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INTRODUCTION

The extensive data needs of the National Science Foundation and the proximate universality of the Census of Population as a classifying device are the underlying circumstances engendering a supporting role for the Bureau of the Census in the Foundation's statistical programs for scientific and technical manpower in the 1970's. In briefest summary, the Bureau's role is to use the Census of Population as a device to focus on the particular groups in the population in which NSF is interested, then expand the amount of information available by a specialized follow-on survey and finally to extend the data through time by periodic recanvassing of the same population. The task of identifying these particular population groups and expanding the amount of information available for them comprises the Postcensal Manpower Survey (PMS). The task of extending the availability of data through time will be the function of a series of annual or biennial science and engineering manpower surveys.

A single sample selection process served both these tasks by selecting a sufficient number of cases (designated as Sample I) to meet the needs of the Postcensal Manpower Survey and by simultaneously selecting, for specified occupations, an equal number of cases (designated as Sample II) for use in maintaining sufficient panel size for periodic recanvassing. The components of the samples are shown in List A. Both Samples I and II were canvassed in approximately the same span of time, and comparative data on response rates are presented in table 2. However, the focus of this paper is on the procedural and methodological aspects of the Postcensal Manpower Survey, and comment on the work connected with Sample II is limited chiefly to salient differences between the purpose and treatment of the two samples.

POSTCENSAL MANPOWER SURVEY

The Postcensal Manpower Survey is a largescale survey addressed to persons recorded in the Census of Population as in the experienced civilian labor force and reported in certain occupations or identified as having completed 4 or more It was designed to obtain deyears of college. tailed information about the occupations and careers of these persons beyond that which is available in the census. Of course, the individual information collected in the survey is held in confidence by the Bureau, and only statistical summaries are made available to the sponsor and the public. The survey is basically similar to the postcensal survey undertaken by the Bureau for NSF in 1962, but it does represent a major effort to profit by and improve upon the experience gained in that earlier survey. The major phases of the Postcensal Manpower Survey are four:

Design of the questionnaire and related 1. survey documents;

2. preparation of a mailing list, including sample design and selection, and locating the census questionnaire of each selected person; 3. data collection; and

4. data processing, including the editing, weighting, and tabulation of the information submitted on the questionnaires.

Pretest .-- A pretest of the questionnaire content and procedures for this survey was conducted in Dane County, Wisconsin, in the spring of 1970. From the 1968 special census of Dane County, questionnaires were located for persons in target scientific and technical occupations and with 4 or more years of college, and their names and ad-dresses were transcribed for use in mailing the pretest questionnaires. The data collection phase comprised an initial mailing, a reminder postal card, and two followup mailings by first class postage. Selected panels of nonrespondents were treated to experimental followups using certified mail and the telephone. Returned questionnaires underwent clerical coding and editing and were key coded on magnetic tape. The resulting data tapes were subjected to a computer editing program, and item tallies were run for the purpose of evaluating the effectiveness of the questionnaire. The pretest included 10,942 persons of whom 7,549, or 68.8 percent, returned completed questionnaires. Comments on particular experiences in the pretest as they apply to the postcensal survey will be made under the appropriate sections below.

DESIGN OF QUESTIONNAIRES $\frac{1}{2}$

Survey goals .-- The preparation of the questionnaires and other forms to be used in the survey involved a process of design, testing, and review over a period of 2 years. Two major requirements guided the development of these forms. First, the PMS questionnaires should obtain key information about scientists and engineers beyond that which would be available in the census. Second, the National Science Foundation desired to be able to identify persons who might be considered to be engineers or scientists according to definitions other than that prevailing in the census. The census identifies as such only those persons who reported themselves to be currently working as engineers or scientists (or unemployed or in the labor reserve and having last worked as engineers or scientists). Meeting this second requirement, then, involved in addition being able to identify persons who had been trained or otherwise qualified in engineering and science fields. These goals required the addition of many questions about educational experience and career patterns, including specific degrees worked for or acquired, the fields of study for each of these degrees, the sources of financial support for academic work, and, in addition, information about jobs held at periods other than the time of the census, first professional job held, self-identification of one's profession, membership in national societies, and the holding of valid professional licenses. Finally, changes in the general economic situation and particular dislocations in industries employing significant numbers of scientific and technical personnel, which occurred in the course of our planning, emphasized the importance of obtaining updated information on the employment situation for highly qualified manpower in general. This did not require significant modification of the basic design of the questionnaire, for it included questions which permitted the determination of current labor force status, recent employment experience, incidence of part-time employment, layoffs, reduction in wage rates, and pejorative occupational changes; however, these developments did affect our analytical view of certain questions.

