



**Requirements for Effective Use of the Water Resources
Scientific Information Center (WRSIC) –
Determined by Field Evaluation**

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Texas A&M University

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REQUIREMENTS FOR EFFECTIVE USE OF THE WATER
RESOURCES SCIENTIFIC INFORMATION CENTER (WRSIC) -
DETERMINED BY FIELD EVALUATION

Prepared by

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ABSTRACT

A field evaluation study of user requirements for effective use of the Water Resources Scientific Information Center (WRSIC) is described. The study included several components including an analysis of potential users classified by their participation in various aspects of water resources; determination of WRSIC user needs according to the type of user; determination of the cost user may pay for services and quality of service demanded; kinds of information that should be included in WRSIC; type of service requirements of potential users; and potential input to WRSIC by users. Total number of organizations interviewed by mail and by personal visits was 726 and total number of persons interviewed was 128, mail Questionnaires were sent to 669 participants and the response was 52.9 percent. The results of the study are summarized in graphical and tabular form.

PREFACE

This report presents the results of research supported under the provisions of the Water Resources Research Act of 1964 (P.L. 88-379).

Agreement No. 14-01-0001-1609, between Texas A&M University and the Office of Water Resources Research, U. S. Department of Interior provided for a comprehensive study of requirements for effective use of the Water Resources Scientific Information Center (WRSIC). The specific objective of the study was to conduct a meaningful field evaluation and analysis of the user requirements for water resources information. The project was divided into several components:

- (a) field analysis through mail Questionnaires and personal interviews of potential users classified by their participation in various aspects of water resources.
- (b) determination of WRSIC user needs according to the type of user.
- (c) determination of the cost users may pay for services and quality of service demanded.
- (d) kinds of information that should be included in WRSIC.
- (e) type of service requirements of potential users.
- (f) potential input to WRSIC by users.

The original Agreement No. 14-01-0001-1609 was amended in February 1969 to include a second, separate study which would assess the monetary value and acceptability to users, of selected services which are offered by WRSIC.

The services selected for study were

- (a) the Selected Water Resources Abstracts (SWRA) publication, and
- (b) the Selected Dissemination of Information (SDI) system.

The present project report describing studies performed, is intended to provide a summary of results obtained in the main part of the study as well as in the second part of the project. Because of rather a large volume of material accumulated and to be reported and because the second study was not closely related to the main part of the project, the final project report consists of three volumes:

- (a) Volume I - Report on the main part of the project.
- (b) Volume II - Appendices to the main part of the report.
- (c) Volume III - Report on "A Study to Assess the Cost Effectiveness of WRSIC Services."

The project was initially under the direction of Dr. Ernest T. Smerdon, former Director of the Water Resources Institute at Texas A&M. Mr. Eugene B. Smith assumed the directorship of the project on October 1, 1968, and Dr. John B. Herbich, Head of the Hydraulic Engineering and Fluid Mechanics Division, has been an Associate Project Director. They were assisted by Mr. Jimmie D. Benson and Mr. Robert A. Miers, Graduate Research Assistants. Volume I of the Report was written by Dr. Herbich and Volumes II and III of the Report by Mr. Smith. Manuscript preparation was performed by Mrs. Brenda K. Gill.

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A. INTRODUCTION

1. Purpose of Study

The problem in the design of information systems is to channel the required information to individuals as efficiently as possible. The goal of any information system is to make available the right information to the right person, in the correct form, in the shortest time possible. A first step in achieving this goal is to define the needs of potential users and procedures for acquiring technical information.

The major purpose of the study was to make a field evaluation of the requirements for effective use of the Water Resources Scientific Information Center (WRSIC). The evaluation was made from the point of view of potential users and this research entailed a carefully designed field evaluation of potential WRSIC users and contributors.

The Water Resources Scientific Information Center, is primarily a granting and contracting agency with only a small professional staff. A number of "centers of competence" provides a majority of the basic inputs for its informational services. The centers are responsible for selecting, abstracting and indexing material in specified subject areas. Each abstract contains appropriate "Descriptors" which are selected from the Water Resources Thesaurus and each entry is classified in designated fields and groups. In addition all Water Resources Research Institutes and grantees and

contractors provide informational material for the abstracting service.

The state of Texas was selected for the study since it is vitally involved in water planning and management between adjacent states (the Red River is part of the Texas-Oklahoma and the Texas-Arkansas boundaries; the Sabine River is part of the Texas-Louisiana boundary) and between adjacent nations (the Rio Grande constitutes all of the Mexico-United States boundary).

In addition, Texas has an extensive coastline and water agencies are concerned with attendant problems in bays and estuaries. Representative water agencies are located at the federal, state and local level. Water research is being conducted in both university and private institutions and there are ample representatives available from the areas of major contracting and engineering.

Other factors in Texas which give scope to the kinds of water problems that potential users of WRSIC face are: the climate in Texas ranges from a subtropical climate to a continental (plains) climate giving a variety of hydrological conditions; mean annual rainfall from 60 inches to less than 10 inches; vast industrial growth occurring particularly in the petroleum and related petro-chemical industries where pollution is a problem; vast urban complexes developing in the Houston and Dallas-Fort Worth areas; and over seven million acres of irrigated land, for which the water is obtained mostly from groundwater giving serious water depletion and related economic problems.

All of the above factors make the state of Texas an excellent sampling area which is representative of the whole of the United States.

2. Objectives of Study

The specific objective of the study was to conduct a meaningful field evaluation and analysis of the user requirements for water resources information. The study included the following components:

- (a) field analysis of potential users classified by their participation in various aspects of water resources.
- (b) determination of WRSIC user needs according to the type of user.
- (c) determination of the cost users may pay for services and quality of service demanded.
- (d) kinds of information that should be included in WRSIC.
- (e) type of service requirements of potential users.
- (f) potential input to WRSIC by users.

The goals of the project were accomplished in three major phases:

- (a) the design phase
- (b) the data collection phase
- (c) the data analysis phase

(a) The design phase included familiarization of the participants with the planned activities of the WRSIC system. This included methods and procedures involved in abstracting, the current awareness

system and the retrospective search system. The questionnaire and interview procedures as well as the statistical procedures involved in the design of the survey were established in this phase. Selected interviews were also conducted in an initial pilot study as an aid in establishing the final design of the questionnaire and interview guide.

Data were obtained by personal interviews with a representative sample of organizations from a population which could not be readily estimated. These personnel were employed by 19 federal agencies, 11 state agencies, 11 colleges and universities, 15 private research organizations, 27 navigation districts, 14 river authorities, 24 conservation and natural resources, 59 engineering firms and 64 contractors. Data were also obtained by mail Questionnaires with a representative sample of 354 from a population which could not be readily estimated. These personnel were employed by 1 federal agency, 1 state agency, 6 colleges and universities, 6 private research organizations, 9 conservation and reclamation districts, 14 fresh water supply districts, 16 levee improvement districts, 13 navigation districts, 4 river authorities, 4 underground water conservation districts, 103 water control and improvement districts, 32 drainage districts and watershed authorities, 39 water authority and utility districts, 4 water control and preservation districts, 14 water improvement districts, 11 water supply districts, 16 conservation and natural resources, 28 engineering firms and 33 contractors.

Data collected included also the individual's use of water resources information, and information on his background, experience and work activity.

(b) Within the scope of the proposed budget, personal contacts with the agencies were used insofar as possible. All major federal and state agencies were contacted in person by the project personnel as well as sample representatives of other agencies and industry. Mail questionnaires were sent to all potential users of water resources information selected by the project personnel.

(c) Data analysis phase included: (i) evaluation and analysis of all responses from the mail and questionnaire and personal interview form, (ii) comparison of responses from the mail and personal interviews, (iii) statistical evaluation of responses, (iv) comments on the results and (v) validity of the study.

B. STUDY COMPONENTS

The study included the following components:

(a) Field analysis of potential users. Potential users were classified by type according to the following initial breakdown. The groups are listed here, but additional descriptive information on each group is given in the following chapter.

- (a) Federal water agencies operating in Texas
- (b) State water agencies
- (c) State sanctioned water agencies
- (d) Municipal water and utility offices
- (e) Industrial groups
- (f) Conservation and natural resources groups
- (g) Private research and consulting organizations
- (h) Private universities and state colleges
- (i) Major construction contractors for water projects

(b) Determination of WRSIC user needs according to type of user.

The needs of the user were ascertained in terms of selected characteristics of the user. For example, the users were subdivided according to user function, such as research, public relations, design, operations, and similar categories. The requirements of a water information system according to these categories were delineated in light of these user needs.

(c) Cost users might pay for services and quality of service demanded. Although it was not known whether charges might be made

to those who participate in WRSIC, the projected value of the services should be known. Information was obtained from all groups concerning the estimated value of WRSIC to their operations and how much they might be willing to pay for such services. Of particular importance was to obtain data on frequency of information search requests and value of that service.

(d) Potential input to WRSIC by users. Since several of the state and local agencies being studied would have information such as reports, articles in their local news organ, and perhaps unpublished file reports or data, the possibility of having the agency be an input to WRSIC was evaluated. Efforts were made to determine if the agency would abstract their documents and articles according to WRSIC procedure and if so, how many inputs might be expected.

(e) Kinds of information that should be included. Agencies in the categories were surveyed to determine the kinds of information they consider to be most important to be included in WRSIC. For example, should this be restricted to published articles and what would be their order of priority for various classes or kinds of published articles. Also, should unpublished water resources data be included if the data could be obtained on loan or if copies could be obtained (possibly on microfilm or by Xerox). Examples of data of this kind might be the USGS open file reports. Also, the potential users of WRSIC were surveyed for open file information that might go into WRSIC.

(f) Service requirements of potential users. The service which is desired by potential users will vary extensively according to the type of users. Items which were covered in the analysis included such items as projected frequency of retrospective searches, response time desired for search and source document requests, the number of individuals who would have a valid need for utilizing the WRSIC system, and the level of service (topical bibliographies, selective dissemination of information, published abstracts or indices) or combination of levels which would be desirable.

C. ORGANIZATIONS SURVEYED

1. General Comment

The list of potential users was compiled using the following resources:

- (a) Directories published by both the state and federal governments.
- (b) Directories published by various professional organizations.
- (c) A mailing list furnished by the publisher of a prominent water related newsletter in the state.
- (d) Consultation with various professionals in the field of water resources.
- (e) Address lists of several individuals conducting the study.

2. Classification

Potential users were classified by type according to the following initial breakdown.

- (a) Federal water agencies operating in Texas. Federal agencies with interest in water in the state were analyzed to determine their needs and appraisal of WRSIC. It is recognized that the Federal agencies will automatically participate in WRSIC, but a need for evaluation of the problems and inputs of the field laboratories and offices was apparent. Specific agencies and offices which were

included are: Soil Conservation Service, Forest Service, Agricultural Research Service, Bureau of Sport Fisheries and Wildlife, Bureau of Reclamation, Federal Water Pollution Control Administration, Bureau of Outdoor Recreation, Bureau of Commercial Fisheries, Geological Survey, Army Corps of Engineers, and International Boundary Commission.

(b) State water agencies. State wide agencies involved in water resources, either directly or indirectly, were surveyed. Agencies included were: The Texas Water Development Board, The Texas Water Quality Board, The Texas Water Rights Commission, The Railroad Commission (responsible for oil and gas production control and water pollution related thereto), The Texas Parks and Wildlife Department, The Texas Health Department, The Texas Highway Department, and The Texas Department of Agriculture. These agencies were personally contacted in the course of this research.

(c) State-sanctioned water agencies. Included in these agencies which do not represent the entire state, are: River Authorities such as the Sabine River Authority, Brazos River Authority, Lower Colorado River Authority, and many others; Water Conservation and Irrigation Districts; Drainage Districts; Watershed Districts; Ground Water Districts; Levee Improvement Districts, Municipal Water Districts or Water Authorities; Navigation Districts; and others. There are approximately 520 of these officially organized agencies in Texas concerned with water which have appointed or elected officers.

Some are only concerned with small limited problems and have little or no staff while others have major responsibility in managing water resources and maintain a full-time staff. Some support or do research. It was not possible to personally contact all in this group, but the more important ones were contacted personally. Others were studied using representative samples. A questionnaire was used to determine interest in WRSIC with appropriate follow-up to establish validity of results.

(d) Municipal water and utility offices. These were the water supply and water treatment offices which are part of city government. These range from large city utility organizations with large staffs and budgets, such as those in Houston and Dallas, down to very small towns with water utility offices. The water offices in the larger cities were personally contacted, but the smaller cities only had a representative sample contacted.

(e) Industrial groups. In the industry segment of the state, there are many, many problems of water supply and waste treatment getting the attention of technical staffs. Many industries are doing in-house research related to water resources. Representative industries in the Houston area were analyzed within the framework of a case study to consider their use of and contribution to WRSIC. Important among these are the industries in petroleum production, petrochemical manufacturing, pulp and paper industries, and food processing.

(f) Conservation and natural resources groups. There are numerous private groups which are either directly or indirectly interested in water resources. These were a part of the study of potential users of WRSIC. For example, the Texas Water Conservation Association, Southwest Water Council, boating clubs, garden clubs, the Sportmens Club of Texas, and the League of Women Voters all have active interest in water resources problems and may be interested in water information systems.

(g) Private research and consulting organizations. Private research organizations are becoming more important in water resources. These include several agencies such as Southwest Research Institute, Tracor, Inc., and others that are very active in water resources research. Also, numerous large consulting engineering firms are actively engaged in the design and supervision of construction of water facilities, and even, in some cases, in overseeing the management and operation of the facilities. The Water Resources Institute is frequently called on to provide information in water resources simply because these agencies generally do not have adequate technical libraries. While the Institute can be of some help, it appears that these groups would gain much by participating in WRSIC and might be an important input to WRSIC.

(h) Private universities and state colleges. Included in these are the institutions which do not directly participate in the program of the Water Resources Institute in Texas. The research offices on

these campuses were contacted to see how these groups would fit into the WRSIC program.

(i) Major construction contractors for water projects. There are numerous construction contracting firms in the state, some doing work only in the state and some with extensive activities in the surrounding states and abroad. Several of the major construction contracting firms were interviewed personally.

A complete listing of all agencies or organizations contracted by mail or personal interview was prepared for use by project personnel.

In order to derive the maximum benefits from the personal interviews to be conducted, an attempt was made to select and interview those organizations which were felt to be potentially large users of water resources literature. The remainder of the organizations were contacted by mail Questionnaires.

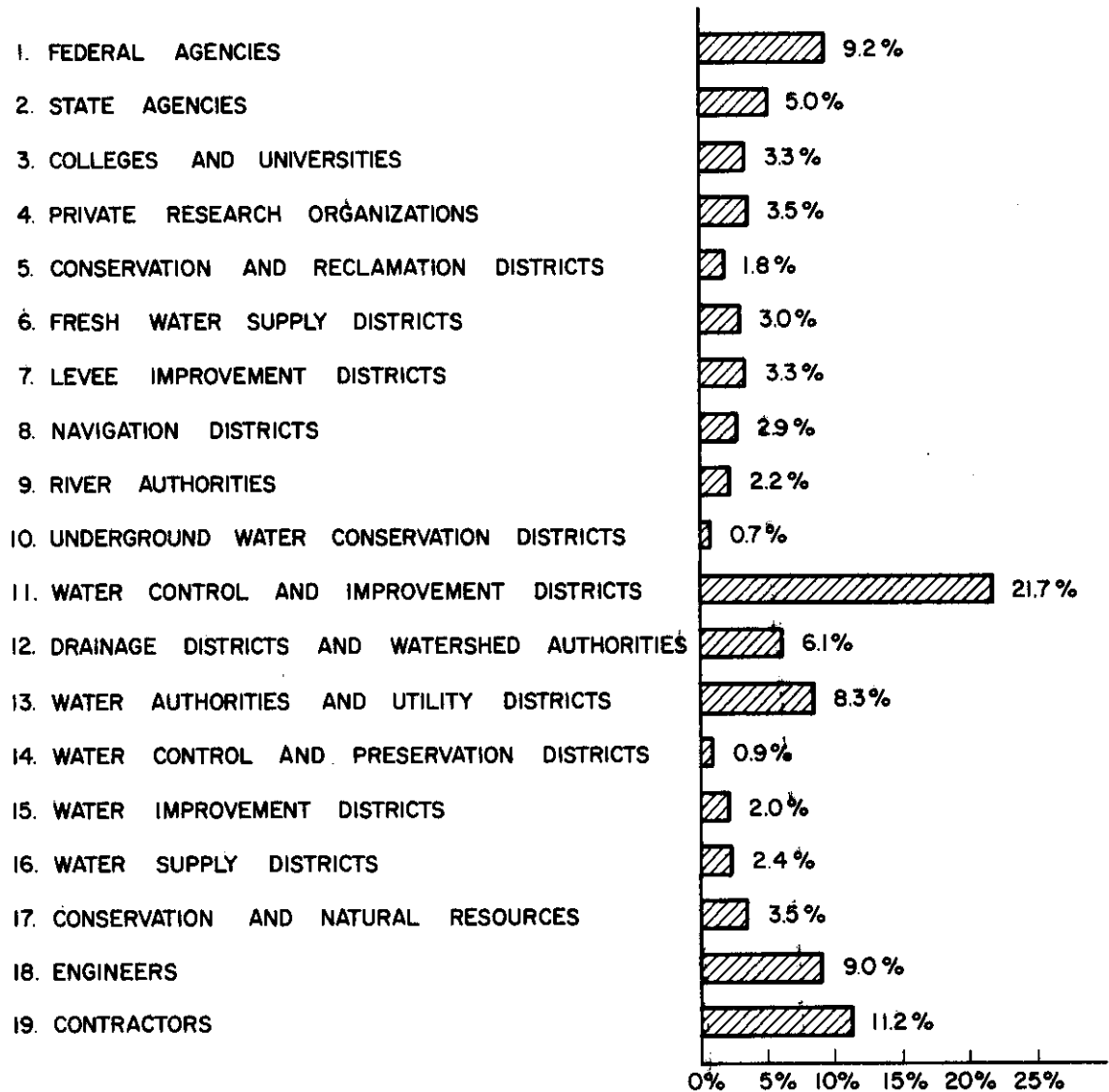
A summary of contacts made is given in Table I.

Figure 1 summarizes the composition of study participants in the overall investigation. It can be seen that the largest number of participants were in the water control and improvement districts (21.7%), followed by the contractors, (11.2%), federal agencies (9.2%) and engineers (9.0%).

In Figure 2 the composition of study participants in the mail Questionnaire is shown. Since the federal and state agencies as well as colleges and universities and private research organizations

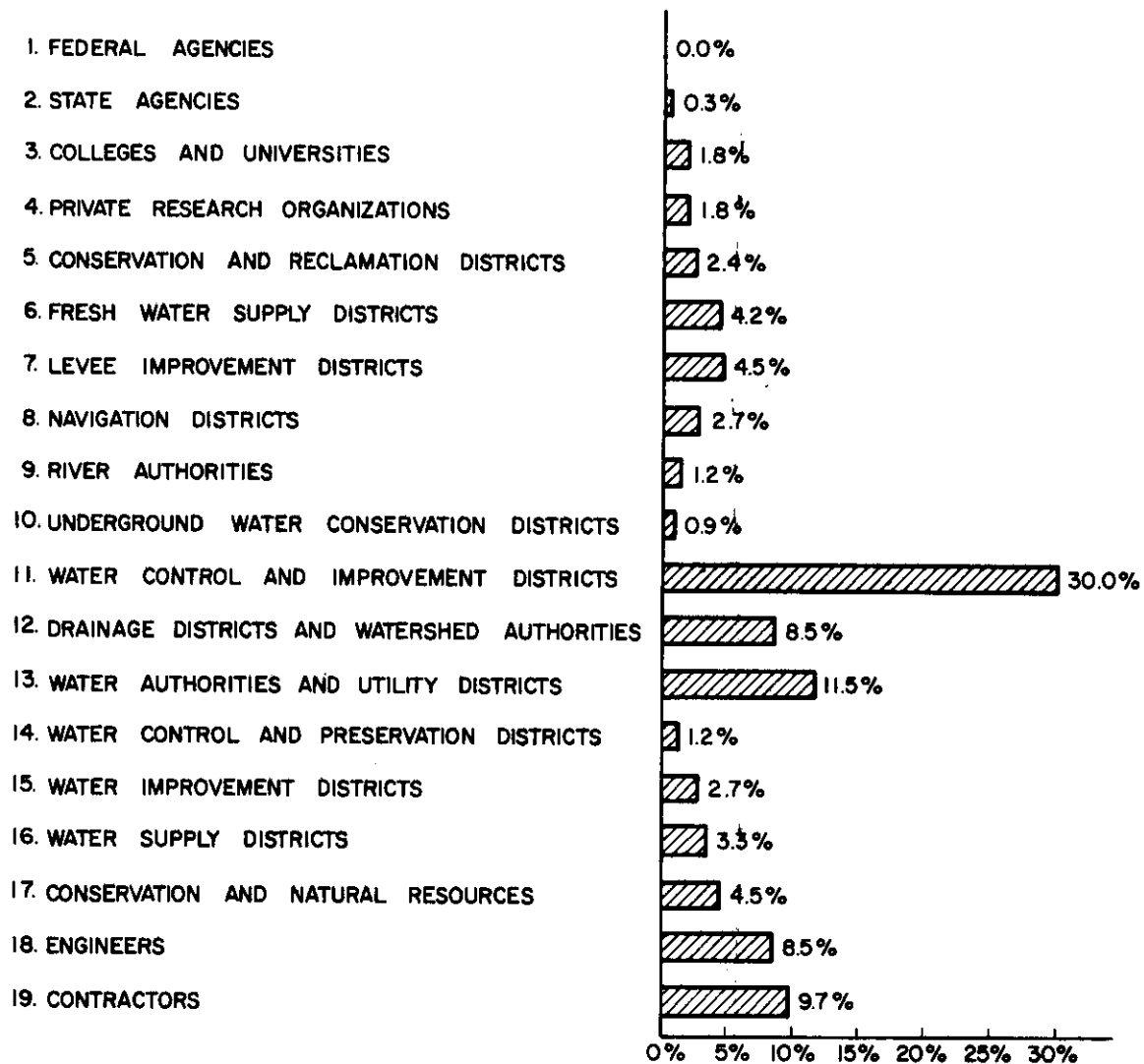
Group Description	Total number of Organizations contacted by mail and personally	Number of Organizations Interviewed personally	Number of Personal Interviews Made	Mail Questionnaire Mailed	Questionnaire Received
01 Federal Water Agencies	19	16	43	3	1
02 State Water Agencies	11	8	22	3	1
03 Colleges and Universities	11	4	9	7	6
04 Private Research Organizations	15	7	10	8	6
05 Conservation and Reclamation Dist.	18	0	0	18	9
06 Fresh Water Supply Dist.	36	0	0	36	14
07 Levee Improvement Dist.	35	0	0	35	16
08 Navigation Districts	27	4	4	23	13
09 River Authorities	14	4	6	10	4
10 Underground Water Conservation Dist.	5	0	0	5	4
11 Water Control and Improvement Dist.	196	0	0	196	103
12 Drainage Dist. and Watershed Auth.	59	0	0	59	32
13 Water Authority and Utility Dist.	67	0	0	67	39
14 Water Control and Preservation Dist.	7	0	0	7	4
15 Water Improvement Dist.	33	0	0	33	14
16 Water Supply Dist.	26	0	0	26	11
17 Conservation and Natural Resources	24	1	1	23	16
18 Engineers	59	9	14	50	28
19 Contractors	64	4	19	60	33
Totals	726	57	128	669	354

Table I - Summary of Contacts Made



COMPOSITION OF STUDY PARTICIPANTS

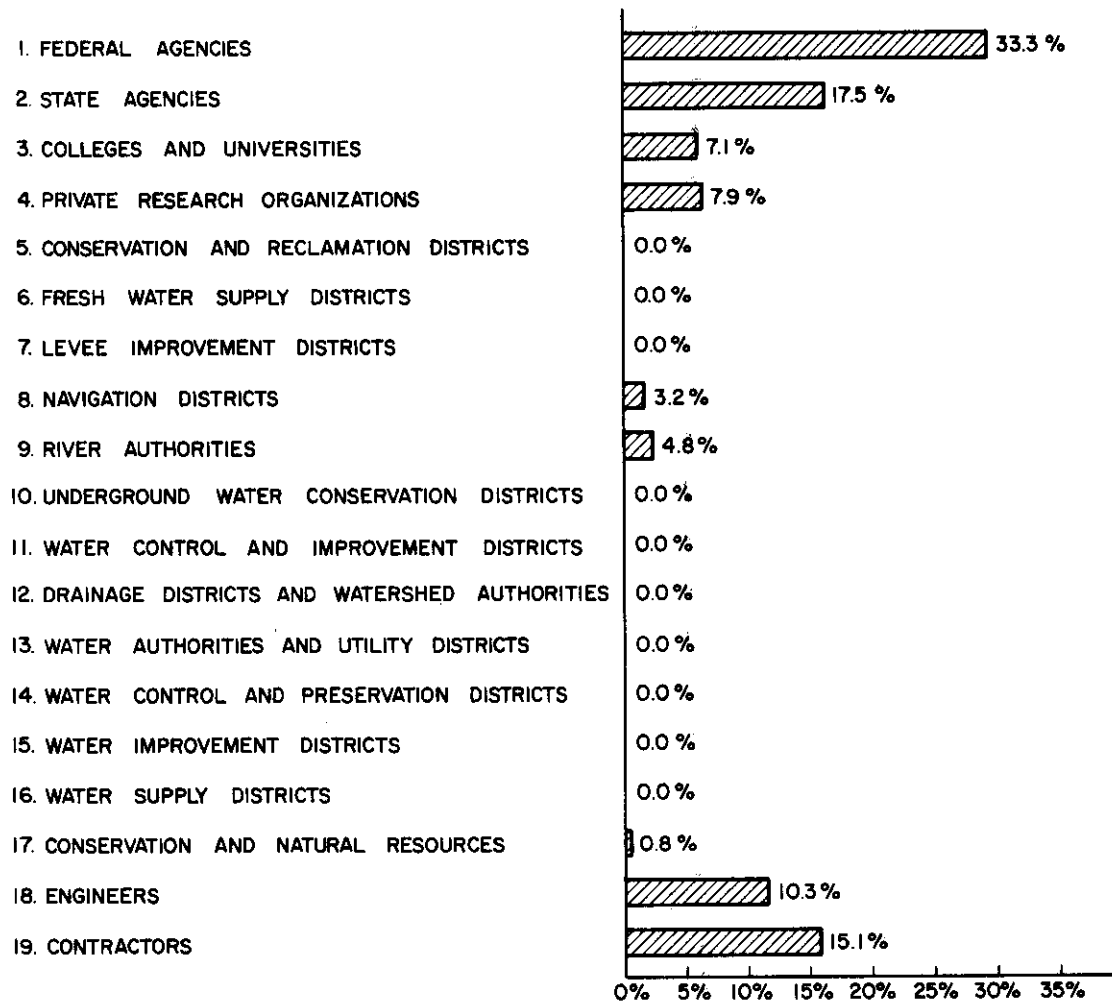
Figure 1



COMPOSITION OF STUDY PARTICIPANTS
(MAIL QUESTIONNAIRE)

Figure 2

were selected for personal interviews only a few, if any, mail Questionnaires were sent to those organizations. The largest number of participants in the mail Questionnaire were the water control and improvement districts (30.0%), followed by water authorities and utility districts (11.5%), contractors (9.7%), drainage districts and watershed authorities (8.5%) and engineers (8.5%). Figure 3 summarizes the composition of study participants in the personal interviews. All federal agencies were interviewed personally, comprising 33.3% of all participants. The other participants were from the state agencies (17.5%), contractors (15.1%), engineers (10.3%), private research organizations (7.9%) and colleges and universities (7.1%).



