, all other</u>			
Old category [076]: Physical scientists, n.e.c.	18,782		
16.296% reassigned to revised category [176]: Physical scientists, all other		3,061	
Old category [079]: Forestry and conservation scientists	34,815		
1.681% reassigned to revised category [176]: Physical scientists, all other		585	
Old category [235]: Technicians, n.e.c.	527,799		
1.639% reassigned to revised category [176]: Physical scientists, all other		8,652	
Total in revised category [176]: Physical scientists, all other		12,298	
DROPPED, all from old category [076]: Physical scientists, n.e.c.:			
71.852% (13,495 cases) reassigned to [174]: Environmental scientists and geoscientists			
4.444% (835 cases) reassigned to revised category [196]: Other life, physical, and social science technicians			
3.704% (696 cases) reassigned to revised category [186]: Miscellaneous social scientists and related workers			
2.222% (417 cases) reassigned to revised category [172]: Chemists and materials scientists			
1.481% (278 cases) reassigned to revised category [164], Conservation scientists and foresters			
<u>5.10: Derivation of revised category [180]: Economists</u>			
Old category [166]: Economists	152,237		
21.875% reassigned to revised category [180]: Economists		33,302	
Total in revised category [180]: Economists		33,302	
DROPPED: 78.125% (118,935 cases) reassigned to [181] Market and survey researchers			
<u>5.11: Derivation of new category [181]: Market and survey researchers (no equivalent in 1990)</u>			
Old category [166] Economists	152,237		
78.125% reassigned to new category [181]: Market and survey researchers		118,935	
Old category [235] Technicians, n.e.c.	527,799		
1.639% reassigned to new category [181]: Market and survey researchers		8,652	
Total in new category [181]: Market and survey researchers		127,587	
<u>5.12: Derivation of revised category [182]: Psychologists</u>			
Old category [167]: Psychologists	191,962		
82.682% reassigned to revised category [182]: Psychologists		158,717	
Total in revised category [182]: Psychologists		158,717	
DROPPED: 16.201% (31,100 cases) reassigned to revised category [200]: Counselors, and 1.117% (2,145 cases) reassigned to revised category [201]: Social workers (Note: both of these groups are not otherwise treated here)			
<u>5.13: Derivation of unchanged category [183]: Sociologists</u>			
Old category [168]: Sociologists	2,211		
100.0% reassigned to unchanged category [183]: Sociologists		2,211	1
Total in unchanged category [183]: Sociologists		2,211	1
<u>5.14: Derivation of revised category [184]: Urban and regional planners</u>			
Old category [173]: Urban planners	18,531		
100.0% reassigned to revised category [184]: Urban and regional planners		18,531	1

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
Old category [235]: Technicians, n.e.c.	527,799		
1.639% reassigned to revised category [184]: Urban and regional planners		8,652	
Total in revised category [184]: Urban and regional planners		27,183	
<u>5.15: Derivation of revised category [188]: Miscellaneous social scientists and related workers</u>			
Old category [169]: Social scientists, n.e.c.	20,297		
98.462% reassigned to revised category [186]: Misc. social scientists and related workers		19,985	2
Old category [076]: Physical scientists, n.e.c.	18,782		
3.704% reassigned to revised category [186]: Misc. social scientists and related workers		696	
Total in revised category [186]: Miscellaneous social scientists and related workers		20,681	2
DROPPED: 1.538% (312 cases) from old category [169]: Social scientists, n.e.c. reassigned to new category [196]: Other life, physical, and social science technicians			
<u>5.16: Derivation of new category [190]: Agricultural and food science technicians (no equivalent in 1990)</u>			
Old category [223]: Biological technicians	56,723		
36.782% reassigned to new category [190]: Agricultural and food science technicians		20,864	
Old category [224]: Chemical technicians	76,639		
2.878% reassigned to new category [190]: Agricultural and food science technicians		2,205	
Total in new category [190]: Agricultural and food science technicians		23,069	
<u>5.17: Derivation of revised category [191]: Biological technicians</u>			
Old category [223]: Biological technicians	56,723		
28.736% reassigned to revised category [191]: Biological technicians		16,300	
Total in revised category [191]: Biological technicians		16,300	
DROPPED: 36.782% (20,864 cases) reassigned to new category [190]: Agricultural and food science technicians; 12.644% (7,172 cases) reassigned to revised category [192]: Chemical technicians; 11.494% (6,520 cases) reassigned to new category [196]: Other life, physical, and social science technicians; 10.345% (5,868 cases) reassigned to revised category [341]: Health diagnosing and treating practitioner support technicians (Note: group not otherwise treated here)			
<u>5.18: Derivation of revised category [192]: Chemical technicians</u>			
Old category [224]: Chemical technicians	76,639		
85.612% reassigned to revised category [192]: Chemical technicians		65,612	
Old category [223]: Biological technicians	56,723		
12.644% reassigned to revised category [192]: Chemical technicians		7,172	
Old category [225]: Science technicians, n.e.c.	75,626		
4.167% reassigned to revised category [192]: Chemical technicians		3,151	
Total in revised category [192]: Chemical technicians		75,935	2
DROPPED from old category [224]: Chemical technicians:			
4.317% (3,308 cases) reassigned to revised category [172]: Chemists and materials scientists			
4.317% (3,308 cases) reassigned to new category [193]: Geological and petroleum technicians			
2.878% (2,205 cases) reassigned to revised category [155]: Engineering technicians, except drafters			
2.878% (2,205 cases) reassigned to revised category [190]: Agricultural and food science technicians			