Sources of content .-- In designing the questionnaires, we sought to take advantage of the experience gained in other surveys. Certain questions, for example, were taken from the 1970 Census of Population and Housing forms. These were mainly of two types: (1) Questions on unchanging characteristics (e.g. date of birth, sex) which were repeated to make certain that we had indeed obtained the questionnaire data from the intended person and (2) questions on characteristics which could legitimately change between the time of the census and the time of the Postcensal Manpower Survey (e.g., educational attainment, employment status, marital status). Naturally, another major source of questions was the 1962 Postcensal Study of Professional and Technical Manpower. Other census surveys which contributed were the 1958 Survey of Professional Manpower, the Consumer Anticipations Survey, and the Subject Response Study for the 1970 Census. Although not an exhaustive list, the following also were sources for content of the PMS questionnaire: The 1968 National Engineers Register and National Register of Scientific and Technical Personnel (NSF), Transferability and Retraining of Defense Engineers (U.S. Arms Control and Disarmament Agency and Stanford Research Institute), the 1967 Professional, Scien-tific, and Technical Manpower Survey (Canada), and the 1966 Survey of Professional Engineers (United Kingdom). In addition, there were some topics which, although not appearing on any of the surveys which we reviewed, were added in order to contribute to meeting the goals of the survey. These included questions on such subjects as receipt of bonuses or participation in profit-sharing plans, means of acquiring specific jobs, reasons for leaving specific jobs, and the association of changes in residence and changes in jobs.

The process of questionnaire development included consultation with more than 2 dozen interested parties from private organizations and such Government agencies as the National Institutes of Health, the Bureau of Labor Statistics, the Manpower Administration, the Office of Education, and the Office of Management and Budget.

<u>Retrospective inquiries.</u>—At least two major differences between the 1962 survey questionnaire and the 1972 PMS questionnaire should be pointed out. One is the difference in handling retrospective questions about careers, and the other is the method of coding and reporting industry and occupation entries. In 1962, there were batteries of questions dealing with the respondent's current (1962) employment, his employment at the time of the census (April 1960), and the full-time civilian job held upon reaching age 24. Because of the acknowledged difficulties in obtaining accurate information when asking about employment at a given point in the past, it was decided to approach the topic of past employment much on the order of a resume; that is, we chose to ask the respondent to give us information about his current job (or his last job if not currently employed) and the two jobs immediately preceding it. The beginning and ending dates associated with each of the three jobs are also requested and from those it is possible to determine occupation at a specific point in time (e.g., April 1970) as well as to calculate the duration of jobs and the periods between jobs. In addition, the questionnaire sent to professional workers also asks about the occupation and beginning date of the first full-time professional job ever held and the occupation and ending date of the last regular full-time job prior to that. The point of this is to more precisely determine the date and nature of the professional career entry job.

<u>Respondent coding of industry and occupa-</u> <u>tion</u>.—The wording of the questions on industry and occupation was essentially the same for 1962 and 1972, as both are designed to be consistent with Census practice. However, in 1962 the question was open ended; the respondent was allowed to enter whatever response he desired, and that entry was coded clerically using the techniques which served in the Decennial Census. In 1972, the National Science Foundation strongly desired to avoid the clerical coding step and preferred to have the respondent choose from a set of lists enclosed with the questionnaire the code which best described his industry and occupation as well as field of specialization for degrees. This procedure has the advantage of standardizing response and, of course, eliminates a major clerical expense. This procedure was tried in the pretest, and a comparison was made of the code given to the respondent's occupation on the Dane County Special Census questionnaire and the code picked from the list by the respondent for the job he reported on the PMS pretest form as being held in April 1968. About 70 to 80 percent of these comparisons fell within the same occupational group (i.e., engineers, social scientists, etc.), and since there may have been differences in the actual job reported or in the descriptions rendered, this selfcoding technique was considered to be acceptable for use in the national survey.

Transmittal letters.--All transmittal letters in the pretest were sent over the signature of Bureau officials, whereas in the national survey, the initial transmittal letter was sent over the signature of a National Science Foundation official with subsequent transmittal letters signed by Bureau officials. One rather important difference in the transmittal letters for the pretest and the national survey should be noted. Bureau administrative regulations introduced after the pretest required the inclusion in the transmittal letters for the national survey of a specific statement that participation in the survey was voluntary. This change doubtless weakened response in the national survey relative to the pretest; however, the pretest transmittal letter clearly stated that the survey was a test confined to Dane County, and the lack of such qualifications in the national survey letter probably favored response. The precise net effect of these changes on the response rate is not known, as we have not yet prepared a separate tally of response rates for Dane County in the national survey.