COMPOSITION OF STUDY PARTICIPANTS
(INTERVIEW QUESTIONNAIRES)

Figure 3

D. PROCEDURES FOR DATA ACQUISITION

1. General Comments

There were three vehicles for collecting the data to determine the requirements of the user of water resources information:

- (a) a mail Questionnaire,
- (b) a "standardized" personal interview, and
- (c) a case study of industrial firms.

The mail Questionnaire was designed to include a subset of the questions from the personal interview Questionnaire and it was as brief as possible in order to obtain a reasonable response.

The personal interview was "standardized", since the same information was collected from each respondent through the use of the same questions. As the respondent sample represented many disciplines and levels (i.e. management, engineering, library services, etc.) and the interview topic was not common to all, thoroughly discussed, or completely understood, the interview was "unrehearsed" in nature and answered in a short period of time (30 - 120 minutes).

The case study was conducted in the highly industrialized Houston-Baytown area and included five industrial firms representing pulp and paper, food, primary metal and metalworking, petroleum and chemical industries.

2. Mail Questionnaire

The mail Questionnaire, with its cover sheet, shown in Appendix A-1 and A-2 was designed to include a subset of the questions required on the interview format. It was felt that since this form was mailed to participants, it must be as brief as possible in order to obtain a reasonable response.

(a) Distribution Procedure. The first mailing included a letter describing the purpose of the questionnaire and a sheet with a further description of the survey (see Volume II, I-17) and the Water Resources Scientific Information Center. The response to the first mailing was good; however contact with a few recipients indicated that the Questionnaire was possibly not applicable in all cases. It seemed that the nonrespondents should have been given the opportunity to indicate "not applicable" in those cases where the questions were irrelevant.

The second mailing was made one month after the first one and the letter shown in Volume II, I-18 provided an opportunity to indicate that the questions were "not applicable." The second mailing consisted of the letter, the information sheet and the same Questionnaire described above. In each mailing the Questionnaire had an indentifying number stamped in the upper right hand corner, to permit an association of the replies with the participant listing. The second mailing was, of course, only sent to those who did not respond.

Mail Questionnaires were sent to 669 participants and the response was 52.9 percent.

(b) Problems Encountered. A listing of the most significant problems associated with the mail Questionnaire is shown below:

1. In several instances the questionnaire was mailed to one organization, where it was forwarded to another for completion. In some cases the recipient was a non-salaried official of a small agency and a full time employee of another organization included in the survey. Careful examination of the returns was required to insure valid data.

2. Some recipients expressed a hostile or negative attitude toward the Questionnaire. A case in point is an individual who did not have time to answer the Questionnaire but had time to write a letter indicating that he would respond if he were paid 15 cents per question.

3. Some recipients felt that the Questionnaire was important but felt inadequate to answer it. This frustration was minimized by indicating in the second mailing that "not applicable" could be used in those cases where the question did not apply.

4. In some cases the recipient, when given the opportunity to use "not applicable" as an answer, used this in response to all questions.

5. It appears that some of the Questionnaires were answered by a secretary rather than by the addressee.

6. Some recipients were no longer affiliated with the organization which was addressed and returned the Questionnaire unanswered, rather than passing it on to someone within the organization.

7. In Question 28, which concerns an interest profile, a sample profile was given to indicate the type of answer which should be given. This question seemed clear but a majority of the respondents used only those words which were given in the sample, rather than using descriptors which reflected their personal interests.

This Questionnaire was designed to be completed in less than 30 minutes and it was felt that this was the minimum amount of information which should be requested. In retrospect it would seem that if questions are to be asked by mail, the time required for answering the questions should not exceed 10 to 15 minutes. The time required to complete the Questionnaire seems to be the most significant problem associated with the mail Questionnaire.

3. Questionnaire and Personal Interview Guide

(a) General Comment. An interview guide Questionnaire was used in conducting the personal interviews in order to maintain the structured environment necessary for statistical analysis. In developing this Questionnaire an initial format was designed and tested for trial interviews. Using the results of these tests, the

final Questionnaire was developed and again tested. The results of the tests using the final Questionnaire indicated it was adequate.

(b) The Questionnaire. The final Questionnaire consisted of six parts as shown in Appendix A-3. Of these six parts, the interviewee completed only the first five.

Part I of the Questionnaire was designed to obtain some information about the organization as to its purpose, size, and other related information. It also identified the interviewee as to his function in the organization.

Part II was, in general, designed to obtain the interviewee's evaluation of the various information resources available and the various types of printed literature utilized by his organization in the light of their usefulness to the organization.

Part III was designed to determine the types of information services which the interviewee feels would be useful to his organization and their value. It also allowed the interviewee to suggest functions which WRSIC might perform or services that WRSIC might provide other than those covered by the Questionnaire, which would be of significant value either to himself or his organization.

Part IV was designed to attempt to obtain information which would be useful in establishing standard interest profiles.

Part V allowed the interviewee to request a summary report of the results obtained from the Questionnaires.

Part VI was completed by the interviewer after the completion of the interview but not in the presence of the interviewee. It provides for the subjective comments of the interviewer.

(c) Procedure Used in Arranging for Interviews. Initial contact with an organization to be interviewed was made by mail. The letter briefly described the purpose of the survey, the amount of time which would be required to complete the Questionnaire, and informed the participants that they would be contacted by telephone during the following week to arrange a definite time for the interview. A printed sheet (see page A-1) introducing WRSIC and briefly describing the objectives of the survey was included with each letter.

When contacted by telephone, the interviewer attempted to answer any questions the person contacted asked about the survey. A mutually agreeable date and time for the interview was then arranged.

(d) Procedure Used in the Conduct of the Interview. The average amount of time used for an interview was about one and one-half hours. Interviews were handled on either an individual basis or a group basis depending upon which was more convenient for the organization being interviewed.

Before beginning the Questionnaire, the interviewer described the objectives of WRSIC and the purpose of this survey. In proceeding through the Questionnaire, the interviewer usually read each question aloud, provided any necessary clarification of the question,

and allowed the interviewee to respond before proceeding to the next question.

Part I and II of the Questionnaire usually required very little explanation on the part of the interviewer. Part III required the interviewer to describe several information services. These descriptions were also included in the Questionnaire for the convenience of the interviewee. Samples were also used by the interviewer to clarify the description of some of the services.

Because of the time factor some of the interest profiles in Part IV were not answered, and some were completed without the use of the Water Resources Thesaurus. The interviewee was shown a sample interest profile worksheet (see page A-19) and asked to supply ten to twenty descriptors on an interest profile worksheet (see page A-20) which would describe his interests related to water and water resources. Part V concluded the interview by allowing the interviewee to request a summary report of the results of the Questionnaire.

(e) Materials Used in the Interview. The basic instrument used in the interview was the interview guide Questionnaire. However, in order to augment some of the descriptions of information services the following materials were used:

1. Three pages from a citation bulletin which illustrated a keyword-in-context index format.

2. A copy of Selected Water Resources Abstracts published by WRSIC.
3. A sample of WRSIC's SDI notices.
4. A microfiche card, and
5. Several brochures showing various microfiche readers.

(f) Problems Encountered. In general, the interviews seem to be very successful. The interviewers were well received by the organizations and the interviewees were, in general, courteous and cooperative. Several problems were encountered, however, in the interviews. The following is a list of some of those problems.

1. In a few cases, it was felt that the interviewees may not have sufficiently considered the questions or interest profiles before responding.
2. In some of the group interviews, a few of the participants tended to copy many of their responses from the other interviewees.
3. Some interviewees, it was felt, may have tended to exaggerate when responding.
4. In one of the governmental organizations, the employees felt that no funds were nor could be made available for information services. However, in interviews with supervisory or administrative members of that organization, it was found that ample funds were available.
5. Some of the state agencies were concerned and apprehensive at first because they feared WRSIC might assume their

responsibilities for record maintenance.

6. It is felt that a few of the organizations claimed not to use water related literature to avoid having to complete the entire Questionnaire.

7. When completing their interest profile worksheet in Part V of the Questionnaire, some of the interviewees may have tended to use descriptors from the sample interest profile worksheet rather than descriptors which reflect their interests.

4. Case Study

Industrial groups were not contacted during the other parts of the data collection phase. It was found that the manpower constraints of the project could not allow a large enough sample of the populations to be taken in order to make a statistically significant analysis. It was decided to evaluate the industrial groups through the "case study" approach.

The interview procedures used in the "case study" were similar to those employed in the personal interview described above.

Five industrial firms were selected for this phase of the study and the interviews were conducted by the Industrial Economics Research Division of Texas A&M University.

E. DATA ANALYSIS

1. General Comments

An analysis should provide a bridge between the data and meaningful guidelines for future decisions on the water resources information systems.

The analysis consisted of organizing, summarizing and interpreting the numerous data. The methods employed brought both the detailed and general information content of the data into focus.

The summary of the data is presented in tabular or graphical form, the selection of methods of presentation was guided by the desire for easy grasp of results of the numerous interviews.

The survey data consists of reports of 482 mail interviews and personal interviews. There were 29 questions on the mail Questionnaire and 46 questions on the personal interview guide. Of the 29 questions of the mail Questionnaire, 25 have qualitative responses and 4 have descriptive responses. Of the 46 questions on the personal interview guide, 41 questions have qualitative responses and 5 have descriptive responses.

Frequency distribution of data included computation of means, standard deviation, coefficients of variation where applicable.

The mean may be defined as

$$\bar{X} = \frac{\sum a_i}{N}$$

where a = the individual item,

Subscript i is the i -th term, and

N = the total number of items

The standard deviation may be defined as

$$\sigma = \sqrt{\frac{\sum (\bar{X} - m)^2}{N}}$$

where m = deviation from mean

N = the total number of items

The standard deviation is usually evaluated as a percentage.

The coefficient of variation may be defined as $\frac{\sigma}{\bar{X}}$

The Chi-square analysis was also conducted

The Chi-square X^2 may be described as $X^2 = \frac{c}{1} \frac{\sum (f_i - F_i)^2}{F_i}$

where f_i = observed frequency in the i -th class

F_i = corresponding theoretical, or expected
frequency for that class

C = number of classes

The confidence intervals may be defined as

$$\bar{X} \pm Z \frac{\sigma}{\sqrt{N}}$$

where \bar{X} = mean

Z = confidence coefficient

σ = standard deviation

N = number of observations

$$\begin{aligned}
 G(Z) &= 0.95 \text{ for } Z = 1.96 \\
 &= 0.90 \quad \quad = 1.64 \\
 &= 0.75 \quad \quad = 1.15 \\
 &= 0.60 \quad \quad = 0.84
 \end{aligned}$$

2. Frequency distribution

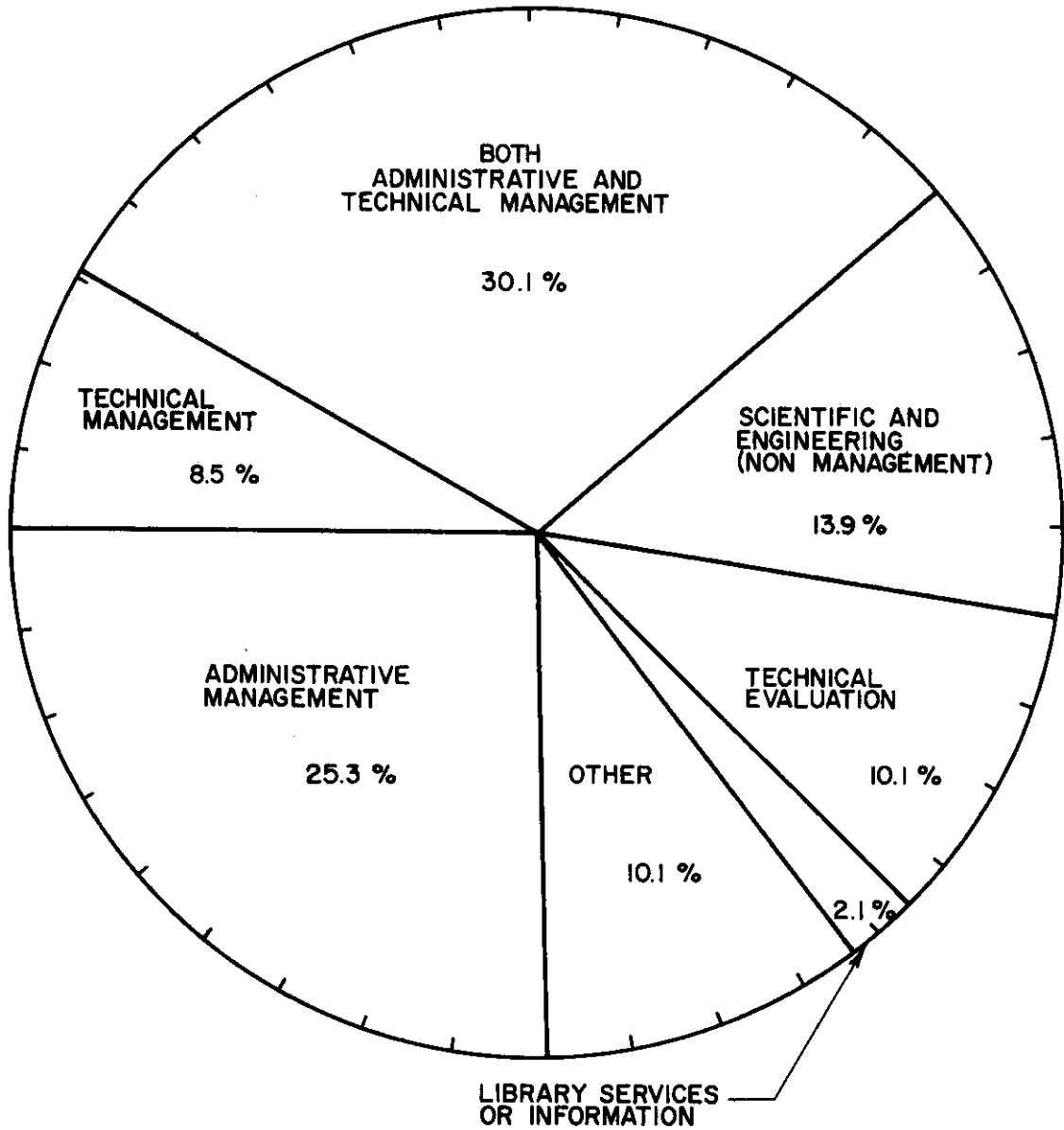
This portion of the analysis concerns itself with frequency distributions for the percent of users, tasks, information units, etc.

(a) Part I: The Organization. Information on the profile of the user, and his organization as well as his need for technical water resources information was sought in the first part of the Questionnaire.

This general profile is one of the first broadly-based estimates for the composition of scientific, engineering and administrative personnel in the area of water resources in the state of Texas.

Question 1.

Duties of respondents were determined from the answers to this question which are presented graphically in Figure 4. Both, the administrative and technical management and the administrative management and technical management represented about two-thirds of all respondents (63.9%).



**QUESTION 1. DUTIES OF RESPONDENTS
(PERCENTAGES OF RESPONSES)**

Figure 4

In general the first letter regarding the personal interview or the mail Questionnaire was sent to the president of the company, or the executive head of the organization. In some cases the Questionnaires were answered by the addressee, but in many instances the personnel interviewed were selected by the addressee as the persons who were more involved in or more knowledgeable in the field of water resources. It is not surprising that the two-thirds of all respondents came from the management side of the organizations interviewed.

The duties of the mail Questionnaire respondents were as follows:

Administrative management	128(36.8)*
Technical management	24(6.9)
Both administrative and technical management	110(31.6)
Scientific and engineering (non-management)	25(7.2)
Technical evaluation	15(4.3)
Library services or information	7(2.0)
Other	39(11.2)

The duties of the personal interviewees were as follows:

Administrative management	17(7.5)
Technical management	24(10.6)
Both administrative and technical management	63(27.8)

Scientific and engineering (non-management)	55(24.4)
Technical evaluation	43(19.1)
Library services or information	5(2.2)
Other	19(8.4)

* Numbers in parentheses represent percentages.

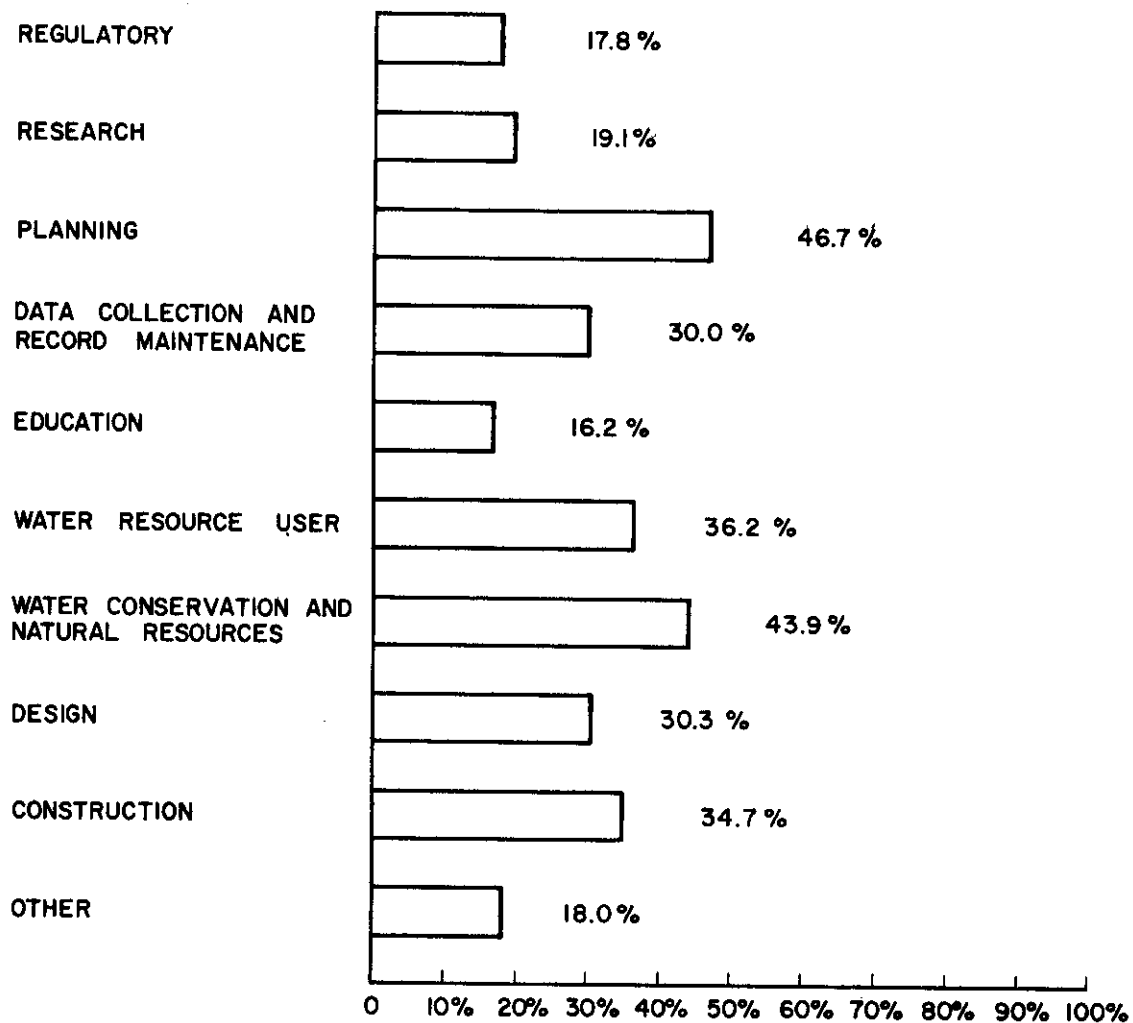
A list of "other" duties is presented in Appendix II; the duties ranged from educational field through legal to general maintenance.

It is felt that the selection of the interviewees was quite good as it covered a wide spectrum of occupations in the general water resources field.

Question 2.

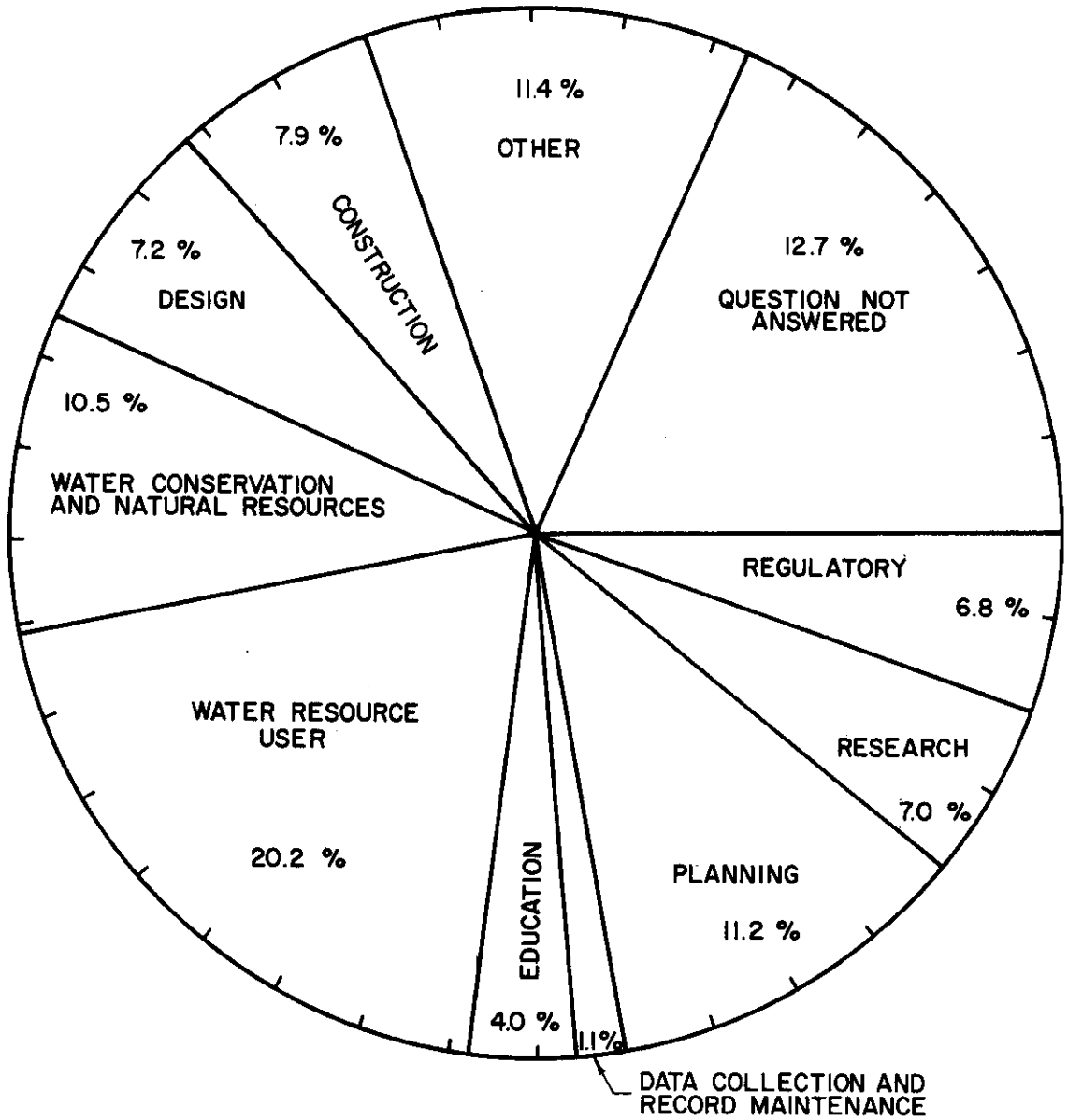
The primary purposes of the organizations surveyed are presented in Figures 5 through 10. The respondents had a chance to list up to five purposes of their organization in order of priority. The overall result is summarized in Figure 5 which is a composite plot of parts 1 through 5. The primary purposes, in descending order, of the organizations surveyed were planning, water conservation and natural resources, water resources user, construction, etc.