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
<u>5.19: Derivation of new category [193]: Geological and petroleum technicians (no equivalent in 1990)</u>			
Old category [224]: Chemical technicians	76,639		
4.317% reassigned to new category [193]: Geological and petroleum technicians		3,308	
Old category [047]: Petroleum engineers	24,565		
3.960% reassigned to new category [193]: Geological and petroleum technicians		973	
Old category [225]: Science technicians, n.e.c.	75,626		
11.677% reassigned to new category [193]: Geological and petroleum technicians		8,823	
Total in new category [193]: Geological and petroleum technicians		13,104	
<u>5.20: Derivation of new category [194]: Nuclear technicians (no equivalent in 1990)</u>			
Old category [235]: Technicians, n.e.c.	527,799		
6.557% reassigned to new category [194]: Nuclear technicians		34,610	
Total in new category [194]: Nuclear technicians		34,610	
<u>5.21: Derivation of new category [196] Other life, physical, and social science technicians (no equivalent in 1990)</u>			
Old category [225]: Science technicians, n.e.c.	75,626		
20.000% reassigned to new category [196]: Other life/physical/social science technicians		15,125	
Old category [223]: Biological technicians	56,723		
11.494% reassigned to new category [196]: Other life/physical/social science technicians		6,520	
Old category [076]: Physical scientists, n.e.c.	18,782		
4.444% reassigned to new category [196]: Other life/physical/social science technicians		835	
Old category [079]: Forestry and conservation scientists	34,815		
3.361% reassigned to new category [196]: Other life/physical/social science technicians		1,170	
Old category [169]: Social scientists, n.e.c.	20,297		
1.538% reassigned to new category [196]: Other life/physical/social science technicians		312	
Old category [216]: Engineering technicians, n.e.c.	239,680		
11.450% reassigned to new category [196]: Other life/physical/social science technicians		27,444	
Old category [235]: Technicians, n.e.c.	527,799		
52.459% reassigned to new category [196]: Other life/physical/social science technicians		276,878	
Old category [208]: Health technologists and technicians, n.e.c.	411,191		
1.327% reassigned to new category [196]: Other life/physical/social science technicians		5,458	
Old category [495]: Forestry workers, except logging	20,431		
27.632% reassigned to new category [196]: Other life/physical/social science technicians		5,645	
Total in new category [196]: Other life/physical/social science technicians		339,387	
DROPPED: from old category [225]: Science technicians, n.e.c.: 64.167% (48,527 cases) reassigned to revised category [155]: Engineering technicians, except drafters; 11.667% (8,823 cases) reassigned to new category [193]: Geological and petroleum technicians; 4.167% (3,151 cases) reassigned to revised category [192]: Chemical technicians			
DROPPED, from old category [235]: Technicians, n.e.c., all to groups not otherwise treated here: 11.475% (60,567 cases) reassigned to revised category [260]: Artists and related workers; 4.918% (25,957 cases) reassigned to revised category [875]: Jewelers and precious stone and metal workers; 3.279% (17,305 cases) reassigned to new category [244]: Library Technicians; 3.279% (17,305 cases) reassigned to revised category [332]: Diagnostic related technologists and technicians			

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SOC Version and Occupational Group (all data are for 1990)	Old SOC (1990)	New SOC (2000)	Compara- bility Scores
6. NON-STEM CATEGORIES (USEFUL TO DERIVE STEM ENGINEERING SUBGROUPS)			
6.1: Derivation of "Architects, except naval" 2000 group (not included in this project as a STEM occupation):			
Old category [043]: Architects	156,874		
100.0% reassigned to revised category [130]: Architects, except naval		156,874	1
Old category [217]: Drafting occupations	324,764		
3.165% reassigned to revised category [130]: Architects, except naval		10,277	
Total in revised category [130]: Architects, except naval		167,151	3

About the STEM Workforce Data Project

The STEM Workforce Data Project uses the full range of statistical resources offered by U.S. federal agencies as well as private sources of information to identify and distribute reliable statistics on scientific, technological, engineering and mathematical (STEM) workers in the United States. This is a project of the Commission on Professionals in Science and Technology (CPST) in Washington, D.C., supported by a grant from the Alfred P. Sloan Foundation. As of April 2007, the STEM Workforce Data Project has released seven reports and three white papers, all available online at <http://www.cpst.org>:

- *Twenty Years of Scientific and Technical Employment*
- *Women in Science and Technology: the Sisyphean Challenge of Change*
- *Sisyphus Revisited: Participation by Minorities in STEM Occupations, 1994-2004*
- *The Foreign Born in Science and Technology*
- *Science and Technology Salaries: Trends and Details, 1995-2005*
- *Four Decades of STEM Degrees, 1966-2004: "The Devil is in the Details"*
- *STEM Employment Forecasts and Distributions Among Employment Sectors*
- *A Half-Century Snapshot of the STEM Workforce, 1950 to 2000*
- *Improving Federal Statistics on the Science, Technology, Engineering and Mathematics (STEM) Workforce*
- *Effects of Recent Revisions in Federal Standard Occupational Classification (SOC) Categories on Counts of the Employment of STEM Professionals*

In 2007, three additional reports and four more white papers will be produced, culminating in a national conference on November 1-2, 2007 in Washington, DC on the present and future status of the U.S. STEM workforce.

Queries about the project are welcome. The principal investigators are Lisa M. Frehill, CPST Executive Director (202-326-7080; lfrehill@cpst.org), and Richard Ellis of Ellis Research Services in Carlisle, PA (717-218-9818; raellis@earthlink.net).