PREPARATION OF THE MAILING LIST

Sample design and selection .-- The sample of approximately 108,000 persons for the Postcensal Manpower Survey (Sample I) was selected from 41 groups of census occupations as shown in List A. These 41 groups were composed of 65 target occupations or strata defined by the Census of Population. Within each stratum, a systematic sample of persons was selected across all 50 States and the District of Columbia. The sampling frame for the survey was the 20-percent census sample records. Each record had been assigned a weight by an involved ratio estimation procedure which is briefly described in the 1970 Census of Population publications. The probability of selection of a person within a stratum was proportional to this 20 percent census weight. The selected cases were confined to the records of persons 16 years old and over and in the experienced civilian labor force. Persons living in group quarters were excluded from the sample. Sample groups 1-31 comprise 54 primary target occupations, and the sample as selected will support detailed tabulations of respondents' characteristics in all but sample group 21. Sample groups 32-40 comprise 9 secondary target occupations with a known propensity for persons who, by training or other qualifications, could be included in the primary target occupations under alternative occupational criteria. The sample size for each of these 9 groups will also permit detailed tabulations of respondents' characteristics in all but sample group 34. The sampling fractions for groups 1-40 do not differ by more than a factor of four, so that it will be possible to reclassify the respondents by alternative occupational criteria (other than the "working as" concept) and tabulate the detailed characteristics of the resulting new groups without increasing the variance for a given sample group by more than 50 percent. Sample group 41 is the residual population in the experienced civilian labor force reporting 4 or more years of college. The size of the sample for this group will permit (1) the tabulation of aggregate statistics for the group and (2) the calculation of the aggregate number of persons who would be in primary target occupations (engineers or scientists only) if no coding errors were made or if alternative occupational criteria were applied.

Sample groups 1-40 include only persons with those occupations actually <u>reported</u> in the census. Persons with imputed entries in those occupations are in the scope of sample group 41.

As stated above, simultaneously with the selection of Sample I for the Postcensal Manpower Survey, another panel of about 58,000 cases, Sample II, was selected for possible future longitudinal surveys. Sample II was selected only from sample groups 1-25 and is equivalent in size to Sample I for those groups. The main purpose in selecting the supplementary sample was to create a reserve to maintain sufficient panel size to permit reconvassing this population annually or biennially to ascertain changes in labor force status and other characteristics. As a byproduct, it is also possible to combine Samples I and II and, for items appearing on the questionnaires for both surveys, produce tabulations with about half the variance as for either sample separately. This feature will be especially useful in tabulating unemployment rates.

The actual sample selection was made in two stages: First, all in-scope records on the Census of Population sample detail file were stripped off and tallied to permit calculation of precise sampling fractions. Second, the sample was selected from the stripped file, and printouts (sample listing sheets) were prepared containing the serial numbers and necessary identifying information for locating the census questionnaire for each selected case.

Obtaining names and addresses .-- The process of searching for the appropriate census questionnaire and transcribing the names and addresses for the PMS sample was a major component of the survey's clerical workload, representing the expenditure of more than 12,000 man-hours over a 6-week period beginning in January 1972. The searching was done in two phases. First, all the enumeration district boxes for the indicated sample cases were isolated and the individual census schedule for each sample case was pulled. Second, the correct sample person was identified by matching characteristics on the sample listing sheet to the census questionnaire. Then the sample person's name and address were transcribed to the sample listing sheet. The serial number of each case was preprinted on the sample listing sheet to obviate the possibility of error in transcribing this number. It was also necessary to use address registers in conjunction with the census questionnaires for all rural areas and for selected urban areas. After the transcription operation was completed and verified, the census questionnaire sample pages pertaining to each sample person were microfilmed for future research use. The serial numbers, names, and addresses on the sample listing sheets were then key coded directly onto magnetic tape; a check-digit feature virtually prevented error in keying the serial number. The resulting data tape comprised the survey master control file and was used to create mailing labels and to check in responses. Of the original sample of 108,000 selected, Census of Population questionnaires were located and names and addresses were transcribed for almost 102,000 (94.2 percent).

DATA COLLECTION

<u>Summary of response</u>.-- The data collection period extended from February 17 to July 17, 1972. In summary, for 12.4 percent of the persons mailed questionnaires, we received no response whatsoever; an additional 4.8 percent of the questionnaires mailed out were returned as not deliverable by the post office; 7.6 percent of the persons to whom questionnaires were mailed refused specifically and categorically to participate in the survey; 0.7 percent were reported as deceased; 0.8 percent returned questionnaires with so little data that it was impossible to process them; and 73.1 percent returned questionnaires with sufficient data for processing. The latter have been termed "completed" questionnaires in this paper. About 0.2 percent of the panel were deleted as being out of scope or by reason of illness so severe that they should be excused from the survey.