The primary purpose of organizations surveyed is shown in Figure 6; the water resources user leads in this category followed by planning. The second designated purpose of the organizations



QUESTION 2. THE FIVE DESIGNATED PURPOSES OF THE ORGANIZATIONS (A COMPOSITE OF PARTS 1 THROUGH 5)

Figure 5



QUESTION 2.-1) PRIMARY PURPOSE OF ORGANIZATION

Figure 6

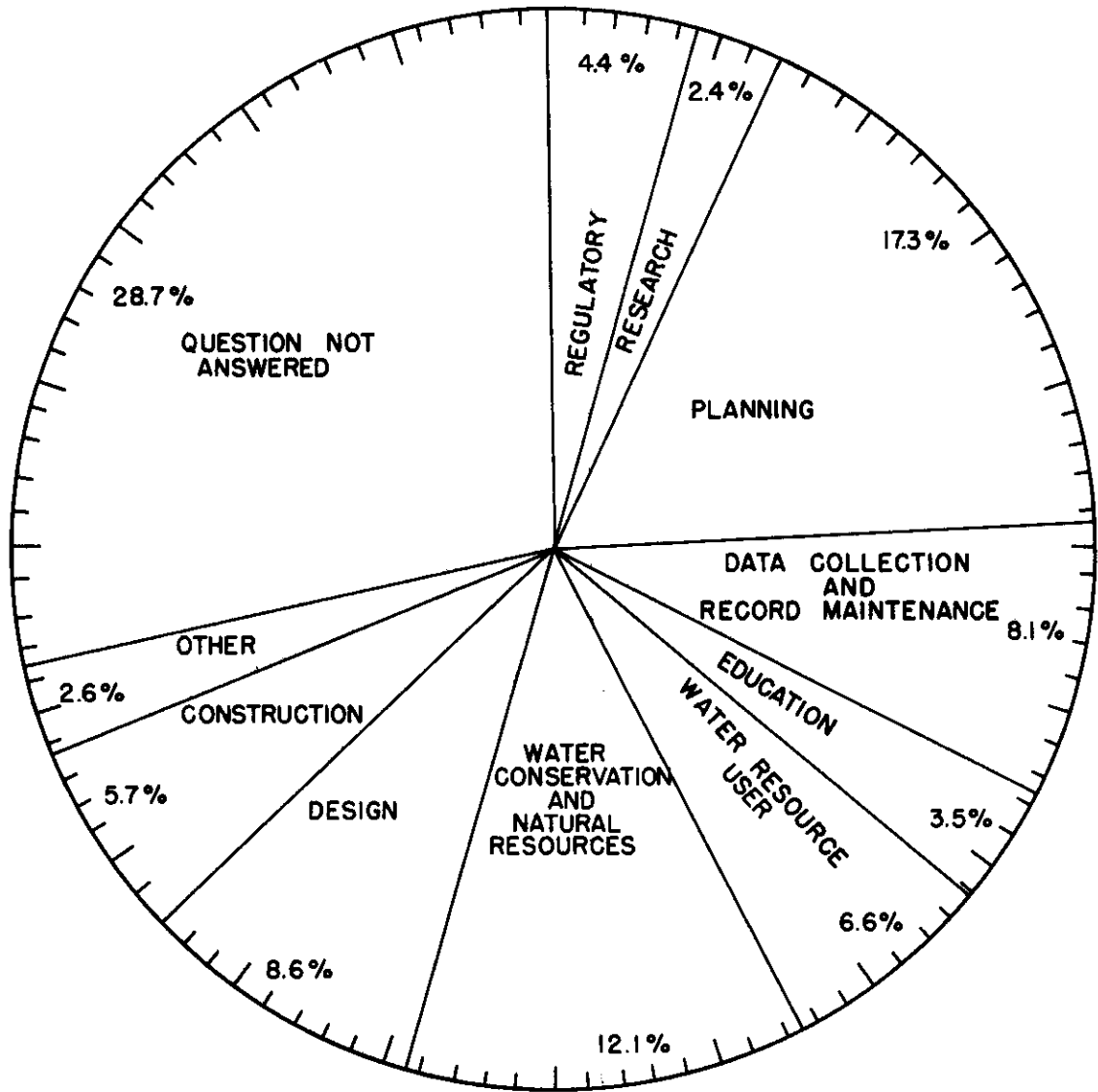
surveyed followed by the third, fourth and fifth purposes are shown in Figures 7 through 10. As expected the percentage of those who did not answer this particular question increased for secondary, tertiary, etc. purposes or the organizations since some organizations indicated only one or two purposes. The second- and third-designated purposes were planning (Fig. 7, 8), the fourth was construction (Fig. 9) and fifth (Fig. 10) the water conservation and natural resources. A list of "other" purposes of the organization in relation to water resources is given in Appendix II. The other purposes listed ranged from drainage through flood control to photogrammetric mapping.

Question 3.

This question gives some idea of the size of the organization interviewed, i.e. personal interviews were conducted for groups 1-4, 8, 9 and 17-19 with the results shown in Table II.

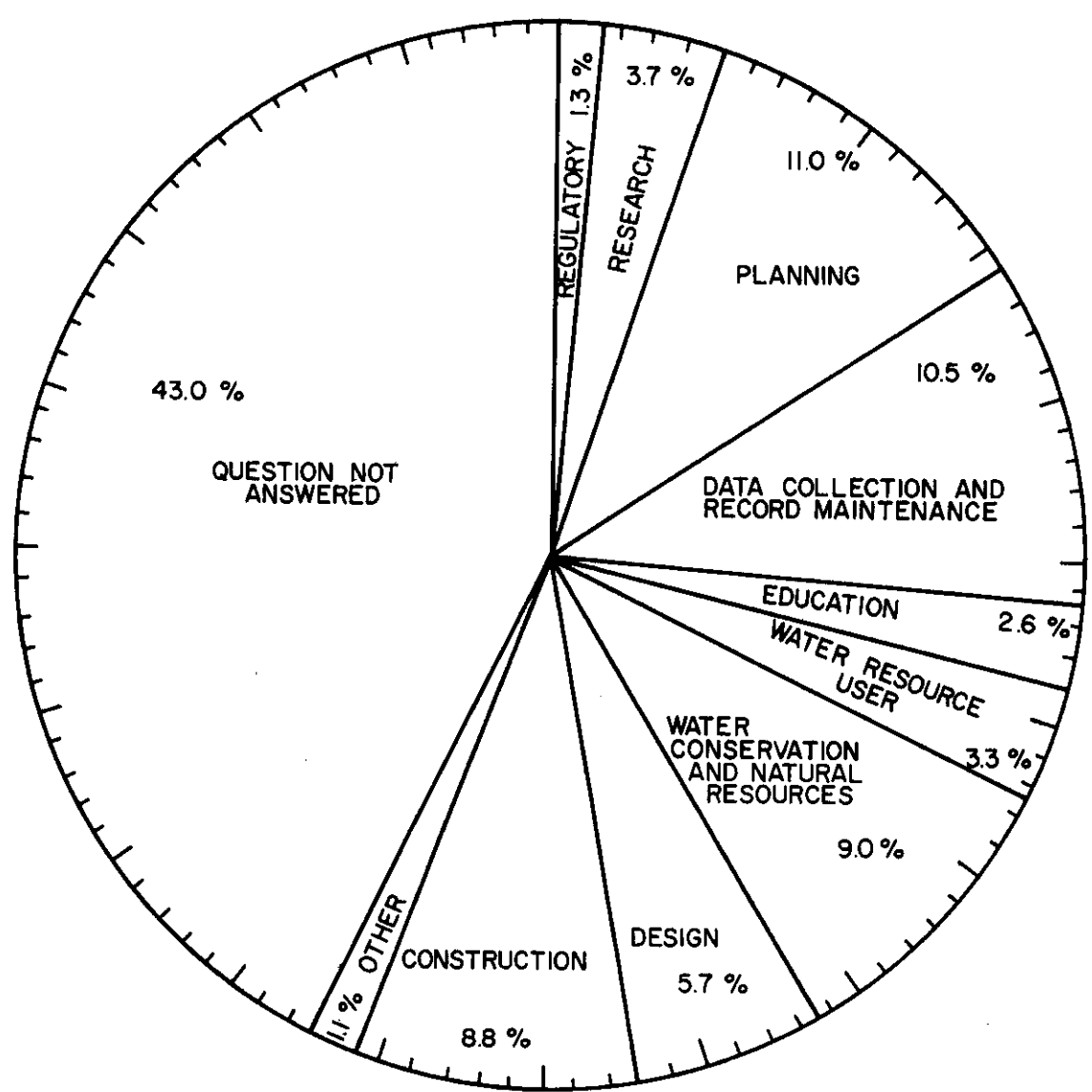
The greatest number of professionals are employed by the Federal Agencies followed by the Engineers and Contractors. The greatest number of supervisory or administrative personnel were employed by the Contractors followed by River Authorities. The River Authorities employed most of the sub-professionals followed by the Contractors and Engineers.

Similar comparisons are made for the mail Questionnaire and for both the mail Questionnaire and the personal interviews. (Table III



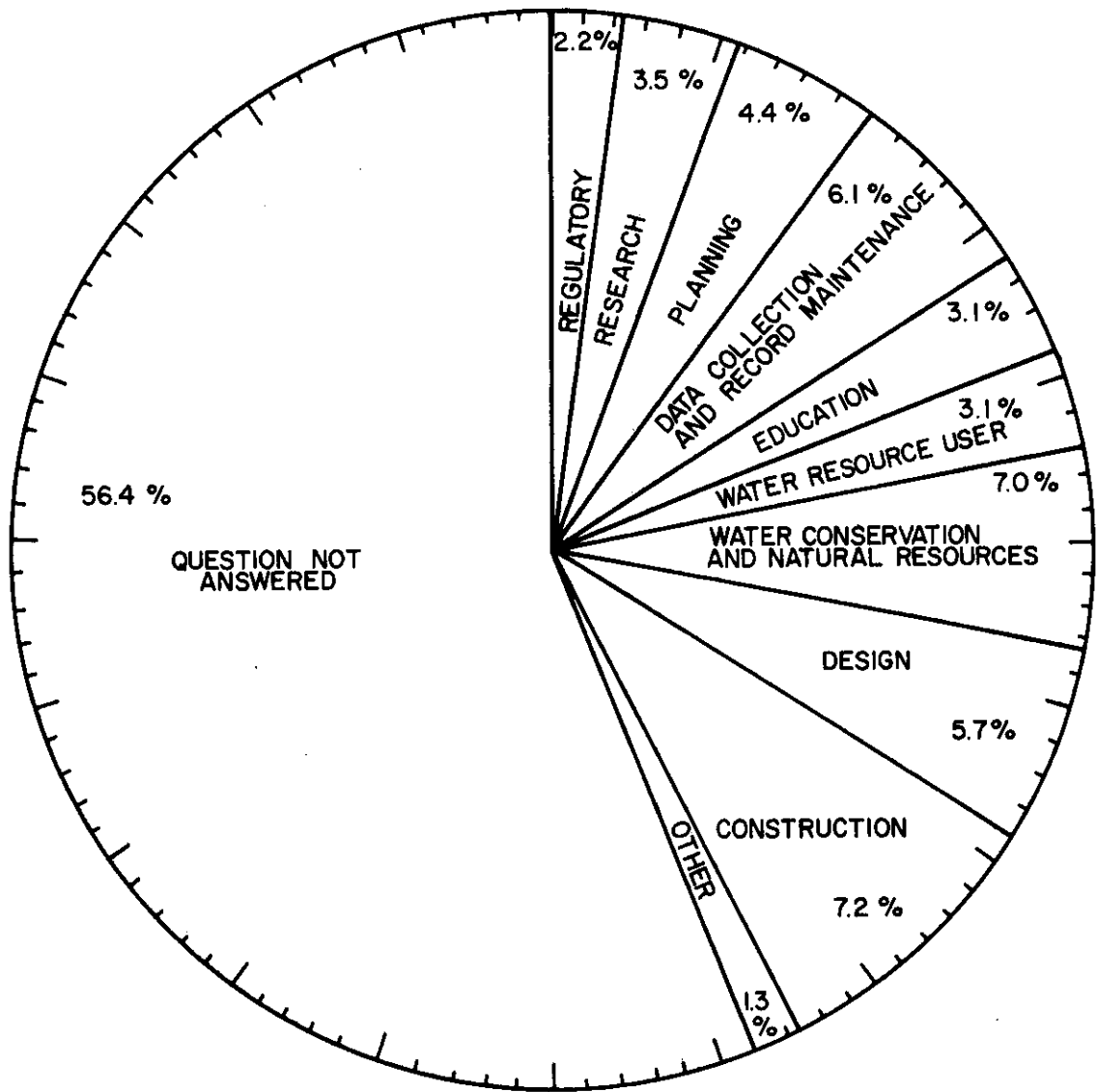
QUESTION 2.-2) SECOND DESIGNATED PURPOSE OF ORGANIZATION

Figure 7



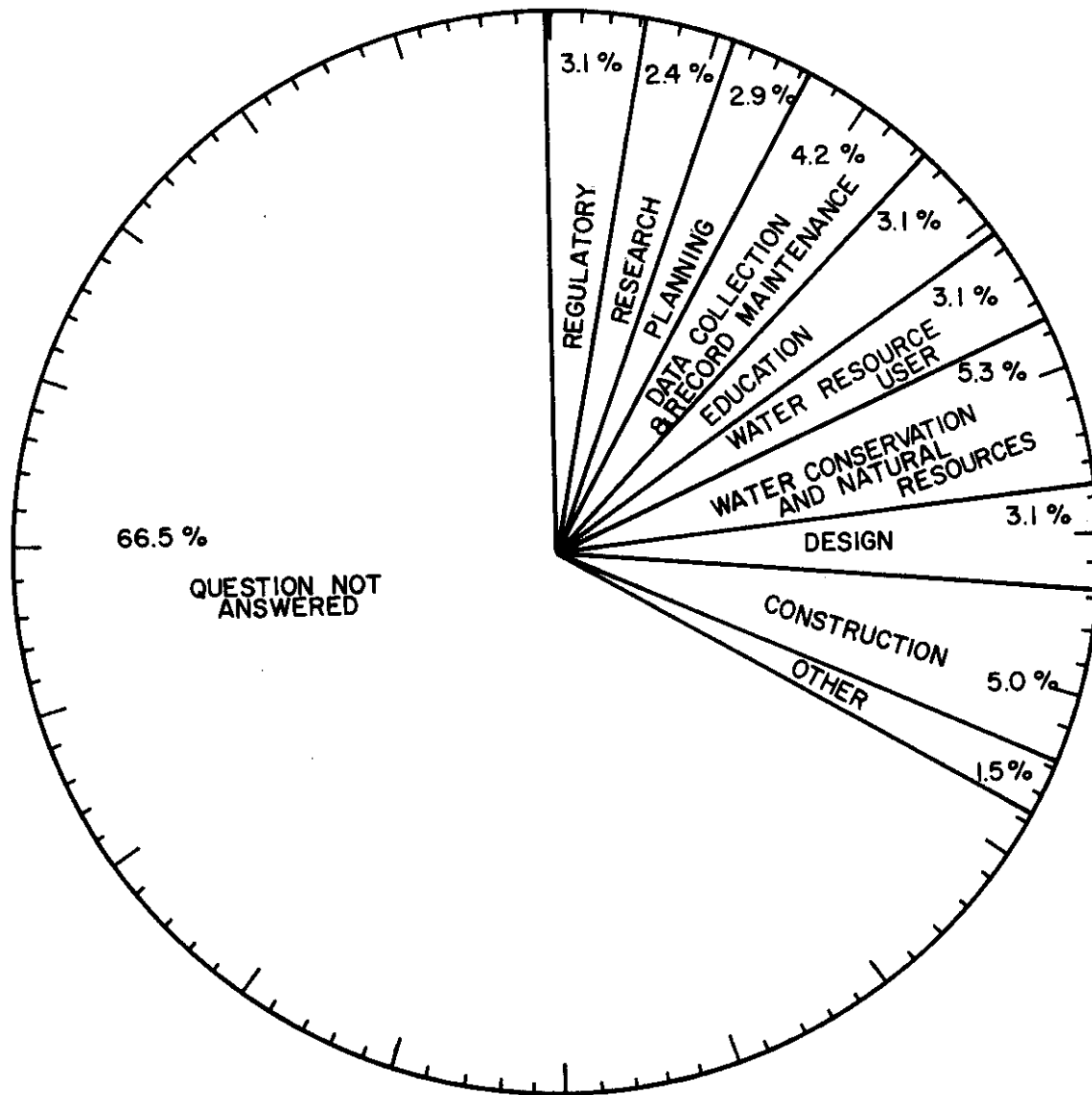
QUESTION 2.-3) THIRD DESIGNATED PURPOSE OF ORGANIZATION

Figure 8



QUESTION 2.-4) FOURTH DESIGNATED PURPOSE OF ORGANIZATIONS

Figure 9



QUESTION 2.-5) FIFTH DESIGNATED PURPOSE OF ORGANIZATIONS

Figure 10

Group	Name	Supervisory or Administrative	Professionals	Sub-Professionals
1	Federal Water Agencies	22.8 (31.4)*	59.5 (105.1)	41.9 (66.0)
2	State Water Agencies	9.2 (12.0)	22.4 (31.5)	29.9 (37.9)
3	Colleges and Universities	1.3 (0.8)	12.0 (9.2)	4.3 (4.6)
4	Private Research Organizations	2.8 (1.5)	21.2 (12.8)	41.3 (29.9)
8	Navigation Districts	4.5 (3.7)	1.3 (0.5)	31.8 (24.4)
9	River Authorities	36.7 (49.1)	27.3 (36.9)	161.0 (278.5)
17	Conservation and Natural Resources	2.0 (0)	0 (0)	0 (0)
18	Engineers	11.9 (7.0)	41.9 (32.5)	46.0 (32.8)
19	Contractors	50.0 (77.2)	38.8 (55.8)	151.8 (269.9)

*Note: Standard Deviation is shown in parenthesis.

Table II
 Approximate Number of Employees in the Organization
 (Personal Interview)

Group	Name	Supervisory or Administrative	Professional	Sub-Professional
3	Colleges and Universities	1.5 (1.4)*	9.3 (7.5)	13.0 (25.6)
4	Private Research Organizations	3.2 (2.9)	7.5 (5.5)	8.7 (14.5)
5	Conservation and Reclamation Districts	1.6 (1.1)	0.6 (0.7)	2.6 (6.2)
6	Fresh Water Supply Districts	3.1 (4.3)	5.3 (14.3)	10.3 (28.5)
7	Levee Improvement Districts	3.3 (6.1)	4.8 (14.2)	8.0 (25.3)
8	Navigation Districts	2.0 (1.6)	0.3 (0.8)	0.7 (1.0)
9	River Authorities	2.5 (1.3)	1.0 (1.2)	1.3 (1.5)
10	Underground Water Conservation Districts	2.7 (2.9)	1.0 (1.0)	2.7 (4.6)
11	Water Control and Improvement Districts	2.4 (4.2)	0.5 (1.3)	6.6 (33.6)
12	Drainage Districts and Watershed Authorities	1.7 (1.8)	0.2 (0.6)	1.3 (2.7)
13	Water Authorities and Utility Districts	2.3 (2.4)	0.5 (0.7)	2.2 (4.7)
14	Water Control and Preservation Districts	4.0 (6.1)	1.0 (1.0)	0 (0)
15	Water Improvement Districts	2.0 (2.2)	0 (0)	0.3 (0.5)
16	Water Supply Districts	2.2 (2.0)	0.8 (1.0)	1.3 (1.2)
17	Conservation and Natural Resources	3.5 (2.7)	4.7 (13.7)	26.2 (50.4)
18	Engineers	2.8 (4.0)	4.7 (5.1)	13.6 (20.7)
19	Contractors	16.4 (23.7)	10.2 (39.6)	23.1 (53.4)

*Standard Deviation

Table III

Approximate Number of Employees in the Organization
(Mail Questionnaires)

and IV). Confidence limits of number of employees in the organization for the personal interviews and mail Questionnaires are given in Table V and VI. Other confidence limits listings are included in Volume II (Appendix II).

Question 4.

This question dealt with the number of employees who must have access to recently published technical information. As expected the greatest percentage of employees who must have access were the professionals (such as engineers) (Table VII, VIII and IX). Confidence limits of number of employees who must have access to recently published technical information on Water Resources are given in Volume II (Appendix II).

Question 5.

This question relates to the time the employees devote to the search for technical water resources information. As it is shown in Figure 11(a) less than 5% of the majority of all those interviewed personally and by mail in the supervisory or administrative category devote to search for information while the majority of the professionals devote between 5 and 10% to the search. The majority of the sub-professionals do not devote any time for search of information. (Figure 11(b)).

Group	Name	Supervisory or Administrative	Professional	Sub-Professional
1	Federal Water Agencies	22.8 (31.4)*	59.5 (105.1)	41.9 (66.0)
2	State Water Agencies	9.2 (12.0)	22.4 (31.5)	29.9 (37.9)
3	Colleges and Universities	1.4 (1.0)	10.9 (8.4)	7.8 (16.3)
4	Private Research Organizations	2.9 (2.0)	16.1 (12.5)	29.1 (29.0)
5	Conservation and Reclamation Districts	1.6 (1.1)	0.6 (0.7)	2.6 (6.2)
6	Fresh Water Supply Districts	3.1 (4.3)	5.0 (14.3)	10.3 (28.5)
7	Levee Improvement Districts	3.3 (6.1)	4.8 (14.2)	8.0 (25.3)
8	Navigation Districts	3.0 (2.7)	0.7 (0.8)	13.1 (21.4)
9	River Authorities	23.0 (40.6)	16.8 (30.7)	97.1 (223.4)
10	Underground Water Conservation Districts	2.7 (2.9)	1.0 (1.0)	2.7 (4.6)
11	Water Control and Improvement Districts	2.4 (4.2)	0.5 (1.3)	6.6 (33.6)
12	Drainage Districts and Watershed Authorities	1.7 (1.8)	0.2 (0.6)	1.3 (2.7)
13	Water Authorities and Utility Districts	2.3 (2.4)	0.5 (0.7)	2.2 (4.7)
14	Water Control and Preservation Districts	4.0 (6.1)	1.0 (1.0)	0 (0)
15	Water Improvement Districts	2.0 (2.2)	0 (0)	0.3 (0.5)
16	Water Supply Districts	2.2 (1.9)	0.8 (1.0)	1.3 (1.2)
17	Conservation and Natural Resources	3.4 (2.6)	4.4 (13.2)	24.1 (48.8)
18	Engineers	5.8 (6.7)	17.8 (26.3)	24.4 (29.3)
19	Contractors	30.4 (54.9)	22.2 (48.6)	67.2 (171.2)

*Standard Deviation

Table IV
Approximate Number of Employees in the Organization
(Combined Mail Questionnaires and Personal Interviews)

Supervisory or Administrative

Group	95%		90%		75%		60%	
1	12.5	33.1	14.2	31.4	16.8	28.8	18.4	27.2
2	4.1	14.4	4.9	13.5	6.2	12.2	7.0	11.4
3	0.8	2.0	0.9	1.9	1.1	1.7	1.1	1.6
4	1.9	3.9	2.1	3.8	2.4	3.5	2.5	3.4
5	0.9	2.4	1.0	2.2	1.2	2.1	1.3	1.9
6	0.7	5.5	1.1	5.1	1.7	4.5	2.1	4.1
7	-0.5	7.1	0.1	6.5	1.1	5.5	1.7	4.9
8	1.3	4.7	1.6	4.4	2.0	4.0	2.3	3.7
9	-2.2	48.2	1.9	44.1	8.2	37.8	12.2	33.8
10	-0.6	5.9	-0.1	5.4	0.7	4.6	1.3	4.1
11	1.5	3.3	1.7	3.2	1.9	2.9	2.0	2.8
12	0.9	2.5	1.1	2.4	1.3	2.2	1.4	2.0
13	1.5	3.1	1.7	3.0	1.9	2.8	2.0	2.7
14	-2.9	10.9	-1.8	9.8	0.0	8.0	1.1	6.9
15	-0.1	4.1	0.2	3.8	0.8	3.2	1.1	2.9
16	1.0	3.5	1.2	3.3	1.5	3.0	1.7	2.8
17	2.0	4.8	2.2	4.6	2.5	4.2	2.8	4.0
18	3.6	8.0	4.0	7.6	4.5	7.1	4.9	6.7
19	14.0	46.8	16.7	44.2	20.8	40.1	23.4	37.5

Table V (a)

Confidence Limits of Number of Employees

in the Organization

(Personal Interviews and Mail Questionnaires)

Professional

Group	95%		90%		75%		60%	
1	27.8	91.3	32.9	86.1	40.9	78.2	45.9	73.2
2	8.9	35.9	11.1	33.7	14.5	30.3	16.6	28.2
3	6.7	15.2	7.4	14.5	8.4	13.4	9.1	12.7
4	10.0	22.2	11.0	21.2	12.5	19.6	13.4	18.7
5	0.1	1.1	0.2	1.1	0.3	0.9	0.4	0.8
6	-3.1	13.1	-1.8	11.8	0.3	9.7	1.5	8.5
7	-4.0	13.6	-2.5	12.1	-0.3	9.9	1.0	8.6
8	0.2	1.2	0.3	1.1	0.4	1.0	0.5	0.9
9	-2.2	35.8	0.9	32.7	5.6	28.0	8.6	25.0
10	-0.1	2.1	0.1	1.9	0.3	1.7	0.5	1.5
11	0.2	0.8	0.3	0.7	0.4	0.7	0.4	0.6
12	0.0	0.5	0.0	0.5	0.1	0.4	0.1	0.4
13	0.2	0.7	0.3	0.7	0.3	0.6	0.4	0.6
14	-0.1	2.1	0.1	1.9	0.3	1.7	0.5	1.5
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.1	1.4	0.2	1.3	0.4	1.2	0.5	1.0
17	-2.6	11.3	-1.5	10.2	0.3	8.4	1.4	7.3
18	9.3	26.2	10.7	24.9	12.8	22.7	14.1	21.4
19	7.6	36.7	10.0	34.3	13.6	30.7	15.9	28.4

Table V (b)
Confidence Limits of Number of Employees
in the Organization
(Personal Interviews and Mail Questionnaires)

Sub-Professional

Group	95%		90%		75%		60%	
1	20.3	63.4	23.8	59.9	29.2	54.5	32.6	51.1
2	13.2	46.5	16.0	43.7	20.1	39.6	22.7	37.0
3	-0.5	16.1	0.9	14.7	3.0	12.6	4.3	11.3
4	14.9	43.3	17.2	40.9	20.7	37.4	23.0	35.1
5	-1.7	6.9	-1.0	6.2	0.1	5.2	0.8	4.5
6	-5.8	26.4	-3.1	23.8	0.9	19.8	3.4	17.2
7	-7.7	23.7	-5.1	21.1	-1.2	17.2	1.3	14.7
8	-0.1	26.3	2.0	24.2	5.3	20.9	7.4	18.8
9	-41.4	235.6	-18.8	213.0	15.9	178.3	37.8	156.4
10	-2.6	7.9	-1.7	7.0	-0.4	5.7	0.4	4.9
11	-0.5	13.8	0.7	12.6	2.5	10.8	3.6	9.7
12	0.2	2.5	0.4	2.3	0.7	2.0	0.8	1.8
13	0.7	3.8	0.9	3.5	1.3	3.2	1.6	2.9
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	-0.2	0.7	-0.2	0.7	0.0	0.5	0.0	0.5
16	0.5	2.1	0.7	2.0	0.9	1.8	1.0	1.7
17	-2.4	50.7	2.0	46.3	8.6	39.7	12.8	35.5
18	14.8	34.0	16.4	32.4	18.8	30.0	20.3	28.5
19	12.7	121.6	21.6	112.7	35.2	99.1	43.8	90.5