Mail canvass .-- The initial mailing of the survey was on February 17, 1972, with followups going out to nonrespondents on March 9 and March 28. All three of these mailings were sent by first class postage. Preliminary results are shown in table 1. As expected, the successive mailings produced dinimishing returns with the proportion returning completed questionnaires declining from 26.1 percent in the initial mailing to 21.4 percent of those in the second mailing and 18.3 percent of those in the third mailing. An additional followup was sent by certified mail on April 24. Proportionately, this mailing was more effective than any of the earlier mailings with 31.2 percent returning completed questionnaires. However, the proportion refusing to complete the questionnaires increased sharply from less than 1 percent of each of the first three mailings to 3.7 percent of the certified. In fact, one-fifth of the total refusals of the survey were received in response to the certified mailing.

The total number of cases returned by the post office as undeliverable (postmaster returns) was approximately 6,000. While successive followups were being sent to nonrespondents, a program was underway to reduce this number. Each piece of mail returned by the post office was remailed to the same address to make sure that its return was not a result of mishandling. If returned a second time for the same reason, the microfilm record of that person's census questionnaire was looked up. These questionnaires were from either the 5 percent or the 15 percent sample in the Census of Population. The 15 percent questionnaire included an item on the name and address of the person's 1970 employer. The PMS package was remailed to the respondent's name in care of that employer. This program reduced the number of postmaster returns by about one-fifth to a total of 4,920.

Telephone followup.--We began telephoning all remaining nonrespondents on May 9. Approximately 32,000 persons were delinquent at that time. All these persons could not be called simultaneously, of course, and 3,100 of them responded before they could be telephoned. In addition, nearly 12,000 could not be contacted either because no telephone number was available or because the number we did obtain was not a good number. The purpose of the telephone call was to ascertain whether or not the respondent had received the questionnaire originally, to obtain the correct address and mail another one if he had not, and to secure his agreement to return a completed form. Of the 17,000 persons actually called, 4,900 refused to complete the questionnaire but agreed to answer an abbreviated list of questions on the telephone; 5,000 refused to cooperate to any extent. However, a good number, approximately 7,000, agreed to complete and return the regular questionnaire. Later, a check was made and those who promised to return a questionnaire but did not (4,900) were called again. These repeat calls yielded an additional 2,000 telephone interviews and almost 500 refusals. In total, of those actually contacted by telephone, 51.6 percent either returned completed questionnaires or gave answers to a list of questions over the telephone. But an additional 32.1 percent refused to participate in the survey; this comprised 71.0 percent of the total refusals for the survey.

Response by occupation and geographic area .---There were some notable differences among the occupation groups in the return rates, as can be seen from the preliminary results shown in table Engineering and science technicians had the 2. lowest rate of completed questionnaires returned (68.8 percent) of all the primary target occupations; this rate was significantly lower than the average for engineers and scientists of 75.0 percent. It was also lower than the rate (72.3 percent) for the secondary target occupations. Life and physical scientists had the highest rate of return of any occupation group at 79.4 percent. The other engineering and science occupations all ranged between 73.0 percent and 74.8 percent, with the exception of computer specialists at 71.9 percent.

Note that response rates for Sample II are higher than for Sample I in every occupation group, although the differences between occupation groups are approximately the same. Since the only significant difference between the techniques used to survey Sample II and sample groups 1-25 in Sample I is the length of the questionnaire, the disparity in response rates indicates the price one pays for increasing the respondent's burden. Furthermore, since the rate of completed questionnaires for Sample I includes cases for which only the short list of questions was answered on the telephone, the actual disparity between the two samples is masked. Presently, more refined data will be available for the investigation of this point.

The lowest rate of return of completed questionnaires for any of the 50 states was 65.8 percent for Nevada, followed by 69.9 percent for Arizona and 70.2 percent for New York. The highest rate of return of completed questionnaires was 81.9 percent for Nebraska followed by 81.1 percent for Delaware and 80.7 percent for West Virginia. As might be expected, the differences among geographic divisions were less, with the highest percentage of completed questionnaires being 75.9 percent for the West North Central Division and the lowest, 71.4 percent, for the Pacific Division. In all, 15 states and the District of Columbia had rates of return of completed questionnaires below the mean of 73.1 percent. Preliminary results by geographic division and State are shown in table 3.

DATA PROCESSING

<u>Precomputer processing.</u>—Mail receipts in the survey were initially classified and sorted by type of receipt: Refusals, correspondence, postmaster returns, completed questionnaires, incomplete questionnaires, and deceased. The postmaster returns, as previously noted, were researched and remailed in care of the employer's address. Deceased, refusals, and good receipts (completed questionnaires) were sent to check-in punch wherein the serial number of the questionnaire was keyed for updating

the master control file. Correspondence and incomplete questionnaires were set aside for review These incomplete questionnaires by an analyst. were screened out from other receipts because certain minimum entries were lacking. The standards required an entry which would indicate current educational attainment (either the highest year of schooling completed or the highest degree obtained by the person) and an entry for current labor force status and current or last occupation. When reviewed by an analyst, approximately half of the returns set aside as incomplete were salvaged based on information reported elsewhere on the questionnaire or by a telephone call made directly to the respondent. For refusals, incomplete returns, and deceased, the check-in punch was the terminal operation. Postmaster returns retained that status if no response was received after the mailout to the employer. Completed questionnaires, after check-in, were routed through two coding and verification processes. The first was general coding in which nonstandard entries were converted to proper form, degree level was coded, and conformity to certain standards on suchitems as wage and salary rates was enforced. Of the 74,000 questionnaires processed, approximately 15,000 were set aside during general coding for professional review, mostly for foreign degrees, wage entry failures, and job sequence problems. The second was geographical coding in which State or foreign country and, depending on the items, county or SMSA were coded for place of birth, location of higher education, location of last three jobs, place of residence before and after each of last three jobs, and current residence.

Computer edit .-- After general coding and geographical coding, the information on the 74,000 questionnaires was key coded directly onto magnetic tape. The resulting data tape was passed through a computer editing program which checked for acceptability of codes and ranges of entries, made substitutions for certain missing items, performed certain recodes (for age, highest degree held, highest degree worked on, etc.), checked for consistency between items, and made a more refined edit of wage and salary rate entries. The specifications for the edit program called for the rejection of questionnaires which had passed the clerical screening without the minimum necessary entries or which contained unacceptable income or wage and salary entries. In addition, records which contained 10 or more minor errors, such as out-of-range entries or inconsistent entries, were also rejected, but records with fewer than 10 of the latter sort of errors were allowed to stay in the file with the erroneous items blanked. The rejects from the computer operation were reviewed, appropriate corrections were made, and the records were reentered on the file.

<u>Matched data file</u>.--The edited data file was then matched with (1) the survey master control file (the computer file used to control mailing and followup actions) so that each record would have an associated indication of its response code, and (2) the census sample detail file containing Census of Population data for each selected PMS case. The resulting matched edited data file therefore contains all census sample information for each person originally selected for the PMS sample, even if we may have been unable to find the census questionnaire (and therefore a name and address for mailing). It contains, in addition, the receipt code classification for all cases mailed out in the survey whether or not a completed questionnaire was returned. Finally, for cases in which completed questionnaires were returned in the survey, all reported data that passed the edit also are recorded in the file.

Weighting .-- One further step is necessary before the final merged data can be used for tabulation: weighting up to census totals. Actually, each record in the data file will contain four separate weights. The first weight will not make any adjustment for noninterview and will be used for comparing the census characteristics of persons not responding in the postcensal survey to those of respondents. The second weight will make an adjustment for nonresponse and a ratio adjustment to known age, sex, and color census control totals by occupation group. This weight will be used for detailed tabulations by the original census occupation categories and for the tabulations by redefined occupation groups. The third weight will be used for purposes of variance computation. The fourth weight, similar in form to the second weight, will be used only when the Postcensal Manpower Survey sample and Sample II are combined for selected computations.

Tabulations .-- The tabulations planned for the Postcensal Manpower Survey fall into three series reflecting relationship of content and priorities in design, programming, review, and publication. The first series of tables is planned to show changes in the employment status of engineers and scientists between 1970 and 1972. It will also provide the information necessary to evaluate the quality of reported data and to estimate the degree of nonresponse bias. Programming is substantially completed on the first part of the tables in this series, and we expect to be reviewing the initial data this fall. The second series of tables is planned to show the basic inventory of scientific, engineering, technical, and other highly qualified manpower for 1970 and 1972. These, tables, similar to those in Technical Paper No. 212 which were based on the 1962 postcensal study, will include data on fields of study, job activity, citizenship, financial support for college work, industry, class of worker, salary rate, professional identification, and so forth, by age, sex, highest degree held, and occupation. This series will be run by the 1970 Census occupation. It will likely also be run for the redefined occupation groups. The design of the second series of tables is substantially completed, although programming is not yet begun. We hope to publish these tables during the winter of 1972-73. The third series of tables will present data focusing on more analytic relationships than the earlier series of tables: Exposure to science courses in high school and subsequent college work in a scientific field of study; field of study for first (or highest) degree, current occupation, and professional identification; father's occupation and field of study for first degree; salary rate for current job and average duration of last three jobs; and so forth. The design of the third series of tables is underway, although no programming has been initiated.