Table VI
Confidence Limits of Number of Employees
in the Organization
(Mail Questionnaires and Personal Interviews)

Group	Name	Supervisory or Administrative	Professional	Sub-Professional
1	Federal Water Agencies	9.4 (11.7)*	25.6 (42.2)	8.4 (9.3)
2	State Water Agencies	7.2 (7.6)	18.8 (28.2)	10.7 (25.4)
3	Colleges and Universities	1.2 (1.0)	4.3 (3.2)	1.2 (1.0)
4	Private Research Organizations	2.1 (1.5)	4.1 (1.6)	3.1 (2.3)
8	Navigation Districts	0.8 (1.0)	0.3 (0.5)	1.0 (2.0)
9	River Authorities	11.0 (19.2)	10.2 (19.6)	4.7 (10.0)
17	Conservation and Natural Resources	2.0 (0.0)	0.0 (0.0)	0.0 (0.0)
18	Engineers	5.5 (3.1)	15.0 (15.1)	4.4 (3.4)
19	Contractors	6.2 (8.7)	9.8 (7.8)	2.5 (3.5)

*Standard Deviation

Table VII
 Approximate Number of Employees in the Organization
 Who Must Have Access to Recently Published
 Technical Information on Water Resources
 (Personal Interviews)

Group	Name	Supervisory or Administrative	Professional	Sub-Professional
2	State Water Agencies		2.0 (0.0)	
3	Colleges and Universities	1.2 (1.6)*	7.2 (7.4)	3.2 (4.6)
4	Private Research Organizations	1.8 (1.7)	4.0 (3.3)	1.0 (2.0)
5	Conservation and Reclamation Districts	1.3 (1.0)	0.5 (0.8)	0.1 (0.4)
6	Fresh Water Supply Districts	1.3 (1.6)	1.6 (3.2)	1.3 (2.8)
7	Levee Improvement Districts	1.0 (1.4)	1.3 (3.2)	2.0 (6.3)
8	Navigation Districts	1.2 (1.5)	0.3 (0.9)	0.3 (0.8)
9	River Authorities	1.8 (1.0)	0.8 (1.0)	0.5 (0.6)
10	Underground Water Conservation Districts	0.3 (0.6)	1.0 (1.0)	0.0 (0.0)
11	Water Control and Improvement Districts	1.1 (1.3)	0.5 (1.3)	0.5 (1.3)
12	Drainage Districts and Watershed Authorities	0.8 (1.2)	0.2 (0.5)	0.1 (0.2)
13	Water Authorities and Utility Districts	0.9 (1.0)	0.4 (0.7)	0.8 (2.0)
14	Water Control and Preservation Districts	0.3 (0.6)	0.3 (0.6)	0.0 (0.0)
15	Water Improvement Districts	1.7 (0.6)	0.0 (0.0)	0.3 (0.6)
16	Water Supply Districts	1.0 (1.2)	0.9 (1.1)	0.9 (1.1)
17	Conservation and Natural Resources	1.6 (1.4)	0.6 (1.4)	0.3 (0.6)
18	Engineers	1.9 (3.6)	3.5 (4.9)	1.0 (1.4)
19	Contractors	2.1 (2.3)	1.3 (3.9)	0.7 (2.2)

Table VIII

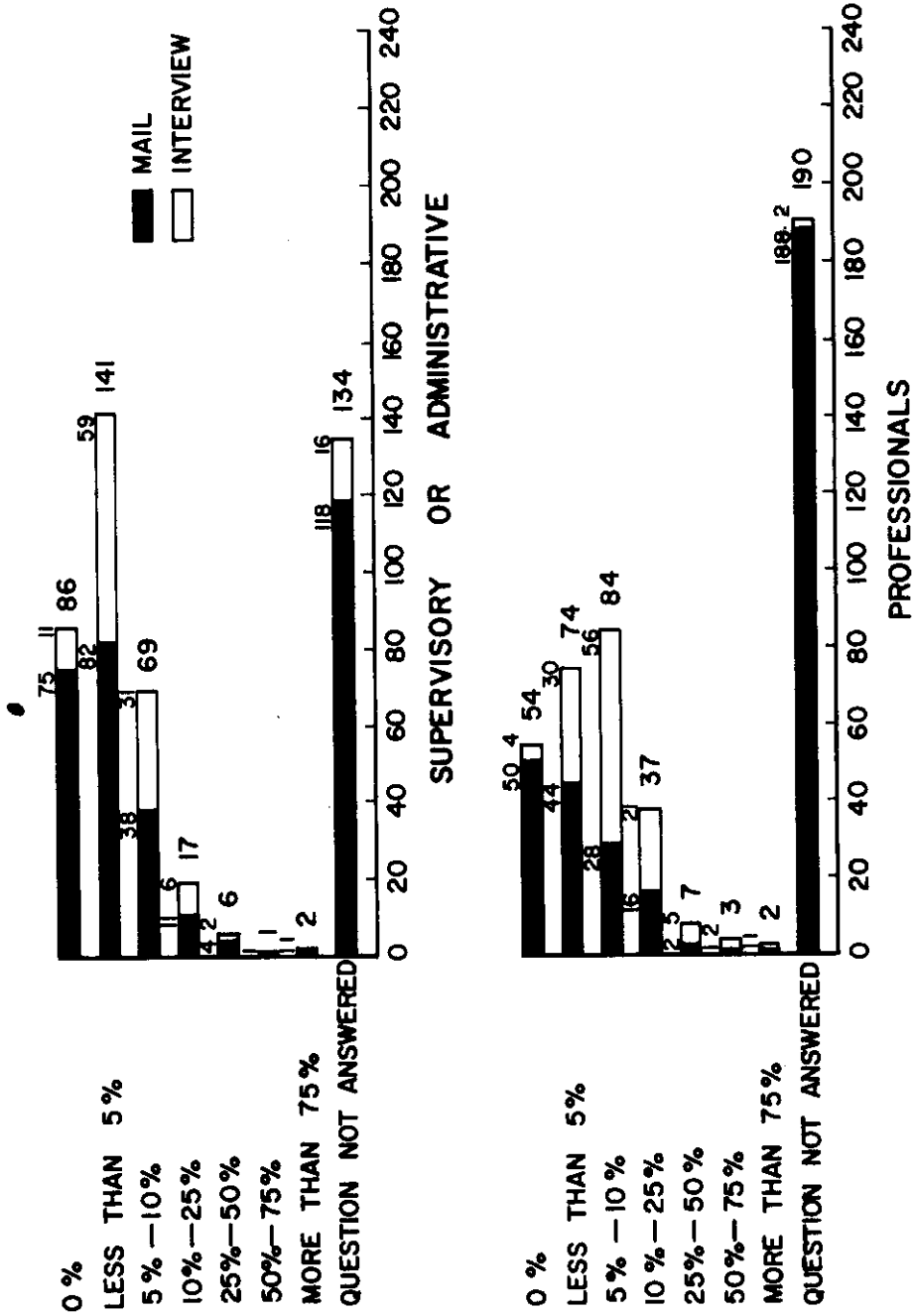
Approximate Number of Employees in the Organization
Who Must Have Access to Recently Published
Technical Information on Water Resources
(Mail Questionnaires)

*Standard Deviation

Group	Name	Supervisory or Administrative	Professional	Sub-Professional
1	Federal Water Agencies	9.4(11.7)*	25.6(42.2)	8.4(9.3)
2	State Water Agencies	7.2(7.6)	18.0(27.8)	10.7(25.4)
3	Colleges and Universities	1.2(1.3)	5.5(5.2)	2.2(3.3)
4	Private Research Organizations	2.0(1.5)	4.1(2.3)	2.3(2.4)
5	Conservation and Reclamation Districts	1.3(1.0)	0.5(0.8)	0.1(0.4)
6	Fresh Water Supply Districts	1.3(1.6)	1.6(3.2)	1.3(2.8)
7	Levee Improvement Districts	1.0(1.4)	1.3(3.2)	2.0(6.3)
8	Navigation Districts	1.0(1.2)	0.3(0.7)	0.6(1.4)
9	River Authorities	7.3(15.1)	6.4(15.4)	3.0(7.8)
10	Underground Water Conservation Districts	0.3(0.6)	1.0(1.0)	0.0(0.0)
11	Water Control and Improvement Districts	1.1(1.3)	0.4(1.3)	0.5(1.3)
12	Drainage Districts and Watershed Authorities	0.8(1.3)	0.2(0.5)	0.1(0.2)
13	Water Authorities and Utility Districts	0.9(1.0)	0.4(0.7)	0.8(2.0)
14	Water Control and Preservation Districts	0.3(0.6)	0.3(0.6)	0.0(0.0)
15	Water Improvement Districts	1.7(0.6)	0.0(0.0)	0.3(0.6)
16	Water Supply Districts	1.0(1.2)	0.9(1.1)	0.9(1.1)
17	Conservation and Natural Resources	1.6(1.4)	0.6(1.4)	0.2(0.6)
18	Engineers	3.1(3.8)	7.5(11.0)	2.2(2.7)
19	Contractors	3.8(6.1)	4.8(7.1)	1.2(2.7)

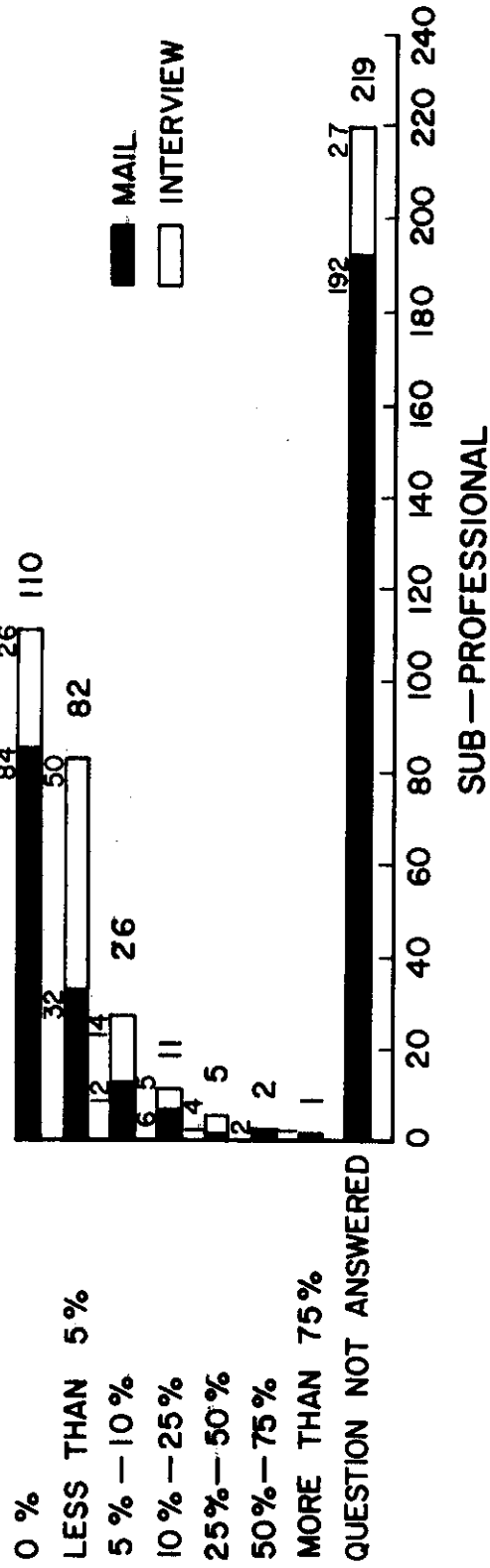
*Standard Deviation

Table IX
 Approximate Number of Employees in the Organization
 Who Must Have Access to Recently Published
 Technical Information on Water Resources
 (Mail Questionnaires and Personal Interviews)



QUESTION 5. PERCENTAGE OF TIME DEVOTED TO THE SEARCH FOR TECHNICAL WATER RESOURCES INFORMATION.

Figure 11(a)



QUESTION 5. PERCENTAGE OF TIME DEVOTED TO THE SEARCH FOR TECHNICAL WATER RESOURCES INFORMATION.

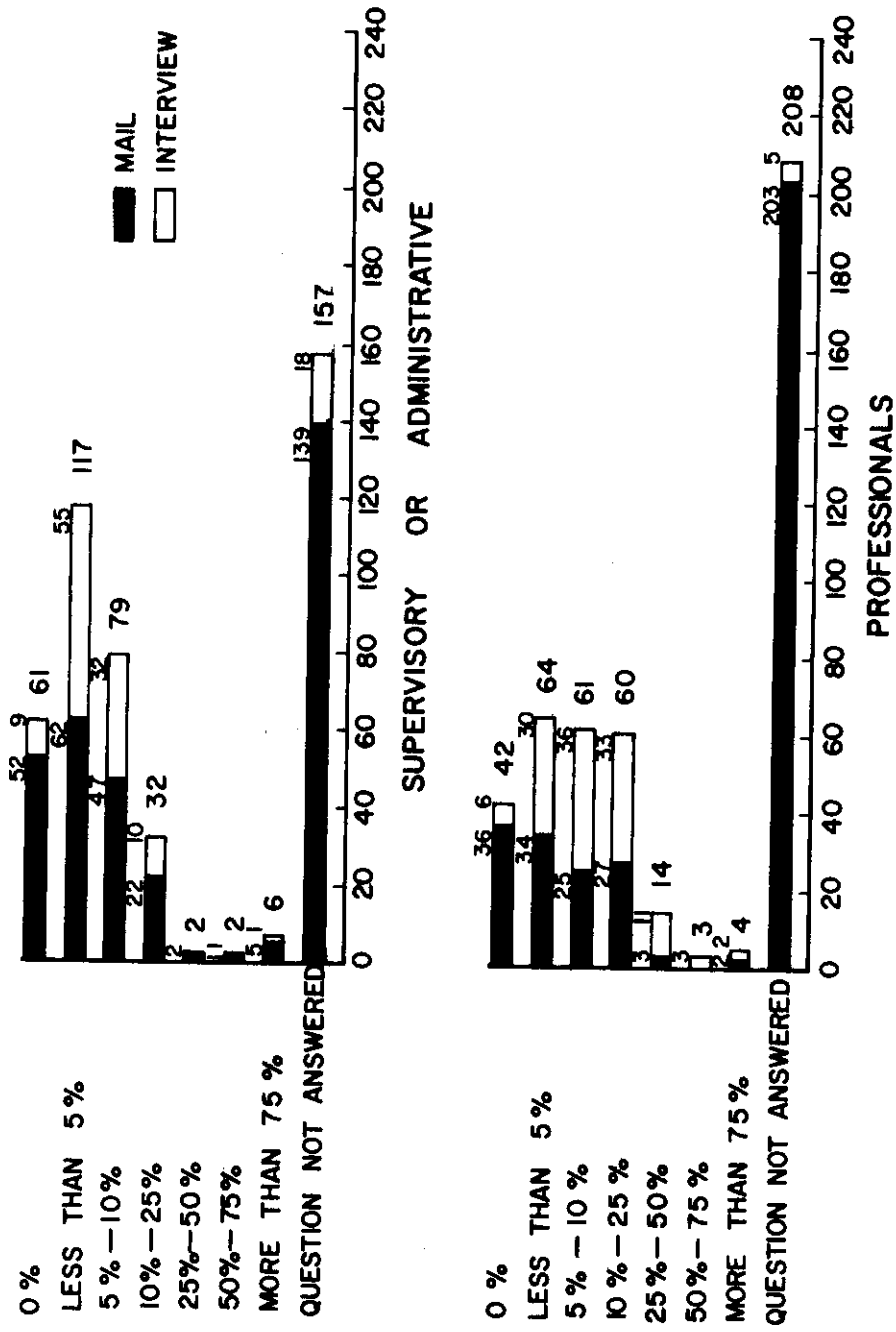
Figure 11(b)

Question 6.

As expected the majority of those interviewed in the supervisory or administrative positions felt that they should spend about the same percentage of time on information search as they do at present (less than 5%). As far as the professionals are concerned, they were almost equally divided between the "less than 5%, 5%-10%, and 10%-25% category". It appears that professionals realize that they should spend more time on information search than they do at present (Fig. 12(a)). The sub-professionals should spend between 0 and 5% of their time on information search (Fig. 12(b)).

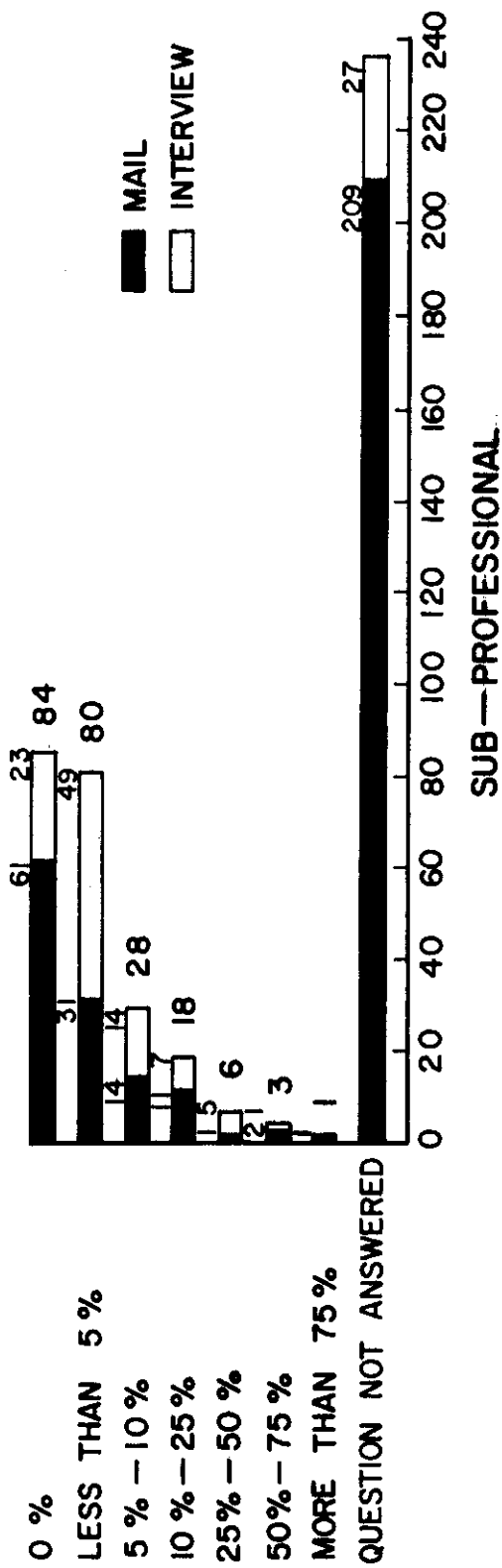
(b) Part II: Current Sources of Information. Questions 7 through 14 related to the usefulness of various information resources to the organizations interviewed. Figure 13 presents a summary of "very significant sources of information." Considering both the mail and personal interview Questionnaire, the personal reference libraries are most significant followed by an internal reference library and a specialized information service external to the organization interviewed. A similar answer was obtained from the personal interviews as from the mail Questionnaire. The "significant sources of information" included information supplied by vendors, manufacturers, or suppliers (Figure 14) followed by an internal reference library and the personal reference libraries.

In Figure 15 through 18 the responses are broken down for each type of information resources.



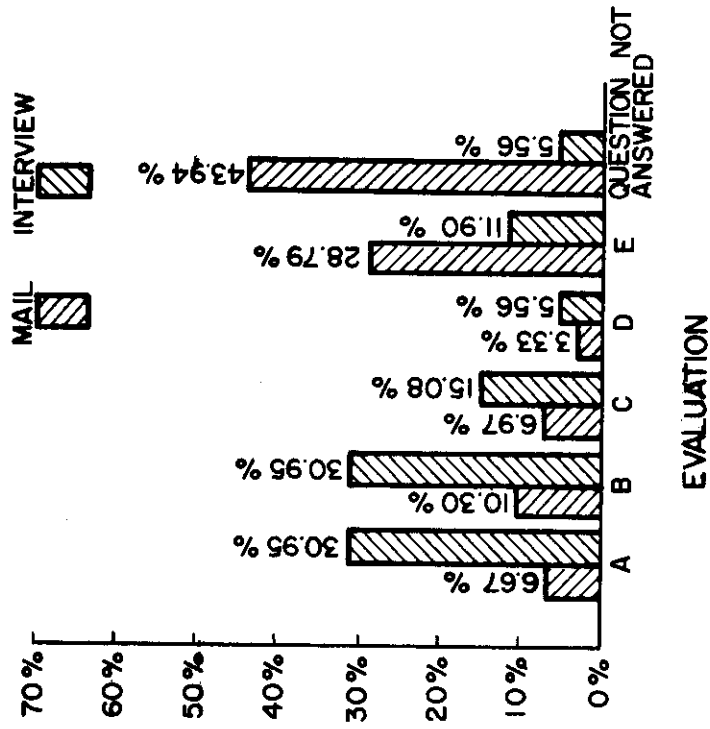
QUESTION 6. PERCENTAGE OF TIME WHICH SHOULD BE DEVOTED TO THE SEARCH FOR TECHNICAL WATER RESOURCES INFORMATION.

Figure 12(a)



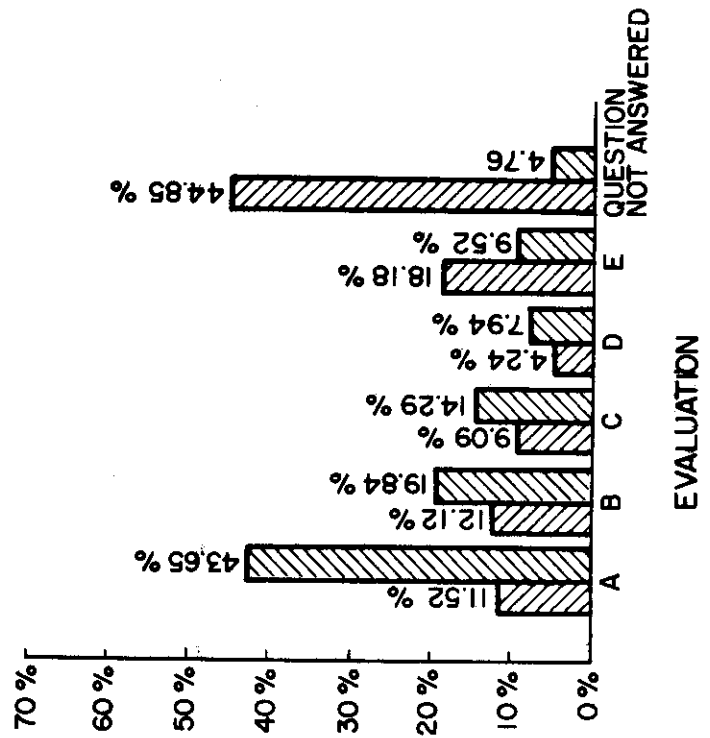
QUESTION 6. PERCENTAGE OF TIME WHICH SHOULD BE DEVOTED TO THE SEARCH FOR TECHNICAL WATER RESOURCES INFORMATION.

Figure 12(b)



QUESTION 7. PERSONAL REFERENCE LIBRARY.

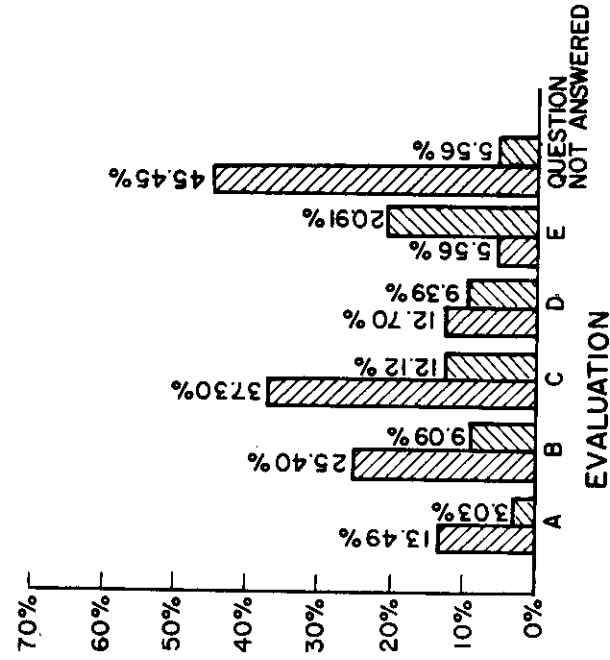
Figure 13(a)



QUESTION 8. AN INTERNAL REFERENCE LIBRARY MAINTAINED BY THE ORGANIZATION FOR USE BY ITS EMPLOYEES.