These tables are planned for publication some time during 1973.

 $\underline{l}/$ Copies of the questionnaire and reference lists used in the survey are available upon request to the author, Social and Economic Statistics Administration, Bureau of the Census, Washington, D.C. 20233.

2/ U.S. Bureau of the Census, <u>Characteristics</u> of <u>America's Engineers and Scientists: 1960 and</u> <u>1962</u>, Technical Paper No. 21, U.S. Government Printing Office, Washington, D.C. 1969.

LIST A

1972 POSTCENSAL MANPOWER SURVEY

LIST OF SAMPLE GROUPS

		Census	
		Occupation	Sample
<u>No</u> .	Title	Code	<u>Size</u>
	Commuter grecialists		
1	Computer programmers.	003	31.88
2	Computer systems englysts		3172
2.	Computer systems analysis	005	68/
٠د	The design of the second secon		004
,		006	2772
4.	Aeronautical and astronautical engineers	000	0702
2.	Chemical engineers	010	2/03
6.	Civil engineers	011	3178
7.	Electrical and electronic engineers	012	3673
8.	Industrial engineers	013	3176
9.	Mechanical engineers	014	3177
10.	Metallurgical and materials engineers	015	796
11.	Mining and petroleum engineers	020.021	806
12.	Seles engineers	022	2817
12	Engineers a c and engineering teschers*	023 111	3179
1).	Mathematical spacialists		
7/	Machematical specialists		
14.	Actuaries, mathematicians, statisticians, and mathematics	02/ 025 02/ 110	27.00
			5179
	Life and physical scientists		
15.	Agricultural scientists and agriculture teachers*	042,102	893
16.	Foresters and conservationists (with 4 or more years of college).	025	823
17.	Atmospheric, space, and marine scientists, geologists, and		
	atmospheric, earth, marine, and space teachers*	043,051,052,103	1725
18.	Biological scientists and biology teachers*	044.104	2589
19.	Chemists and chemistry teachers*	045,105	3183
20.	Physiciata, astronomera, and physics teachers*	053,110	1866
21	Life and physical acientists n a c	054	65
22	Operations and guardens accompany and analysts	055	218/
~~•	operations and systems researchers and analysis	0))	5104
~~	Social scientists	001 11/	27.60
23.	Economists and economics teachers*	091,116	5109
24.	Psychologists and psychology teachers*	093,114	2104
25.	Political scientists, sociologists, urban and regional planners,		
	social scientists, n.e.c., sociology teachers,* and social	092,094,095,	
	science teachers,* n.e.c	096,121,122	1742
	Engineering and science technicians		
26.	Agricultural, biological, and chemical technicians, except health	150,151	3175
27.	Draftsmen	152	3780
28.	Electrical and electronic engineering technicians	153	3177
29.	Industrial and mechanical engineering technicians and numerical		
	control tool programmers	154.155.172	1931
30.	Sirvevors	161	3162
31	Wethemetical technicians and engineering and science	202	200
	toobaidiana a a	156 162	21 92
		1,00,102	,10)
20	Demonstral and labor relations contains	054	2001
22.	rersonnet and labor relations workers	110	2001
	health specialties teachers*	113	1425
34.	Trade, industrial, and technicial teachers*	134	162
<u>ور</u>	Miscellaneous teachers*	135	991
36.	Teachers,* subject not specified	140	3189
37.	Technicians, n.e.c	173	1955
38.	Research workers, not specified	195	3177
39.	School administrators, college (with 4 or more years of college)	235	1506
40.	Managers and administrators, n.e.c. (with 4 or more years of college	245	9489
41.	Persons in the experienced civilian labor force. with 4 or more		
-	years of college, and not in any of the above occupations		5758