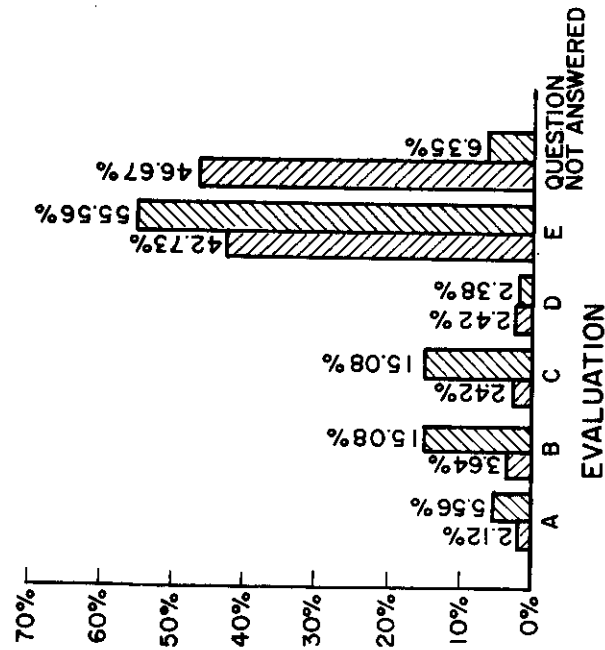
Figure 13(b)

MAIL INTERVIEW



QUESTION 10. A PUBLIC, PRIVATE, OR ACADEMIC LIBRARY WHICH IS READILY ACCESSIBLE TO MEMBERS OF THE ORGANIZATION

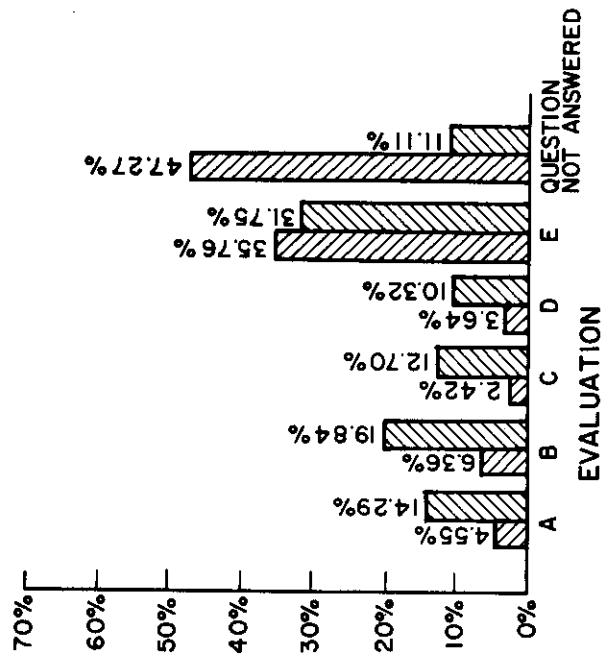
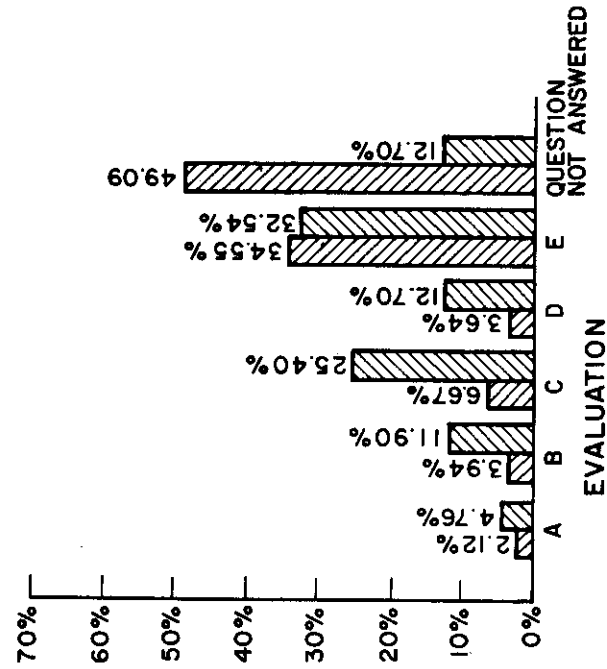
Figure 14(b)



QUESTION 9. A RESEARCH PERSON (OR STAFF) WHOSE PRIMARY DUTY IS TO PROVIDE ASSISTANCE IN LITERATURE SEARCHES

Figure 14(a)

MAIL INTERVIEW



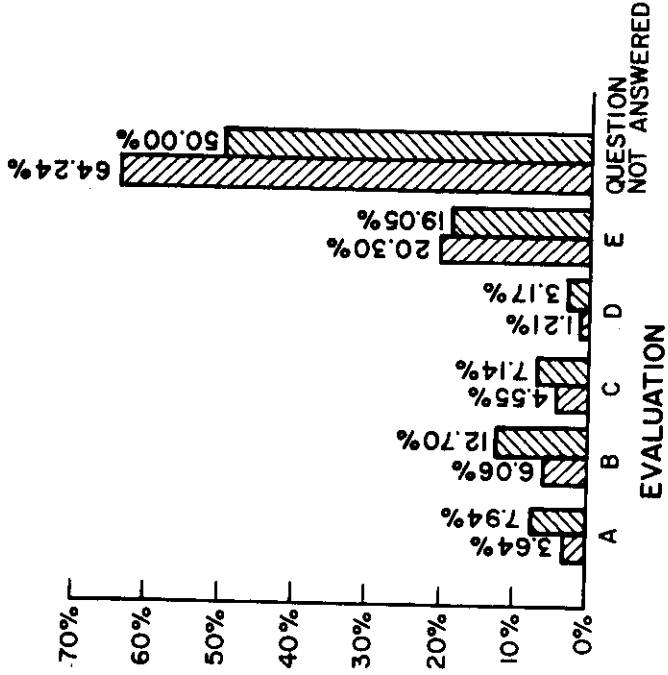
QUESTION 11. A SPECIALIZED INFORMATION SERVICE EXTERNAL TO THE ORGANIZATION

QUESTION 12. DOCUMENT CENTERS OR EXTERNAL LIBRARY RESEARCH SERVICES AVAILABLE TO THE ORGANIZATION

Figure 15(a)

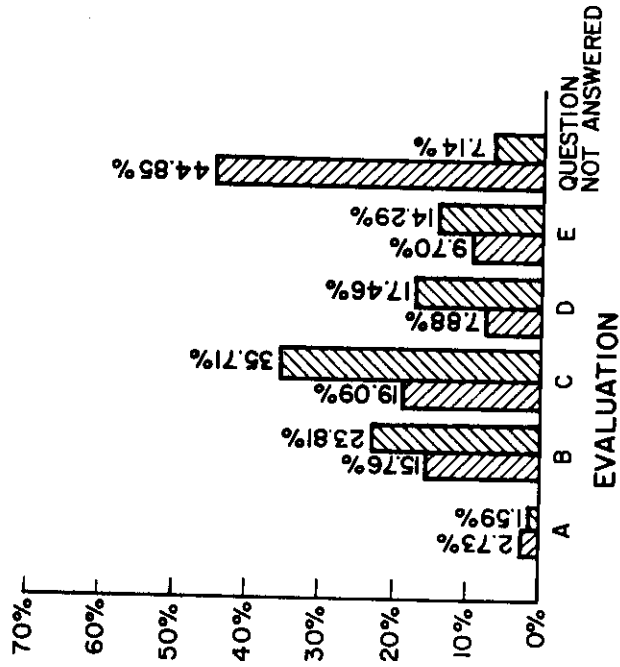
Figure 15(b)

 MAIL
 INTERVIEW



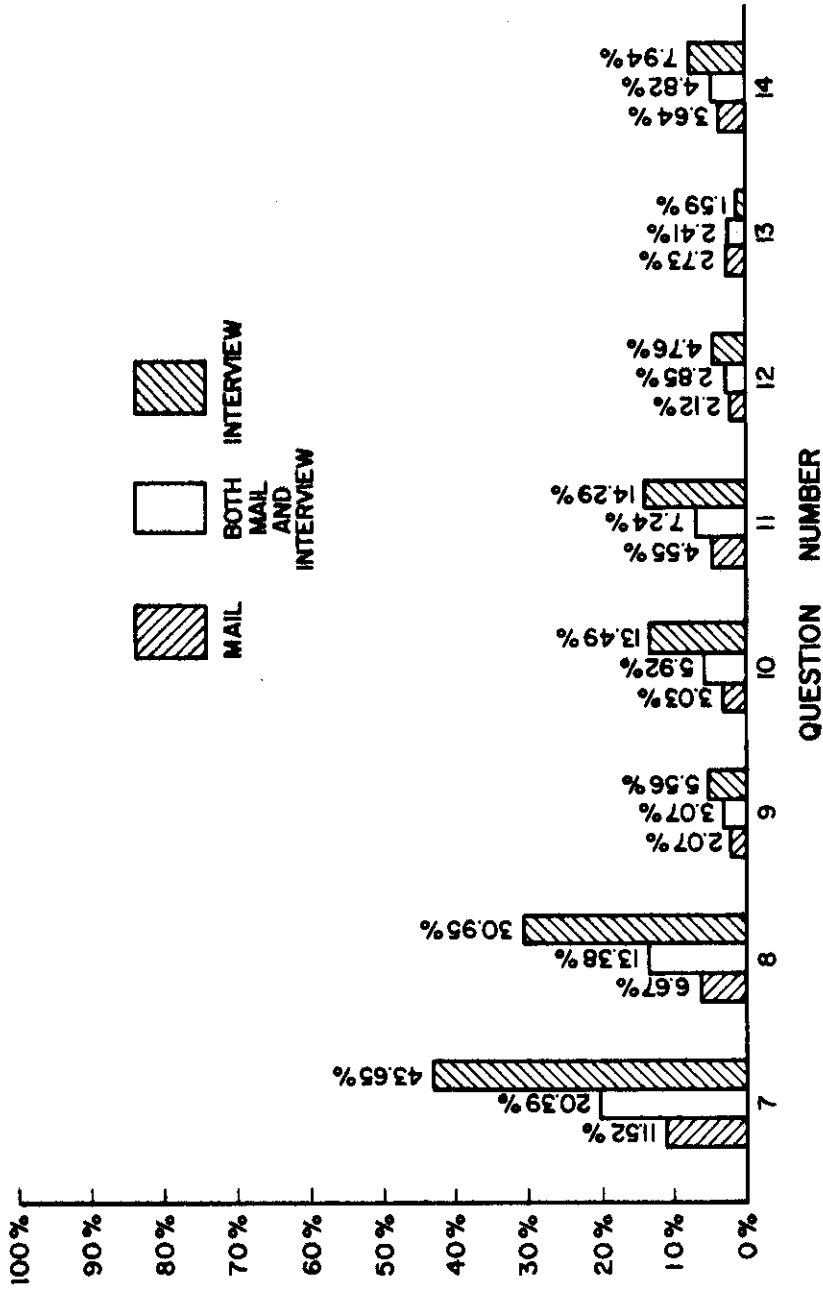
QUESTION 14. SIGNIFICANT SOURCES OF INFORMATION FOR THE ORGANIZATION OTHER THAN THOSE MENTIONED IN QUESTIONS 7-13

Figure 16(b)



QUESTION 13. INFORMATION SUPPLIED BY VENDORS, MANUFACTURERS, OR SUPPLIERS

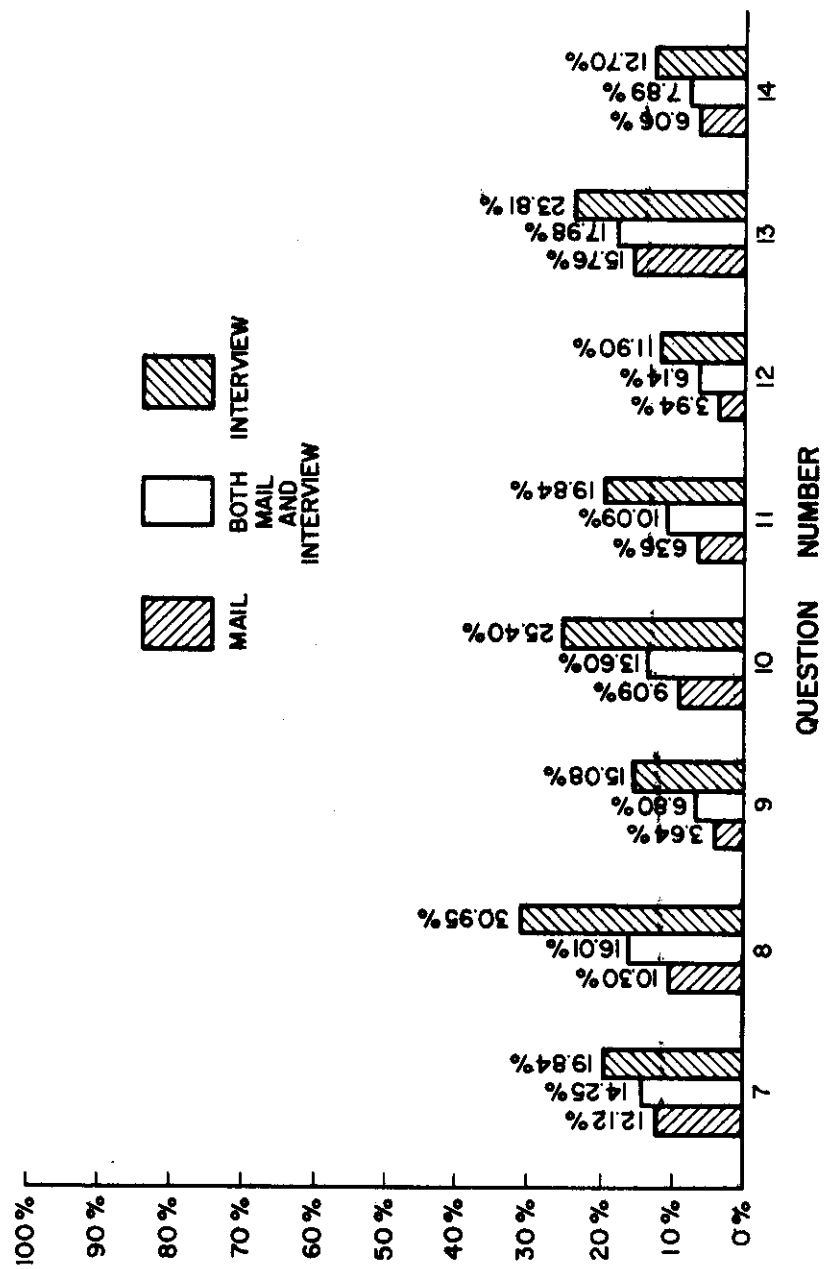
Figure 16(a)



RESPONSE 'A' - VERY SIGNIFICANT SOURCES OF INFORMATION (AVAILABLE AND ALMOST ALWAYS USED)

QUESTIONS 7 THROUGH 14

Figure 17



RESPONSE 'B' - SIGNIFICANT SOURCES OF INFORMATION (AVAILABLE AND USUALLY USED)

QUESTIONS 7 THROUGH 14

Figure 18

One of the questions in this group, number 11 asked to specify a specialized information service external to the organization, if available.

The complete listing of answers to these questions is given in Appendix II and the services and from the reports of federal agencies such as Corps of Engineers, Bureau of Reclamation OWRR, U.S.G.S., and S.C.S. to state agencies' reports and consulting engineers' services.

In answer to question 12 (Appendix II) the majority listed libraries at the Universities such as Texas A&M, University of Houston and Texas Technological University. Some use the inter-library loan services and the United Engineering Center Library in New York City.

In answer to question 14 in the mail Questionnaire (Appendix II) a number listed the AWWA Journal, Water Resources Research Institutes' publications, and proceedings of various short courses and conferences. It is interesting to note that in the personal interviews a great number of respondents quoted the Texas Water Report as one of the significant sources of information (35 out of 82 respondents).

Question 15.

This question was specifically asked to determine whether the organization interviewed had a library. The following table summarized the answers for different groups.

Group No.	Yes	No	Non-Respondents
1	37(88.1)*	5(11.9)	0(0.0)
2	17(77.4)	2(9.1)	3(13.6)
3	7(77.8)	2(22.2)	0(0.0)
4	9(90.0)	0(0.0)	1(10.0)
8	1(25.0)	1(25.0)	2(50.0)
9	3(50.0)	3(50.0)	0(0.0)
17	1(100.0)	0(0.0)	0(0.0)
18	11(84.6)	2(51.4)	0(0.0)
19	13(68.4)	6(31.6)	0(0.0)

Table X

*Numbers in parentheses represent percentages

Most of the organizations surveyed maintain a library as indicated in Table X. In many cases the individual questioned could not specify the number of separate identifiable documents that are received each year or the number of periodical titles. Consequently, the data received in question 15(a), (b) and (c) may be considered unreliable.

Question 16.

This question was worded to determine whether the organization receives regularly state and federal reports in their area of interest. Table XI summarized the answer to this question.

Group No.	Yes	No	Non-Respondents
1	41 (97.6)*	1(2.4)	0(0.0)
2	19(86.4)	1(4.6)	1(4.6)
3	8(88.9)	1(11.1)	1(11.1)
4	4(40.0)	5(50.0)	1(10.0)
8	2(50.0)	0(0.0)	2(50.0)
9	6(100.0)	0(0.0)	0(0.0)
17	1(100.0)	0(0.0)	0(0.0)
18	9(69.2)	4(30.8)	0(0.0)
19	8(42.1)	11(57.9)	0(0.0)

Table XI

*Numbers in parentheses represent percentages.

It is obvious that many organizations rely on state and federal reports for their source of information.

Question 17.

This question dealt with the newsletters which may be received by the organization.

Table XII summarizes the answers to this question.

Group No.	Yes	No	Non-Respondents
1	35(83.3)*	6(14.3)	1(2.4)
2	19(86.4)	1(4.6)	2(9.0)
3	9(100.0)	0(0.0)	0(0.0)
4	3(30.0)	6(60.0)	1(10.0)
8	2(50.0)	0(0.0)	2(50.0)

Table XII continued:

Group No.	Yes	No	Non-Respondents
9	6(100.0)	0(0.0)	0(0.0)
17	1(100.0)	0(0.0)	0(0.0)
18	9(69.2)	3(23.1)	0(0.0)
19	8(42.1)	6(31.6)	0(0.0)

Table XII

*Numbers in parentheses represent percentages.

It is again obvious that a great many organizations receive newsletters dealing with water resources.

The second part of this question was designed to determine whether the newsletters are a useful source of information. Apparently the majority thought so as evidenced by Table XIII.

Group No.	Yes	No	Non-Respondents
1	37(88.1)*	4(9.5)	1(2.4)
2	18(81.8)	1(4.6)	3(13.6)
3	9(100.0)	9(0.0)	0(0.0)
4	4(40.0)	2(20.0)	4(40.0)
8	2(50.0)	0(0.0)	2(50.0)
9	6(100.0)	0(0.0)	0(0.0)
17	1(100.0)	0(0.0)	0(0.0)
18	10(76.9)	1(7.7)	2(15.4)
19	13(68.4)	4(21.1)	2(10.5)

Table XIII

*Numbers in parentheses represent percentages.

Question 18.

This question was designed to determine the habits of persons receiving journals and other publications. As indicated in Table XIV most people read the articles of interest and file them for later references. However, based on personal interviews and seeing how busy some of the individuals are and knowing the human nature, it appears that the majority would like to do this, but they actually file the material received for future reference and frantically search for literature when a given problem arises.

Group No.	A	B	Non-Respondent
1	34(81.0)*	8(19.0)	0(0.0)
2	18(81.8)	2(9.1)	2(9.1)
3	8(88.9)	1(11.1)	0(0.0)
4	2(20.0)	6(60.0)	2(20.0)
8	2(50.0)	0(0.0)	2(50.0)
9	6(100.0)	0(0.0)	0(0.0)
17	1(100.0)	0(0.0)	0(0.0)
18	8(61.5)	5(38.5)	0(0.0)
19	13(68.4)	4(21.1)	2(10.5)

Table XIV

*Numbers in parentheses represent percentages

Question 19.

This question inquired as to the number of hours a person spends in current-awareness activities. The answers indicate that

the persons interviewed spend about 5.9 hours per week on the average in current awareness activities.

Question 20.

This question asked for a listing of any programs or special services to keep the personnel current in terms of recent published material.

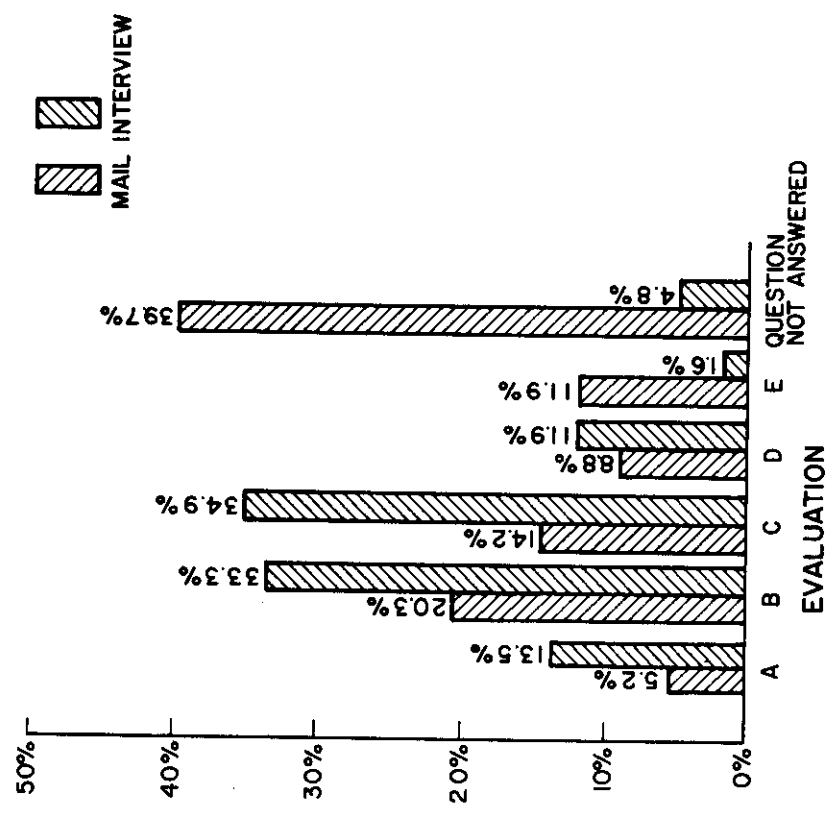
A listing of answers may be found in Appendix II ; the answers ranged from circulation of recent library acquisitions to organizing internal seminars, or sending personnel to outside seminars and conferences. (See Volume II)

Question 21 through 31.

These questions are concerned with the sources of water resources information (i.e. printed literature) utilized by the interviewees and their relative values. The suggested sources of information included trade journals, trade magazines, handbooks, reference books, project reports, newsletters, printed advertising, catalogues, abstract of citation bulletins, monographs and other.

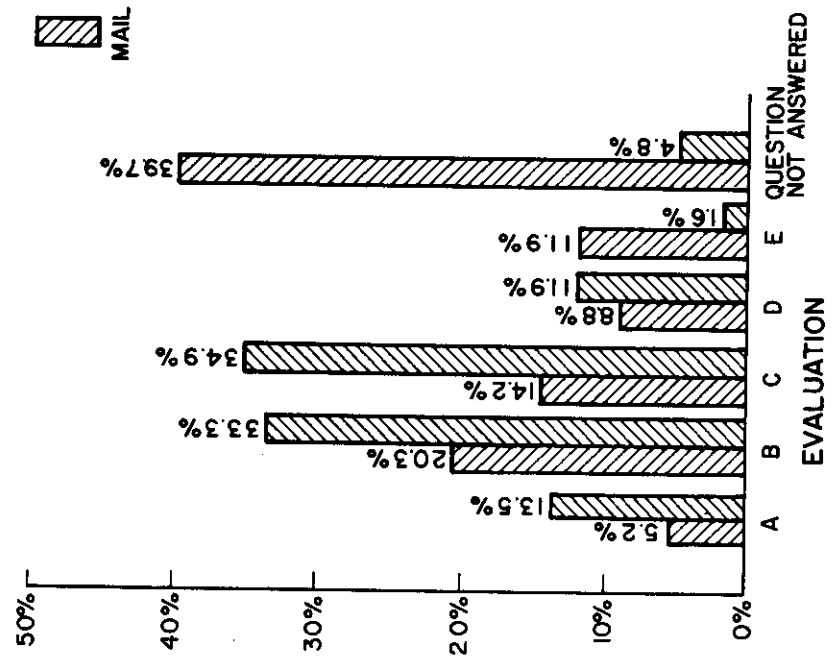
The majority of persons interviewed personally find the trade journals "a very useful source" of information while those interviewed by mail indicated the journals as "a useful source" of information (Figure 19a). The trade magazines are a "source of limited significance" to those interviewed personally and "a useful source" to the

mail interviewees (Figure 19b). Both handbooks and reference books were found to be "a very useful source" to personal interviewees but only "a useful source" to those interviewed by mail (Figure 20a and b). Those interviewed personally find the project reports "a useful source" while the mail interviewees only "a source of limited significance" (Figure 21a). The newsletters are "a source of limited significance" to the personal interviewees and "a useful source" and a source of limited significance to the mail interviewees (Figure 21b). Printed advertizing is "seldom, or never used" by the personal and mail interviewees (Figure 22a). Catalogues are "seldom or never used" by those interviewed personally and "a source of limited significance" by those who answered the mail questionnaire (Figure 22b). Abstracts or citation bulletins are "a useful source" to those interviewed personally. It should be pointed out that those interviewed in person were shown the Water Resources Abstracts and the Citation Bulletin, while many interviewed by mail were unaware of their existence. It is not surprising, therefore, that a large percentage (42.7%) of those interviewed by mail chose not to answer the question and 22% answered "non applicable" (Figure 23a). Monographs are "seldom or never used" by those interviewed in person and the majority of those interviewed by mail marked "non applicable" as their answer. It is possible that many of those interviewed by mail were not aware what was meant by "monographs" as the source of information (Figure 23b).