n.e.c. - not elsewhere classified

* College and university

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Collection period	Total at risk in the collection period	Completed question- naires	Deceased	Refusal
Total number	101,835	74,483	675	7,689
First mailing (2/17/72-3/14/72)	101,835	26,603	270	47
Second mailing (3/15/72-3/31/72)	74,194	15,906	169	211
Third mailing (4/3/72-4/28/72)	54,309	9,946	120	405
Certified mailing (5/1/72-7/17/72)	42,444	13,234	103	1,564
Telephone calls (5/15/72-7/17/72)	17,042	8,794	13	5,462
First mailing (2/17/72-3/14/72) Second mailing (3/15/72-3/31/72) Third mailing (4/3/72-4/28/72) Certified mailing (5/1/72-7/17/72) Telephone calls (5/15/72-7/17/72)	100.0 100.0 100.0 100.0 100.0	73.1 26.1 21.4 18.3 31.2 51.6	0.7 0.3 0.2 0.2 0.2 0.2 0.1	7.6 (1) 0.3 0.7 3.7 32.1
Total percent	100.0	100.0	100.0	100.0
First mailing (2/17/72-3/14/72)	100.0	35.7	40.0	0.6
Second mailing (3/15/72-3/31/72)	72.9	21.4	25.0	2.7
Third mailing (4/3/72-4/28/72)	53.3	13.4	17.8	5.3
Certified mailing (5/1/72-7/17/72)	41.7	17.8	15.3	20.3
Telephone calls (5/15/72-7/17/72)	16.7	11.8	1.9	71.0

Table 1.--1972 POSTCENSAL MANPOWER SURVEY: RESPONSE RATES BY TYPE AND COLLECTION PERIOD TO WHICH ATTRIBUTED (PRELIMINARY)

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 $\underline{1}$ Less than 0.1 percent.

	Total mailed out	Completed question- naires	Other responses				
Occupation group			Total ¹ /	Deceased	Postmaster returns	Refusal	
SAMPLE I All occupations							
Number Percent	101,835 100.0	74,483 73.1	14,741 14.5	675 0.7	4,920 4.8	7,689 7.6	
Primary target occupations. Engineers and scientists. Computer specialists. Engineers. Mathematical specialists. Life and physical scientists. Operations and systems researchers and analysts. Social scientists. Engineering and science technicians.	100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0	73.5 75.0 71.9 74.8 74.2 79.4 73.0 73.1 68.8	14.2 13.6 14.4 14.2 14.0 11.3 14.9 13.2 16.4	0.6 0.2 0.8 0.6 0.5 0.8 0.7 0.6	4.7 4.4 6.1 3.6 5.0 4.9 3.7 5.0 5.8	7.5 7.2 6.9 8.5 6.9 4.7 9.2 6.2 8.5	
Secondary target occupations Other occupations, with 4 or more years of college.	100.0 100.0	72.3 71.7	15.1 14.8	0.8 0.6	5.1 4.6	7.6 7.7	
SAMPLE II All occupations Number Percent	54,281 100.0	44,718 82.4	5,400 10.0	363 0.7	2,308 4.3	2,086 3.8	
Primary target occupations. Engineers and scientists. Computer specialists. Engineers. Mathematical specialists. Life and physical scientists. Operations and systems researchers and analysts. Social scientists. Engineering and science technicians. Secondary target occupations. Other occupations, with 4 or more years of college.	100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 (X) (X) (X) (X)	82.4 82.4 79.9 82.7 82.2 84.6 81.5 80.8 (X) (X) (X)	10.0 10.0 11.2 9.8 10.7 8.7 10.3 10.6 (X) (X) (X)	0.7 0.3 0.8 0.2 0.5 0.6 0.7 (X) (X) (X)	4.3 5.8 3.4 5.0 4.5 3.4 5.5 (X) (X) (X)	3.8 3.8 4.3 4.4 4.2 2.4 4.8 3.0 (X) (X) (X)	

Not applicable

1/ Includes questionnaires returned with insufficient data for processing and cases deleted as out of scope.

Table 3 .-- 1972 POSTCENSAL MANPOWER SURVEY: RESPONSE RATES BY TYPE FOR DIVISIONS AND STATES (PRELIMINARY)