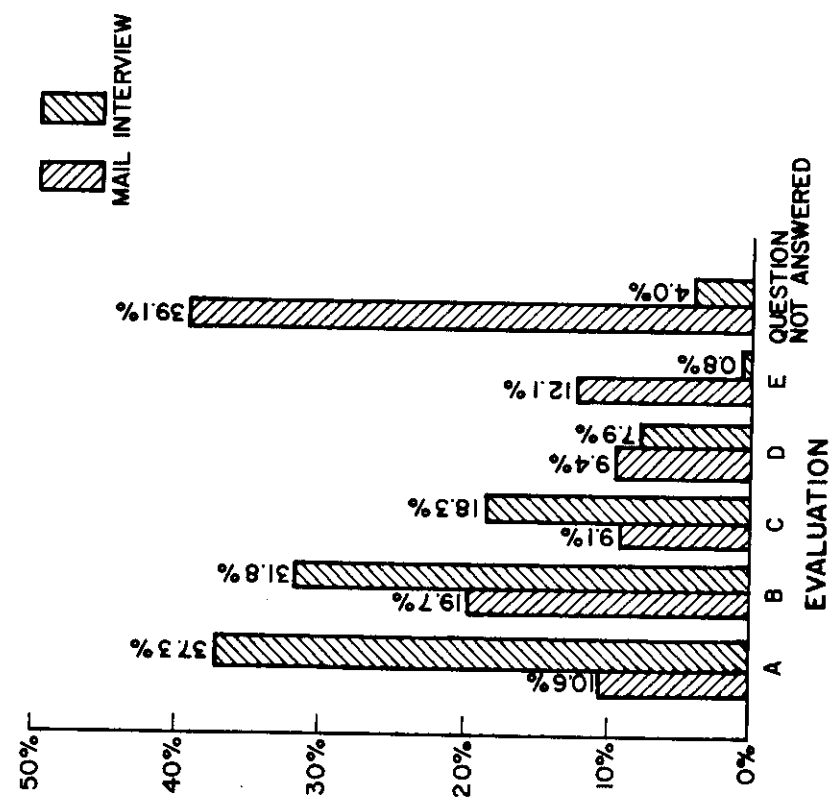
QUESTION 21. TRADE JOURNALS

Figure 19 (a)



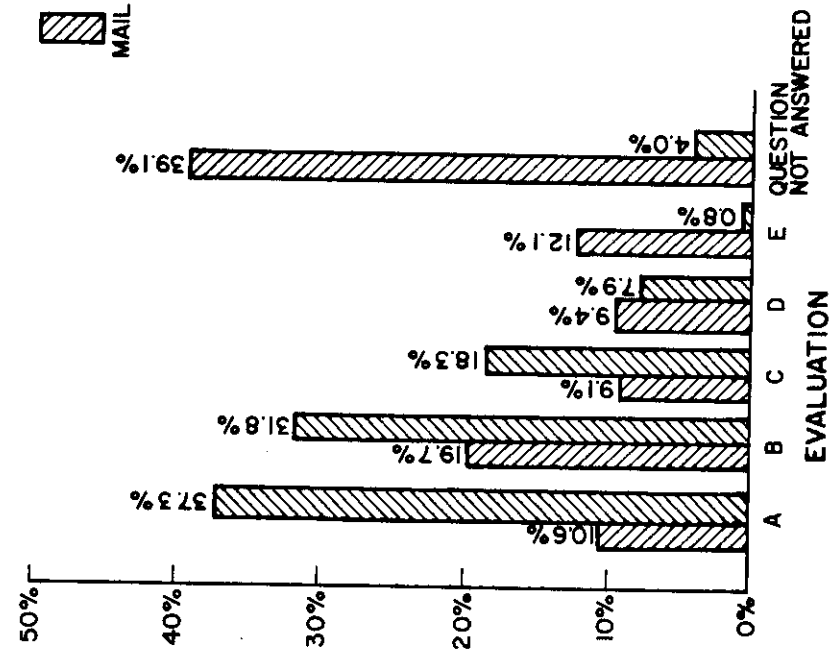
QUESTION 22. TRADE MAGAZINES

Figure 19 (b)



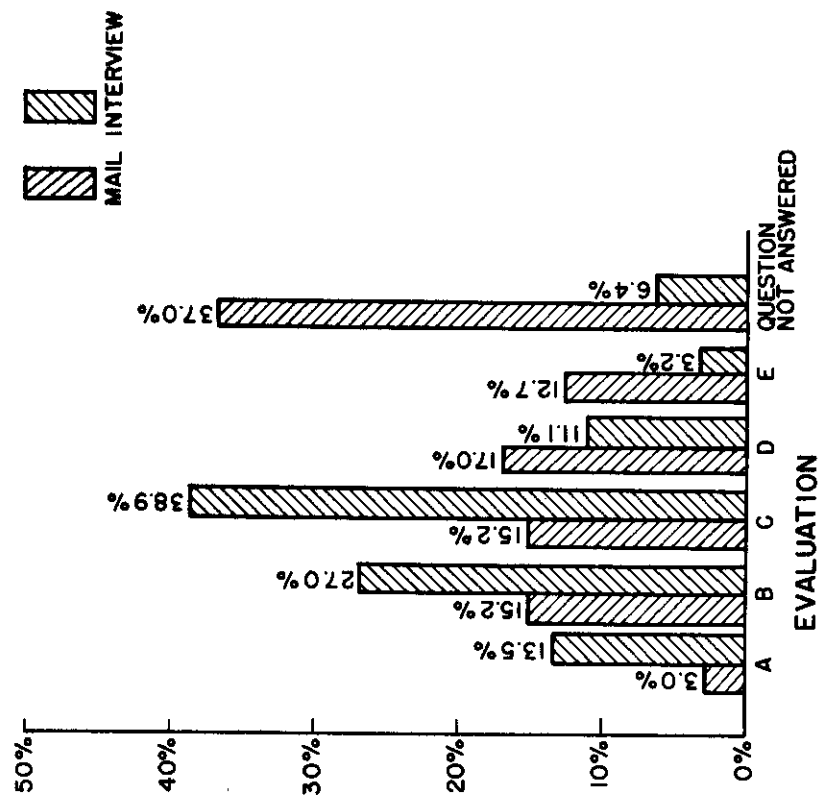
QUESTION 23. HANDBOOKS

Figure 20 (a)



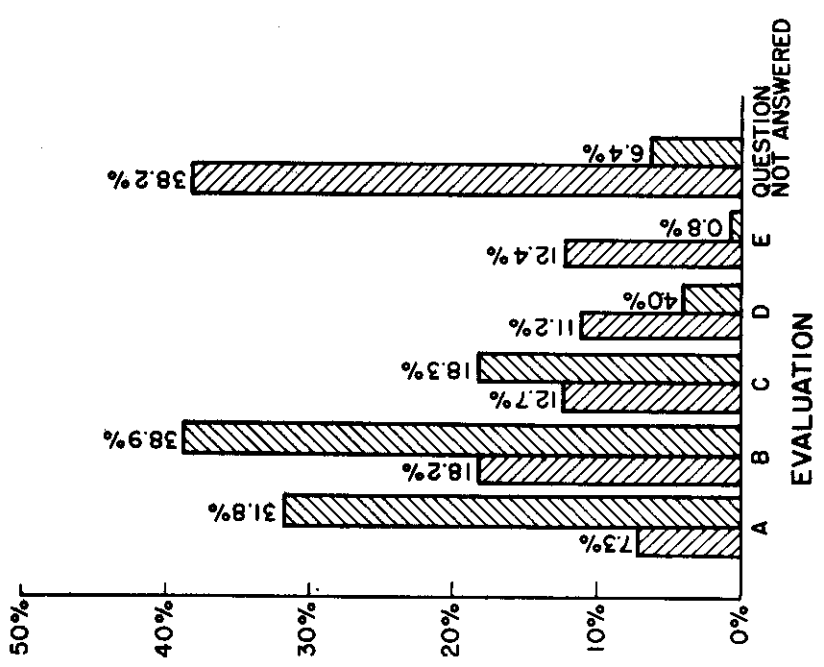
QUESTION 24. REFERENCE BOOKS

Figure 20 (b)



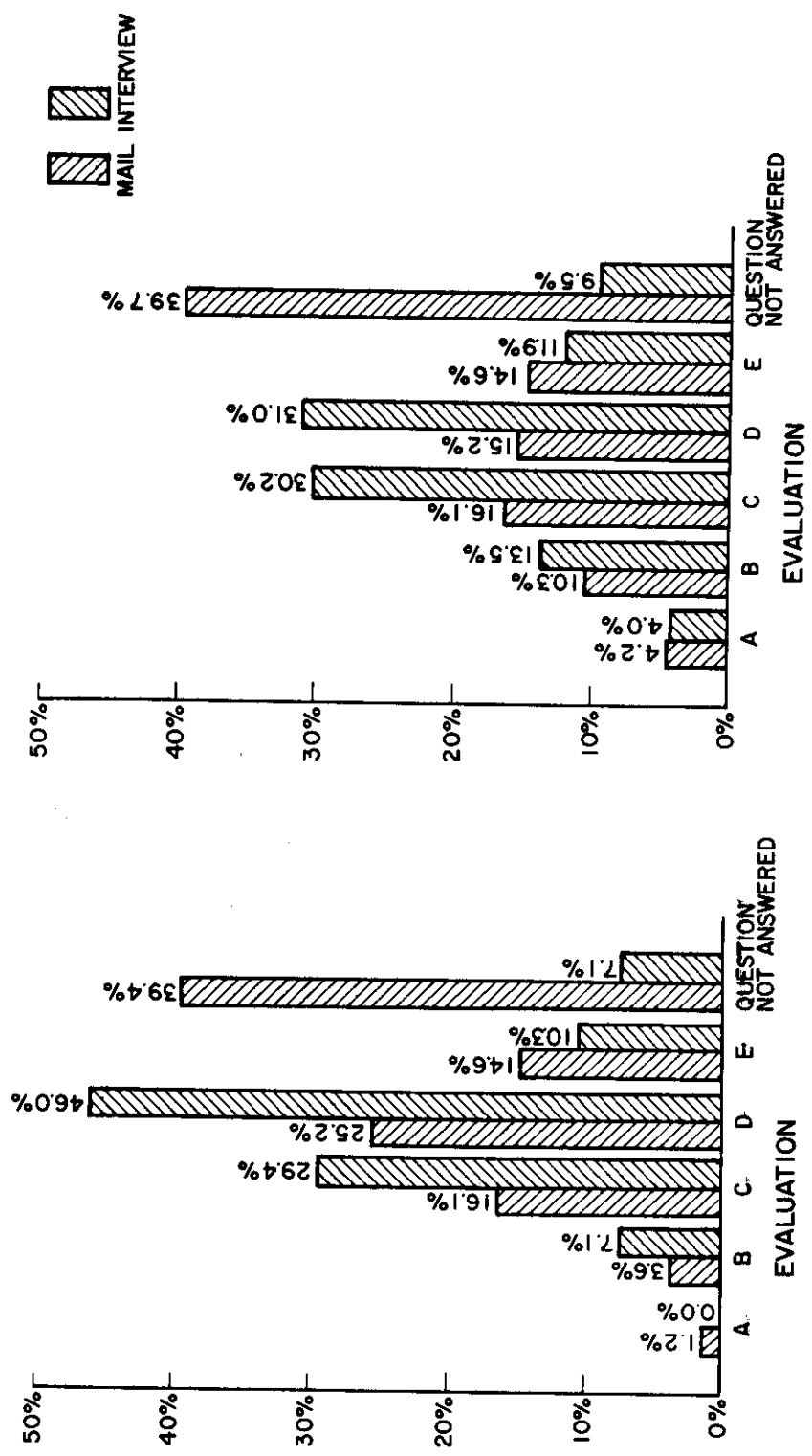
QUESTION 26. NEWSLETTERS

Figure 21 (b)



QUESTION 25. PROJECT REPORTS

Figure 21 (a)

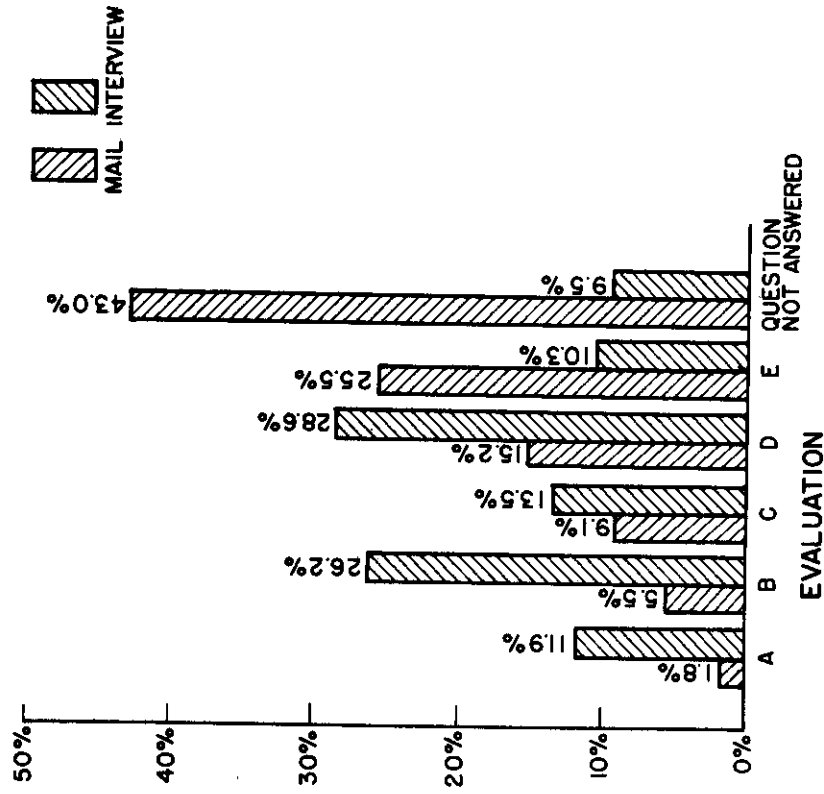


QUESTION 27. PRINTED ADVERTISING

QUESTION 28. CATALOGUES

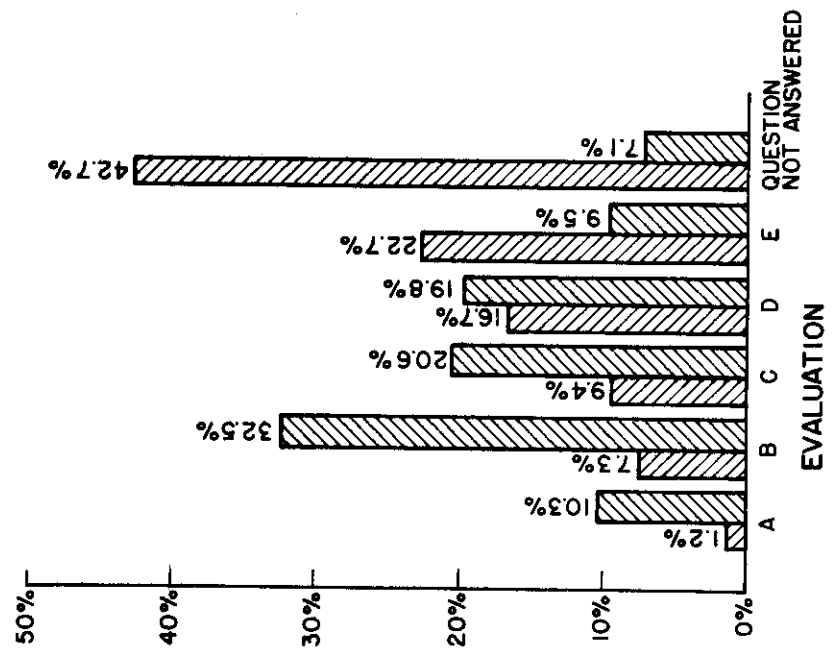
Figure 22 (a)

Figure 22 (b)



QUESTION 30. MONOGRAPHS

Figure 23 (b)



QUESTION 29. ABSTRACT OR CITATION BULLETINS

Figure 23 (a)

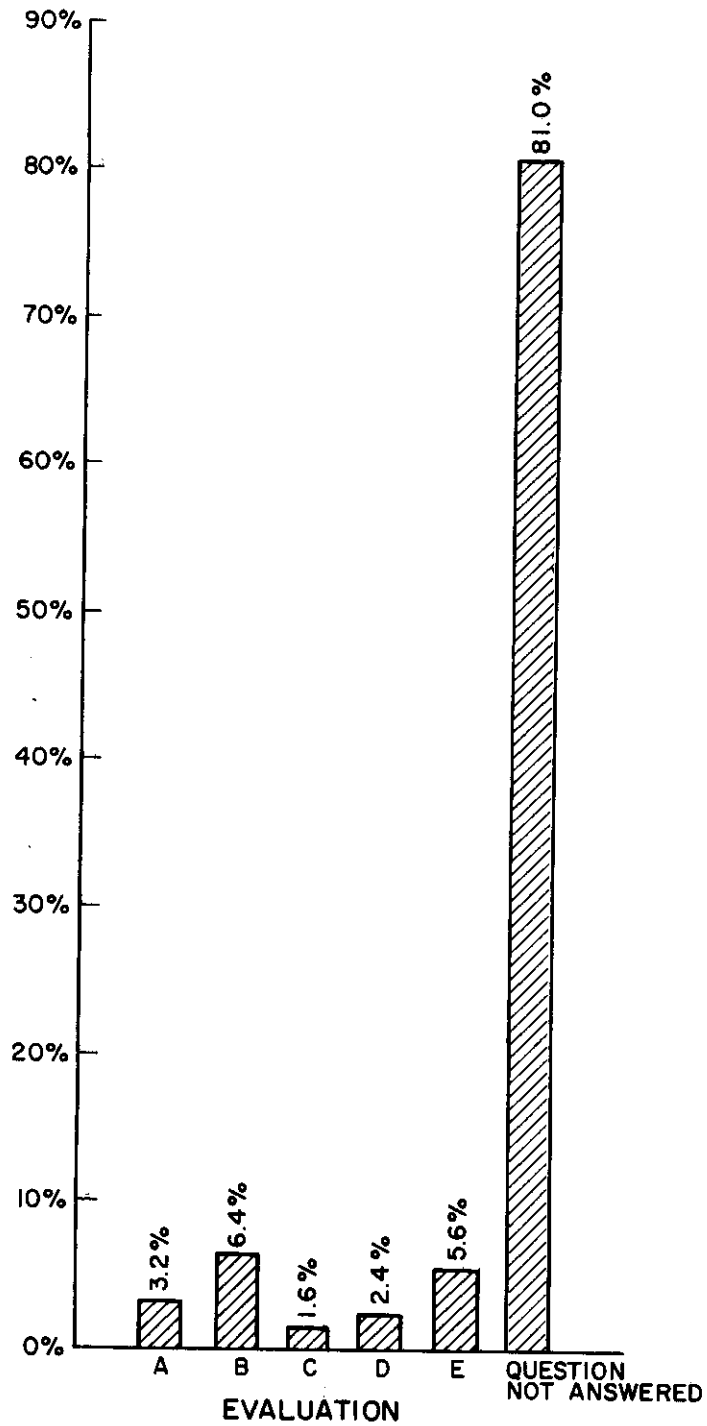
Question 31 referred to other "source" of information, and asked for specifying the source. The response to this question was disappointing, only 24 answered in both the mail Questionnaire and personal interview answer sheet and there were 102 non-respondents (Figure 24).

Question 32.

In this question the respondents were asked to list the titles of five of the most useful sources of information to their organization. The response to both the mail Questionnaire (Question 25) and the personal interview (Question 32) was very good. There were numerous publications of interest to the organizations surveyed. A large number of these were federal or state publications of interest to the organizations surveyed. A large number of these were federal or state publications. A complete listing is given in Appendix II. (See Volume II)

Question 33.

An effort was made to determine whether the organization publishes any information which would be worthwhile and available for addition to WRSIC's data base. The response to this question was quite good and appears that many of the organizations publish project reports which may be of interest to WRSIC. A listing of answers is presented in Volume II.



QUESTION 31. OTHER SIGNIFICANT SOURCES OF INFORMATION IN PRINTED LITERATURE (INTERVIEW QUESTIONNAIRES ONLY)

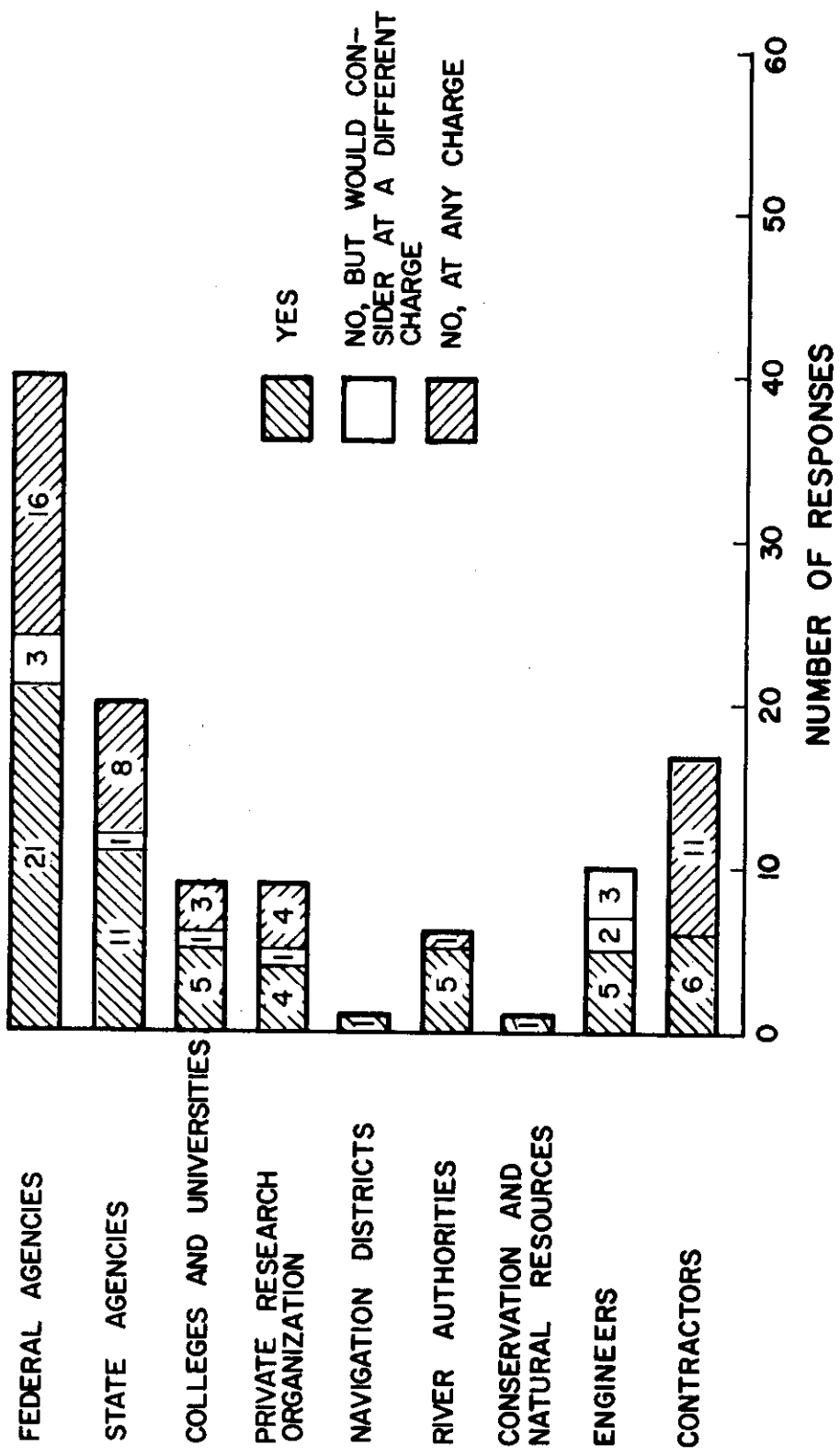
Figure 24

(c) Part III. Information Services. Two types of information services which may be offered by WRSIC include "current awareness" and "retrospective search" procedures. The "current awareness" services are designed to make the user aware of the existence of current literature which is available in his field. The possible services include the Citation Journal, Abstract Bulletin and the Selective Dissemination of Information (SDI). The "Retrospective Search" services include the Abstract Bulletin and Machine Search.

This question specifically asked whether the interviewee would subscribe to a Citation Journal at a cost of \$15-20 per subscription. The majority of the respondents (59) answered yes and the minority (44) would not subscribe at any charge. Eight of the respondents would consider subscribing at a lower charge (Figure 25). The comments of those who would not subscribe at any charge are given in Appendix II. (See Volume II)

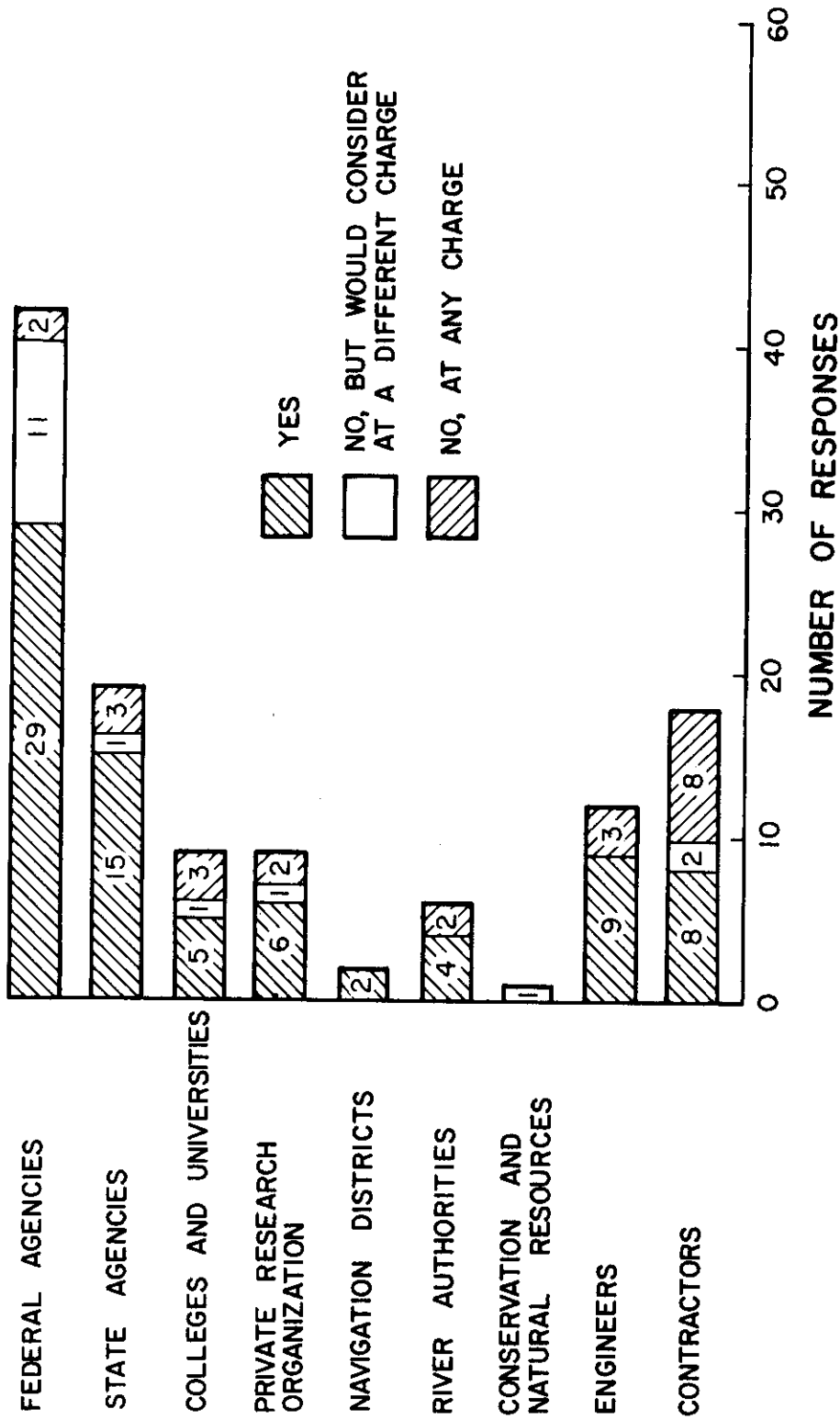
Question 35.

An answer was sought whether the respondent would subscribe to an Abstract Bulletin at a cost of \$30 to \$40 per subscription. The majority of respondents (77) answered affirmatively, seventeen answered negatively but would consider at a different charge and 22 respondents would not subscribe at any charge (Figure 26). The comments of those who would not subscribe at any charge are given in Appendix II. (See Volume II)



QUESTION 34. A) WOULD YOU SUBSCRIBE TO A CITATION JOURNAL AT A COST OF \$ 15 TO \$ 20 PER SUBSCRIPTION ?

Figure 25



QUESTION 35. A) WOULD YOU SUBSCRIBE TO AN ABSTRACT BULLETIN AT A COST OF \$30 TO \$40 PER SUBSCRIPTION ?

Figure 26

Question 36.

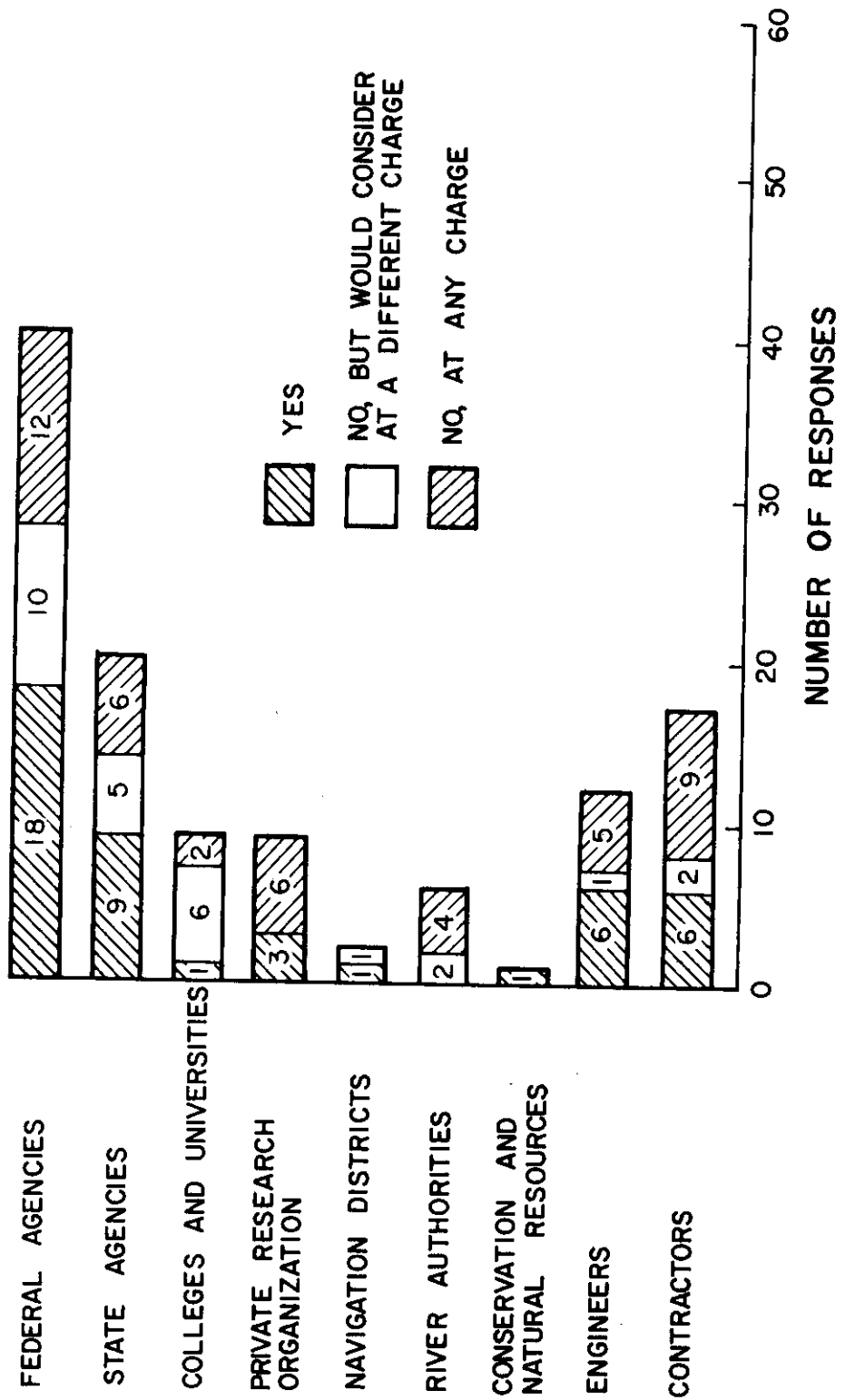
This question asked whether the respondent would subscribe to an SDI Service using a Standard Interest Profile, if the subscription cost was \$80 to \$100 per year. Forty-three respondents would not subscribe to this service at any charge and the additional twenty-seven would consider the service at a lower charge. Forty-four respondents would subscribe to the SDI Service at the cost indicated (Figure 27). The comments of those who would not subscribe at any charge are given in Appendix II. (See Volume II)

Question 37.

This question was designed to determine whether the respondent would subscribe to a SDI Service using an Individual Interest Profile at a cost of \$250-\$300 per year. The majority (63) would not subscribe to SDI service, additional twenty-five would consider the service at a lower cost and twenty-two would subscribe to the SDI service at the cost indicated (Figure 28). The comments of those who would not subscribe at any cost are given in Appendix II. (See Volume II)

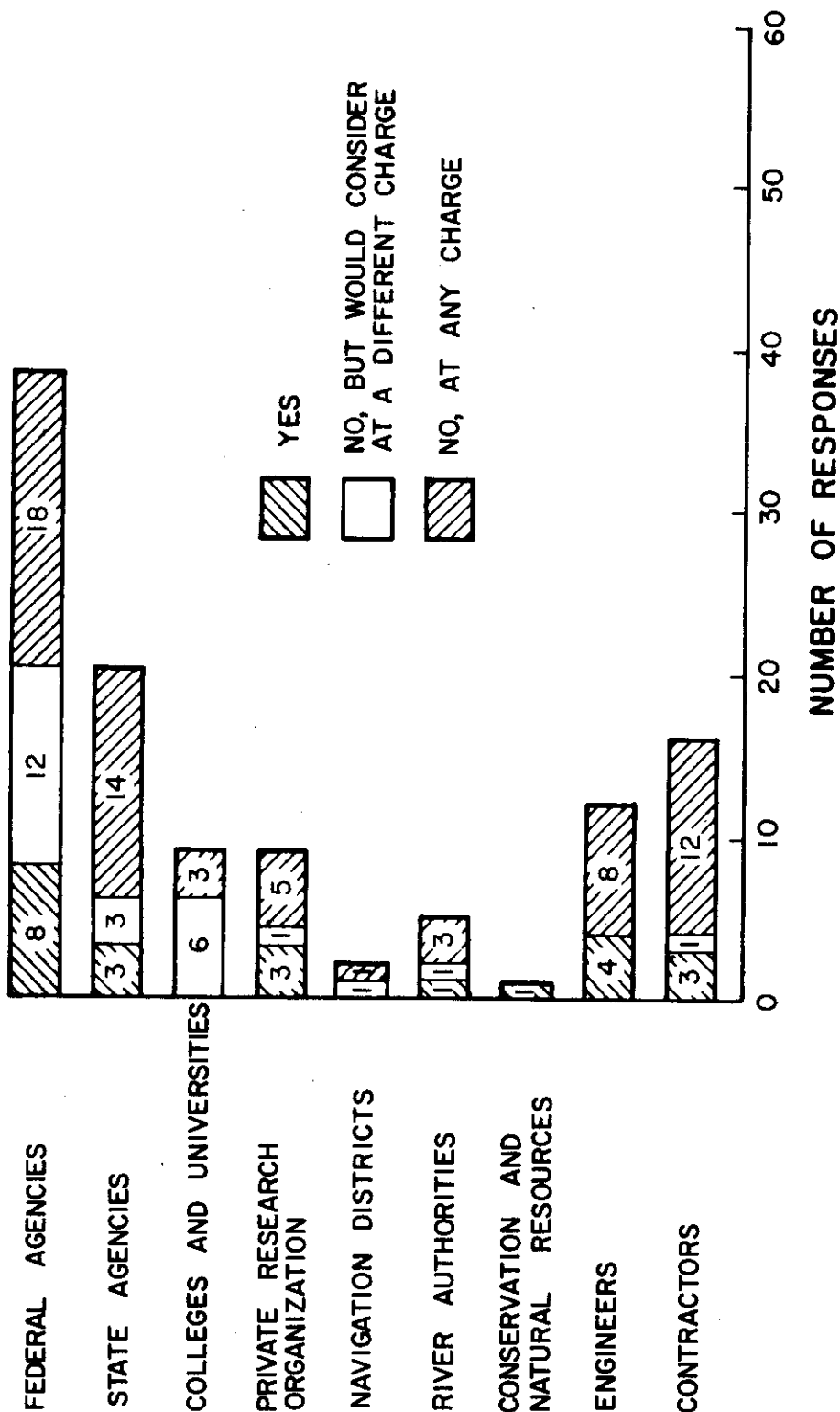
Question 38.

A query was made whether the interviewees would use the Retrospective Machine Search Service with an Individual Interest Profile at a cost of \$100-\$125 per request. The majority (44) would not use this service, but consider it at a lower cost. Twelve respondents would not use it at any charge and twenty-five answered



QUESTION 36. A) WOULD YOU SUBSCRIBE TO AN SDI SERVICE USING A STANDARD INTEREST PROFILE AT A COST OF \$ 80 TO \$ 100 PER SUBSCRIPTION ?

Figure 27



QUESTION 37. A) WOULD YOU SUBSCRIBE TO AN SDI SERVICE USING AN INDIVIDUAL INTEREST PROFILE AT A COST OF \$ 250 TO \$ 300 PER SUBSCRIPTION ?

Figure 28

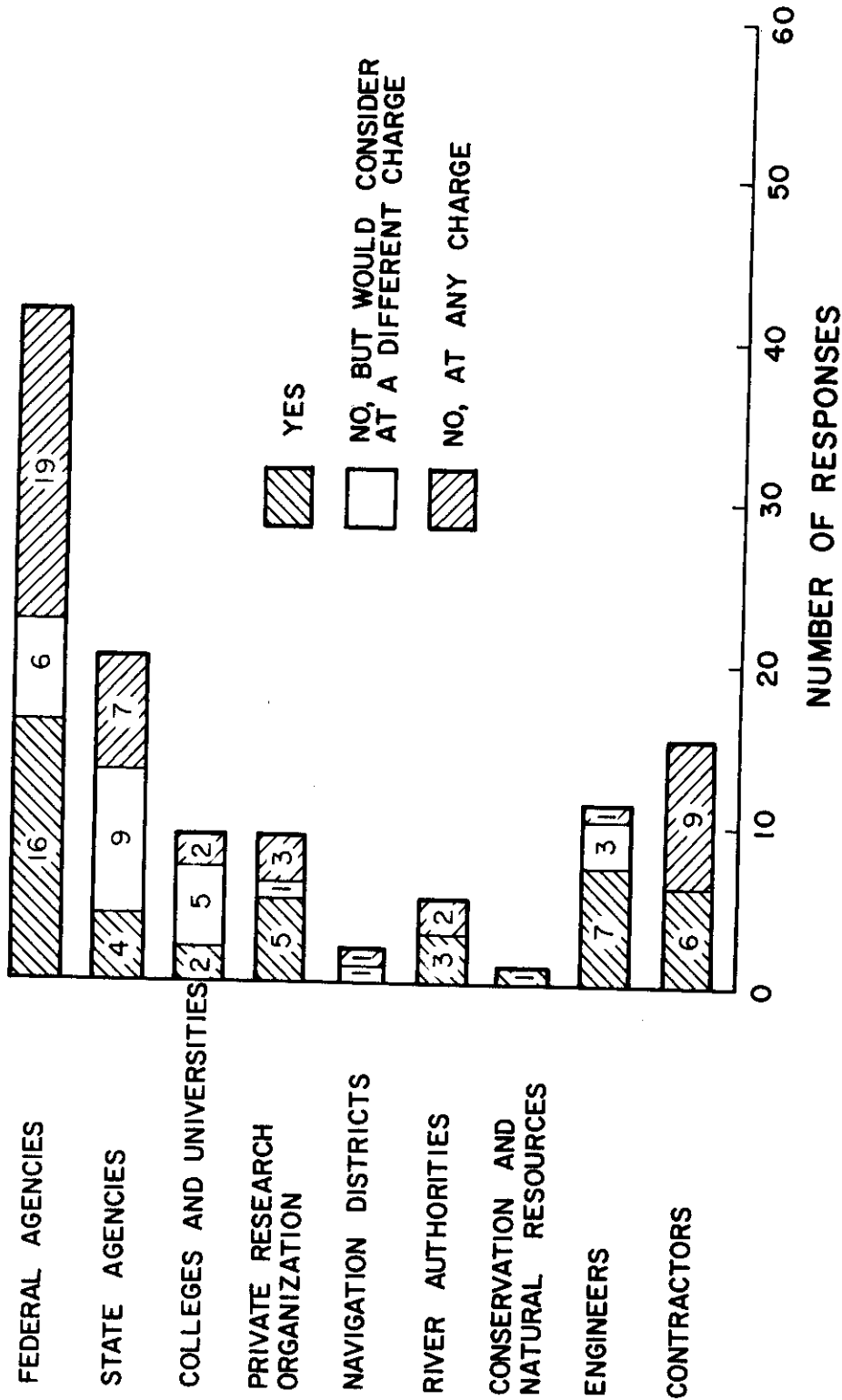
affirmatively (Figure 29). Those who were interested in this service thought that they would probably make about 2.3 requests per year and that the total number of requests from their organization would be 8.0 per year.

Question 39.

This question dealt with service preferences. The first part asked for preference if only one service were available. The majority (55) preferred the Abstract Services followed by the SDI Services, Retrospective Machine Search and the Citation Journal (Figure 30). The second part of the question asked for preference if only two services were available. The majority preferred the Abstract Services (77) followed by SDI Services (61). The last part of the question inquired about the preferences if only three services were available. Most of the respondents preferred the Abstract Services (97), followed by SDI Services (82) and the Retrospective Machine Search (63).

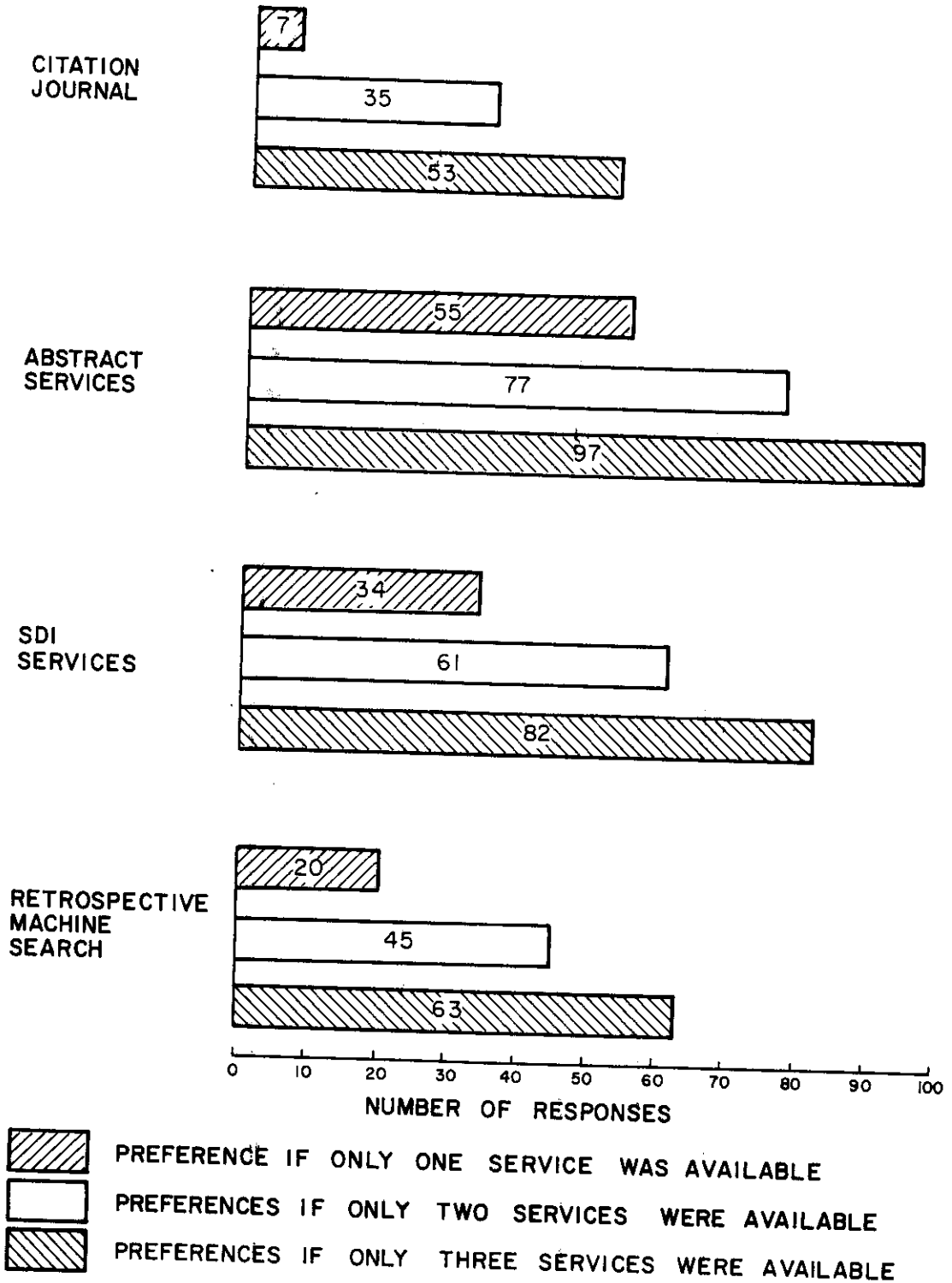
Question 40.

Since time is an important factor in the use of information services, two questions were asked about the most desirable and the most acceptable time period between request and receipt of the results for the retrospective search service. It appears that the most desirable time period is one week (or less) and that the maximum acceptable period is two weeks, or less. It should be noted



QUESTION 38. A) WOULD YOU USE A RETROSPECTIVE MACHINE SEARCH SERVICE AT A COST OF \$100 TO \$125 PER REQUEST?

Figure 29



QUESTION 39. SERVICE PREFERENCES

Figure 30

however, that a large number of respondents (36 out of 100) gave the maximum acceptable period as 1 month, or less (Figure 31).

Question 41.

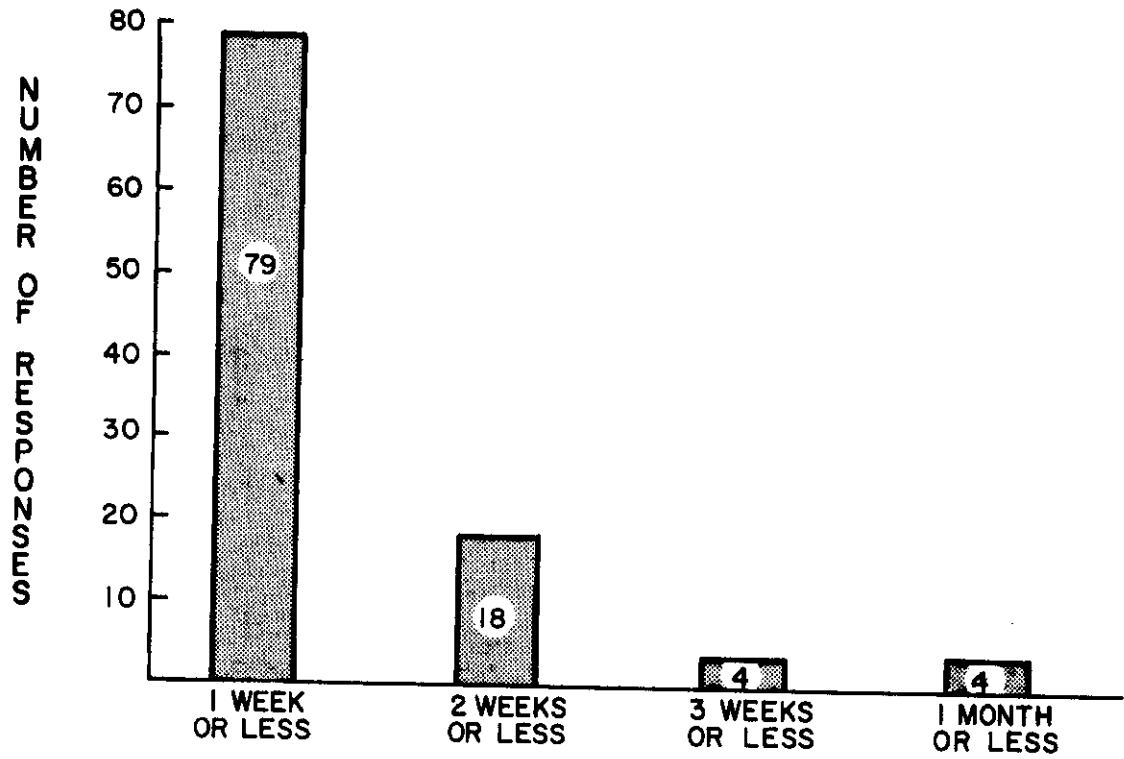
This question was more general than the previous one as it dealt with any type of information services. The most desirable time period was again one week (or less) but about half as many of the respondents would be satisfied with a two week (or less) time period. The maximum acceptable time period was almost equally divided between two weeks, or less, three weeks, or less, or one month, or less. (See Figure 32)

Question 42.

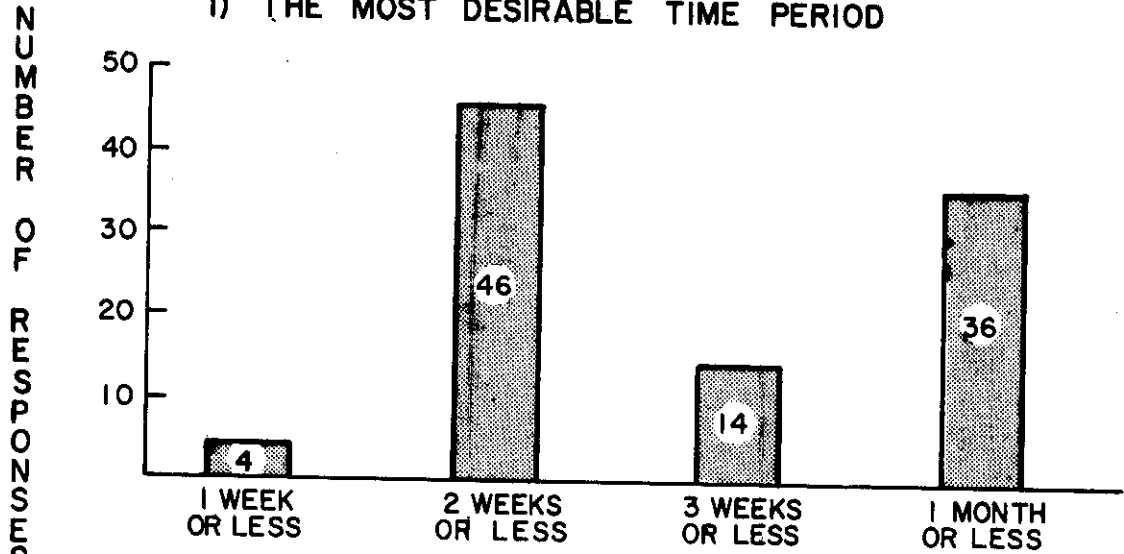
This question was expected to give some idea of the number of microform readers in possession of the respondents. It appears that only 29.3 percent have some form of the microform readers and 64.2 percent do not (6.5% did not respond to this question). The majority of those who answered affirmatively have the microfilm readers. A listing of microform equipment available is given in Appendix II. (See Volume II)

Question 43.