				Other response			
Division and state	Total	No response	Completed question- naire	Total1/	Deceased	Post- master return	Refusal
UNITED STATES Number Percent	101,835 100.0	12,611 12.4	74,483 73.1	14,741 14.5	675 0.7	4,920 4.8	7,689 7.6
NEW ENGLAND: Maine. New Hampshire. Vermont. Massachusetts. Rhode Island. Connecticut.	100.0 100.0 100.0 100.0 100.0 100.0 100.0	11.5 10.2 10.2 7.9 12.3 10.9 11.0	73.3 75.9 76.4 74.7 72.6 72.0 73.8	15.2 13.9 13.4 17.4 15.1 17.1 15.2	0.6 0.8 1.3 0.5 0.2 0.8	4.2 3.1 4.7 2.6 4.7 3.1 3.8	8.9 7.7 6.8 11.4 8.6 10.7 9.2
MIDDLE ATLANTIC: New York New Jersey Pennsylvania	100.0 100.0 100.0 100.0	12.5 13.7 12.1 10.8	72.8 70.2 75.3 75.2	14.7 16.1 12.6 14.0	0.8 0.7 0.7 0.9	4.4 5.4 3.3 3.8	8.1 8.4 7.1 8.3
EAST NORTH CENTRAL: Ohio. Indiana. Illinois. Michigan. Wisconsin.	100.0 100.0 100.0 100.0 100.0 100.0	12.0 11.8 12.0 14.0 11.4 8.6	73.5 74.3 74.2 70.7 74.1 77.5	14.5 13.9 13.8 15.3 14.5 13.9	0.7 0.9 0.7 0.4 0.7 0.5	4.2 3.4 4.4 5.1 4.0 4.1	8.2 8.1 7.4 8.5 8.5 7.6
WEST NORTH CENTRAL: Minnesota. Iowa. Missouri. North Dakota. South Dakota. Nebraska. Kansas.	100.0 100.0 100.0 100.0 100.0 100.0 100.0	11.1 11.2 9.5 13.2 10.3 12.8 8.7 9.9	75.9 74.7 79.4 72.1 79.5 77.7 81.9 77.9	13.0 14.1 11.1 14.7 10.2 9.5 9.4 12.2	0.7 0.8 0.3 1.1 2.1 0.0 0.6	4.2 4.8 4.2 3.2 2.7 2.6 3.8	6.7 7.2 5.4 7.5 4.9 4.8 6.1 6.3
SOUTH ATLANTIC: Delaware. Maryland. District of Columbia. Virginia. West Virginia. North Carolina. South Carolina. Georgia. Florida.	100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0	12.9 7.4 11.7 20.7 11.3 8.5 12.9 12.6 14.3 15.4	73.4 81.1 75.5 60.6 75.5 80.7 72.5 75.0 71.0 70.3	13.7 11.5 12.8 18.7 13.2 10.8 14.6 12.4 14.7 14.3	0.6 0.4 0.5 0.7 0.4 1.0 0.7 0.9 0.6 0.6	4.7 3.5 3.6 10.4 4.3 2.2 5.3 3.4 6.3 5.2	6.8 7.0 7.4 5.9 7.2 5.7 6.5 6.3 6.5 6.8
EAST SOUTH CENTRAL: Kentucky. Tennessee. Alabama. Mississippi.	100.0 100.0 100.0 100.0 100.0	11.6 11.3 11.5 11.1 13.5	75.1 76.9 75.5 74.8 72.3	13.3 11.8 13.0 14.1 14.2	0.9 0.6 0.5 1.2 1.5	4.8 3.7 4.2 5.5 6.6	6.4 6.4 6.7 6.4 5.5
WEST SOUTH CENTRAL: Arkansas. Louisiana. Oklahoma. Texas.	100.0 100.0 100.0 100.0 100.0	13.1 11.3 12.7 13.3 13.3	72.4 77.2 73.5 71.9 71.9	14.5 11.5 13.8 14.8 14.8	0.6 0.2 0.6 0.5 0.6	5.8 5.5 4.9 5.2 6.2	6.7 5.1 6.7 7.3 6.6
MOUNTAIN: Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada	100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0	11.5 12.3 11.5 7.4 9.5 12.9 14.2 9. 7 17.1	73.6 77.1 75.0 75.7 76.6 71.8 69.9 74.1 65.8	14.9 10.6 13.5 16.9 13.9 15.3 15.9 16.2 17.1	0.6 0.3 0.0 0.6 0.6 0.4 0.9 1.7	6.2 3.4 6.9 5.9 5.9 5.2 6.9 9.4	6.7 6.2 5.6 4.5 5.9 7.4 8.9 6.9 4.7
PACIFIC: Washington Oregon California. Alaska. Hawaii.	100.0 100.0 100.0 100.0 100.0 100.0	13.2 11.5 10.9 13.7 9.4 14.7	71.4 73.6 75.6 70.6 74.5 74.5	15.4 14.9 13.5 15.7 16.1 10.8	0.6 0.7 0.6 0.0 0.5	5.7 5.6 5.3 5.7 12.8 5.4	7.7 7.3 6.0 8.0 2.7 4.1

1/ Includes questionnaires returned with insufficient data for processing and cases deleted as out of scope.