This question was designed to determine whether the potential users of information services would request the microform copies or hard-copies of material. 48.5 percent of the respondents said they would request a microform copy and 42.0 percent answered



1) THE MOST DESIRABLE TIME PERIOD



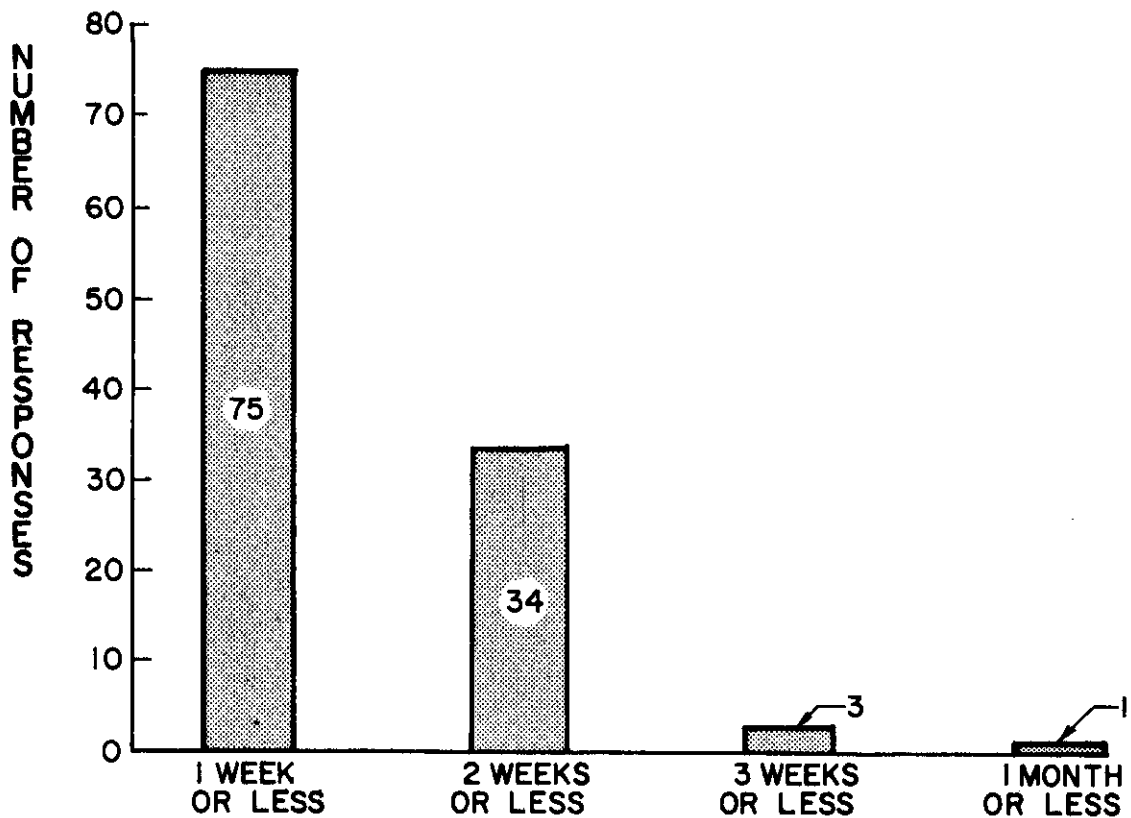
2) THE MAXIMUM ACCEPTABLE TIME PERIOD

QUESTION 40. TIME PERIOD BETWEEN REQUEST AND RECEIPT OF THE RESULTS FOR A RETROSPECTIVE SEARCH SERVICE.

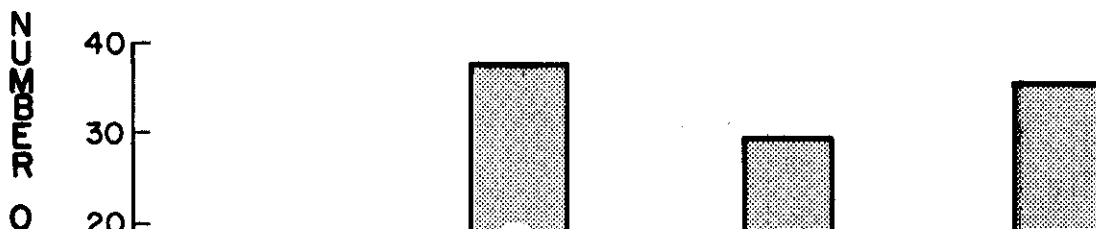
Figure 31

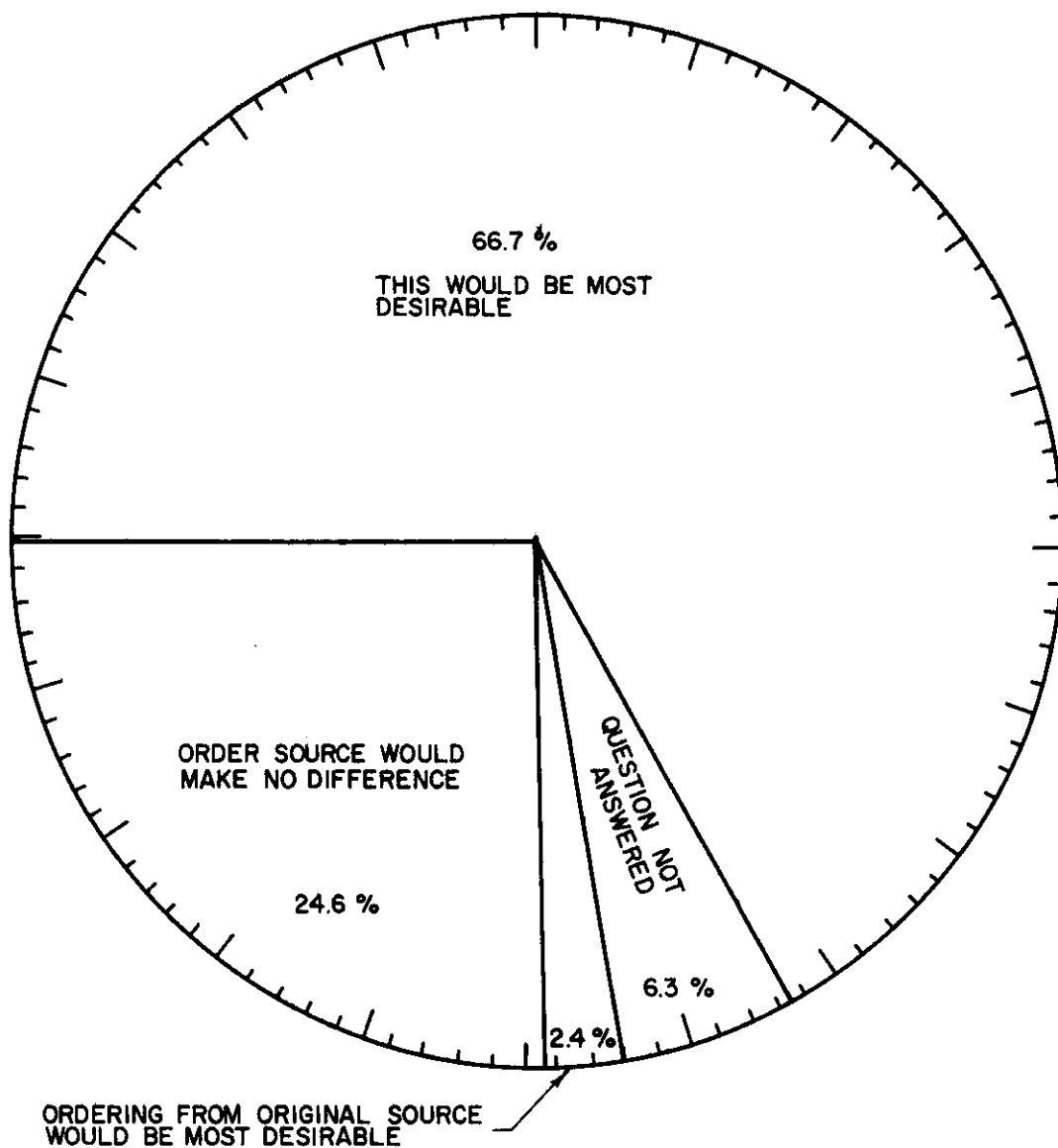
negatively (9.5 percent did not answer). The majority of those who replied negatively gave the inconvenience and lack of funds to purchase microform readers as the main reason for need of hard-copies of material. Listing of all comments is presented in Appendix II. (See Volume II)

Question 44



1) MOST DESIRABLE TIME PERIOD





QUESTION 44. A CENTRAL FACILITY FOR THE ACQUISITION OF COPIES OF PRINTED MATERIAL

Figure 33

ly. 3.2 percent answered negatively and 8.7 percent did not answer (Figure 34).

Question 46.

This question asked for a brief statement as to some function(s) the Center may perform or service(s) it might provide which would be of significant value to the respondent and to his organization. The answers are given below:

No need to comment at this time.

Would need to become more familiar with services planned and how they may be used by us.

Other than those already discussed, I can think of none other at this time.

Area economic studies, needs water impact studies, water recreation studies, effect that new supplies of water could have on the growth of an area, impact of water transportation on an area.

Distribute published materials of Congress on request or include in abstract.

Those mentioned in this Questionnaire would all be useful.

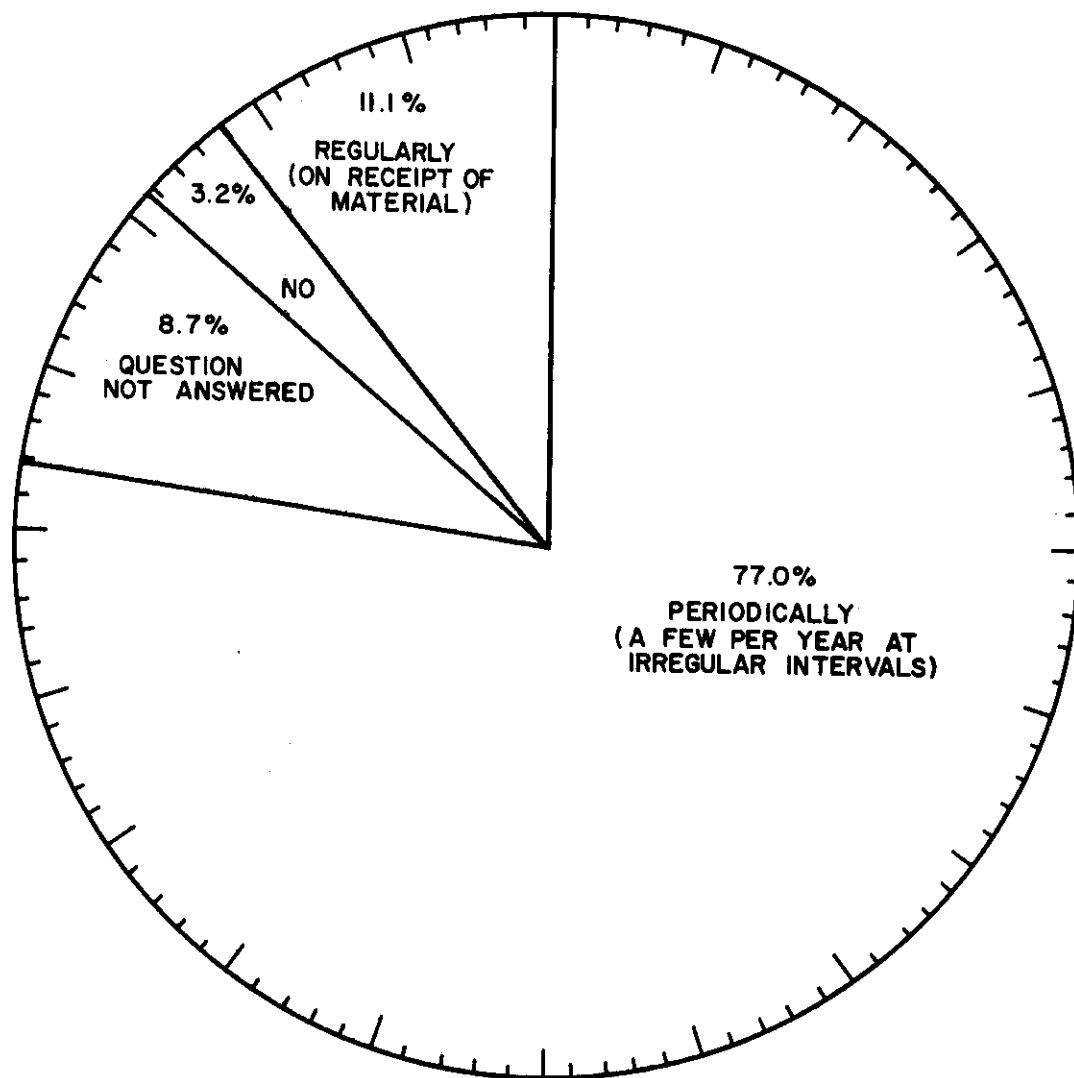
No comments other than previously discussed.

Review profiles periodically.

Making copies of abstracted material available upon request.

Better matching of user interest to material available.

Periodic re-evaluation of profiles.



QUESTION 45. WILLINGNESS TO COMPLETE AND RETURN SHORT EVALUATION FORMS

Figure 34

It would disseminate superfluous data and would give the needed information as required by any dateline.

A consolidation of available literature into one library (source) would greatly help by reducing time in reviewing the various texts and by knowing that all of the information was available at one place.

Inventory of professional people considered outstanding in their fields.

Inventory of professional services-individuals and companies.

Inventory of professional services.

Data items probably would be obtained from USGS Office of Water Data.

Coordination if not already published.

Would be a time saver.

We are an action agency thus do not do a great deal of research. Usually technical studies are used in analysis of basic data rather than interpretative reports. The use would be limited.

Basic economic hydrology, construction costs data.

Source of reference material to consult when developing research outlines and when preparing manuscripts reporting research data.

Acquisition of foreign articles and copies of limited distribution material.

It would be useful in reviewing literature when a research project is begun.

The Citation Journal would provide information of general interest. If abstracts of only those articles could be obtained, the best service would be to obtain a microfilm of the original.

It would enable scientists to do a better job of literature review before initiating research projects.

Publish monographs

Make sure its indexing system is compatible with other leading libraries so that materials need go to the organization library without need for indexing changes, etc.

Furnish abstracts of current work in specialized areas.

Reflection of availability of material published in the less formal fashions.

Previous questions adequately cover the area.

Provide a complete annual catalog of all theses and dissertations.

Provide some adaptation of extension service which would be directed to making known to potential users types of services available, and making known to Center types of services desired.

Consulting service for information retrieval. Assistance for arranging for publication.

Abstracts of articles published in a foreign language.

Provide for the exchange of policy information and technical information between state water quality control agencies.

Unpublished manuscripts.

Unpublished manuscripts.

In view of the nature of our programs, it appears that these services would not be of great value to us. Abstracts may be of some value however.

Would be of value in a specific field of interest and need for information.

Prompt evaluation of material concerning common interest areas. Material made available concerning areas not previously considered.

Previously mentioned information services. Put on mailing list.

- 1) Literature reviews for research proposals.
- 2) Relating interdisciplinary efforts.
- 3) Increase interest on part of student.

The services suggested are splendid. However, the proposed costs are beyond the reach of individuals.

Provide timely reporting of research activities in water resources.

Provision of permuted titles, abstracts and copies of documents as requested.

The services listed on p. 10 would serve some useful purpose.

Provide availability list of sources of information of individual interests and needs in research, dissertations, reports, etc.

Perform a retrospective search in one specific area (i.e. unsaturated flow in soils) and provide microfiche copies of all complete articles in the area with author and title reference. Include relevant dissertations and university reports in Abstract Journal.

Periodic newsletter on major breakthroughs.

Better coverage of thesis and progress reports of state-federal organizations.

Review of progress in specific field of interest.

- 1) A weekly or bi-weekly popular newsletter of the latest major accomplishments in water resources research.
- 2) Include abstracts.

Some way to provide information immediately i.e. as an operation, provide immediate (1 day) answer to specific questions with suggested sources of prior information.

Assist this Port Authority in its continuing efforts to promote the development, improvement, maintenance and non-pollution of Port District Waterways.

Our interest is in what affects Texas generally and the Brazos Basin specifically; services similar to these proposed but aimed at the Texas region would be very helpful.

Grouping of abstracts by governmental agencies such as FWPCA, other water districts, etc. Purpose: to provide management alternatives based on experiences of similar agencies.

Provide legislative information on the federal level.

Provide Abstract Bulletins on regular basis for selected areas of interest.

Provide a ready fast source of material on a particular subject.

Make a central library available for local users.

Screen the universal volumes of paper for duplication.

See previous answers.

See previous answers.

Availability of sources, design criteria, and construction techniques.

Information on sources of water in a given area for residential, commercial, industrial uses.

This would require further consideration and knowledge of the services to be provided.

Supply information on specific subject that is limited only to information desired.

Listing of construction projects related to water resources in planning stages. Information on ground and surface water availability on an area (county or group of counties) basis.

Utilized properly, the center should be able to dispense information which even though available, is extremely hard to obtain within a reasonable length of time.

Maintain data on rainfall data, runoff, stream flow flood data, ground water, well depths, laws by areas - de-watering techniques, etc.

Ground water information, flow information, flood information, rainfall, wind, etc.

Potential production of aquifers in specific localities.

Stream flow and frequency curves for specific area. Water quality, ground and surface water in specific localities.

(d) Part IV. Establishing User Profiles. An interest profile may be determined by providing up to 20 descriptor terms which describe a user's interest area. Most of the persons interviewed were asked to complete the interest profile worksheet. However, because of lack of time, or unwillingness of the interviewees to look up the descriptor terms from the Water Resources Thesaurus, the response to this question was poor. Sample interest profile worksheet is included in Appendix II. (See Volume II)

F. RESULTS OF ANALYSIS

1. General Comments

In general, both the mail and personal interview Questionnaires achieved the planned objective. Those responding to the mail questionnaire did not have the benefit of looking at a sample Abstract Bulletin or the Citation Journal. In many cases the spaces for answers were left blank and it appeared that the interviewees were unaware or unfamiliar with WRSIC Services. The mail Questionnaire reached a much greater population than that possibly by the personal interviews and in general may be considered quite reliable. Question 28, regarding the interest profile, was in many cases misunderstood as the respondents tried to select specific topics from a sample list of hydrologic cycle terms rather than from their own specialty.

The Personal Interview guide was rather long and a number of persons answering questions tried to rush through it or felt that the interviewer was taking quite a lot of their time. For this reason the attempt to establish user profiles was largely unsuccessful.

In all other aspects both the mail Questionnaire and the Personal Interview guide were found to be well designed and provided meaningful answers.

Numbers on Mail Questionnaire	Equivalent numbers on the Personal Interview Guide
-------------------------------	--

1	1
2	2
3	3
4	4
5	5
6	6
7-14	7-14
15	21
16	22
17	23
18	24
19	25
20	26
21	27
22	28
23	29
24	30
25	32
26	33
27	46
28	Part IV
29	Part V

Table XV Equivalent Questions in
Mail Questionnaire and Personal Interview Guide

2. Comparison of Mail Questionnaire results with personal interview results

All of the mail Questionnaire questions were used in the Personal Interview guide. For comparison purposes the question numbers are summarized in Table XV.

A review of answers from the mail Questionnaire and from the Personal Interview guide reveals that responses were in general similar.

In comparing the answers obtained from the mail Questionnaire and by personal interviews one should first compare the distribution of duties of respondents:

<u>Duties</u>	<u>Mail</u>	<u>Interview</u>
Administrative Management	36.8%	7.5%
Technical Management	6.9%	10.6%
Both administrative and technical management	31.6%	27.8%
Scientific and engineering	7.2%	24.4%
Technical evaluation	4.3%	19.1%
Library services or information	2.0%	2.2%
Other	11.2%	8.4%

Table XVI Duties of Respondents

As can be seen from the above comparison, more than one-third of those interviewed by mail were in the administrative management while about one-fourth of those interviewed were scientists and engineers.

As a consequence the respondents of mail Questionnaire would normally have a slightly different idea about information usage than those interviewed personally.

The composition of participants in the mail and personal interview phases also varied substantially since no, or few, mail Questionnaires were sent to the federal and state agencies, and colleges and private research organizations while those agencies and organizations were primarily covered by personal interview. In contrast the water control and improvement districts, drainage districts and watershed authorities, and water authorities and utility districts were questioned by mail only. Only the engineers and contractors were questioned by mail and interviewed in approximately the same numbers.

A comparison can be made on the percentage of time devoted to search for technical water resources information (Question 5).

	Percentage of time		
	Less than 5%	5-10%	10-25%
Supervisory or Administrative			
Mail	82(58.2)*	38(55.1)	11(64.5)
Interview	59(41.8)	31(44.9)	6(35.5)
Professionals			
Mail	44(59.5)	28(33.3)	16(43.4)
Interview	30(40.5)	56(66.7)	21(56.6)
Sub-Professionals			
Mail	32(39.1)	12(46.2)	6(54.5)
Interview	50(60.9)	14(53.8)	5(45.5)

*Numbers in parentheses indicate percentages

Table XVII Percentage of time devoted to information search

In general, the supervisory or administrative personnel indicated higher percentages in the mail Questionnaire than in the personal interviews. The professionals interviewed spend more time in search for information than those professionals interviewed by mail. There does not appear to be any significance to this and, in general, the overall, combined results of both the mail Questionnaire and personal interview were analyzed.

As far as the percentage of time which should be devoted to search for information (Question 6) the following comparison may be made:

	Percentage of time		
	Less than 5%	5-10%	10-25%
Supervisory or Administrative			
Mail	62(52.9)*	47(49.6)	22(68.8)
Interview	55(47.1)	32(40.4)	10(31.2)
Professionals			
Mail	34(53.2)	25(41.1)	27(45.1)
Interview	30(46.8)	36(58.9)	33(54.9)
Sub-Professionals			
Mail	31(38.8)	14(50.0)	11(61.3)
Interview	49(61.2)	14(50.0)	7(38.7)

*Numbers in parentheses indicate percentages

Table XVIII Percentages of time which should be devoted to
information search

The answers obtained by mail or through an interview were similar.

In comparing answers to questions 5 and 6 it is obvious that individuals in all categories, particularly the professionals feel that they should be devoting more time to the search of information than they do now.

Questions 7 through 14 dealt with the current sources of information. The answers were summarized in Figures 25-30. In general, the mail responses and the personal interview responses were comparable with no significant deviations.

Questions 21 through 30 (Personal Interview guide) or Questions 15 through 24 (mail Questionnaire) were concerned with the sources of information. The responses were again comparable with the exception of the answers to Question 21 regarding the usefulness of "Trade Journals" as "a very useful source." Apparently the respondents were not clear what the difference between "Trade Journals" and "Trade Magazines" were. Those interviewed had a chance to find out the difference and after realizing that the "Trade Journals" meant to be "Technical Professional Journals" many responded that this was a very useful source (Figure 31(a)).

3. Effect of duty distribution of respondents and purpose of organization.

This section covers a comparison of Questions 1 and 2 with the other questions in attempt to determine the results based on present position and type of organization.

a. Duty of Respondents

Question 1.

The responses to this question were summarized on pages 30-31 of Volume I. Figure 4 (page 31) for example, presented the information on duties of persons interviewed personally and by mail. It was thought that further analysis may be of interest which will show the effect of distribution of duties within various agencies (such as federal, or state) and with certain segments of industry (such as engineers) on the type of response received.

Questions 7-12

The answers to Question 7 were summarized in Figure 13(a), page 56. As an example, let us consider the answer (A) (A very significant source): the mail Questionnaire response was 11.52% and the interview response was 43.65%. These represented combined answers for all categories. The same data were re-analyzed according to different categories of respondents for both the mail and personal interview and Table XIX presents the results. It is quite obvious that there is a large deviation in answers, for example, 50 percent of those in technical evaluation field thought that personal libraries were a very significant source of information while only 18.4 percent of the administrative management thought so. The results for other sources of information, such as internal reference library (Question 8) are shown in Table XX, such as a special research person (Question 9) are shown in Table XXI, such as

Present Position	Very Significant Source	Significant Source	Limited Significance	Insignificant Source	Not Available
Administrative Management	18.4	13.8	14.9	17.2	35.7
Technical Management	39.5	7.0	25.6	9.3	18.6
Both Administrative and Technical Management	32.9	26.6	16.1	6.3	18.1
Scientific and Engineering	41.3	30.7	16.0	5.3	6.7
Technical Evaluation	50.0	13.5	15.4	5.6	13.5
Library Services or Information	36.4	9.1	36.4	9.1	9.0
Other	32.4	18.9	8.1	2.7	37.9
Total	34.2	20.3	16.5	8.5	20.5
	Percentage				

Table XIX Present Position Versus Source of Information
Personal Reference Libraries (Question 7)

Present Position	Very Significant Source	Significant Source	Limited Significance	Insignificant Source	Not Available
Administrative Management	6.7	13.5	14.6	9.0	56.2
Technical Management	16.7	33.3	14.3	9.5	26.2
Both Administrative and Technical Management	23.6	26.4	16.7	4.2	29.1
Scientific and Engineering	35.1	36.5	13.5	6.8	8.1
Technical Evaluation	25.5	45.1	11.8	3.9	13.7
Library Services or Information	45.5	27.3	18.2	0.0	9.0
Other	29.0	10.5	10.5	0.0	50.0
Total	22.7	26.9	14.5	5.6	30.3
			Percentage		

Table XX Present Position Versus Source of Information
Internal Reference Library (Question 8)

Present Position	Very Significant Source	Significant Source	Limited Significance	Insignificant Source	Not Available
Administrative Management	2.4	7.2	8.4	3.6	78.4
Technical Management	5.0	10.0	10.0	7.5	67.5
Both Administrative and Technical Management	6.4	10.6	9.9	3.5	69.6
Scientific and Engineering	2.8	14.1	9.9	2.8	70.4
Technical Evaluation	7.8	17.6	15.7	5.9	53.0
Library Services or Information	0.0	18.2	18.2	0.0	63.6
Other	8.1	13.5	13.5	0.0	64.9
Total	5.1	11.8	10.8	3.7	68.6
		Percentage			

Table XXI Present Position Versus Source of Information
Special Research Person (Question 9)

public, private or academic library (Question 10) are shown in Table XXII, such as a special external information service (Question 11) are shown in Table XXIII, and such as document centers of external research services (Question 12) are shown in Table XXIV. In general, it may be stated that the scientific and engineering personnel and evaluation groups find the personal and internal libraries, or the special research personnel assigned to literature search, a very significant or a significant source of information. These groups are more involved in design and operation of water resources systems and are in greatest need of information. It is surprising to find that these groups find the document centers or external library research services of limited significance. Possibly they are not aware of services such as WRSIC or are not familiar with library research services.

Question 18.

The results of analysis are summarized in Figure 35 and the response here was fairly uniform, the majority of all categories say that they read the material as received and file for future reference.

Questions 21-29.

The answers to these questions are summarized in Tables XXV-XXXIII. Some similarities are observed between tabulations for Questions 7-12 and for Questions 21-29. It may be recalled that in an evaluation of trade journals 32.5 percent of those

Present Position	Very Significant Source	Significant Source	Limited Significance	Insignificant Source	Not Available
Administrative Management	12.9	22.4	12.9	21.2	30.6
Technical Management	9.8	17.1	36.6	14.6	21.9
Both Administrative and Technical Management	7.0	17.6	33.8	14.8	26.8
Scientific and Engineering	16.2	28.4	37.8	10.8	6.8
Technical Evaluation	11.5	25.0	40.4	13.5	9.6
Library Services or Information	0.0	45.5	45.5	0.0	9.0
Other	5.3	23.7	47.4	2.6	21.0
Total	10.2	22.3	33.0	13.8	20.7
	Percentage				

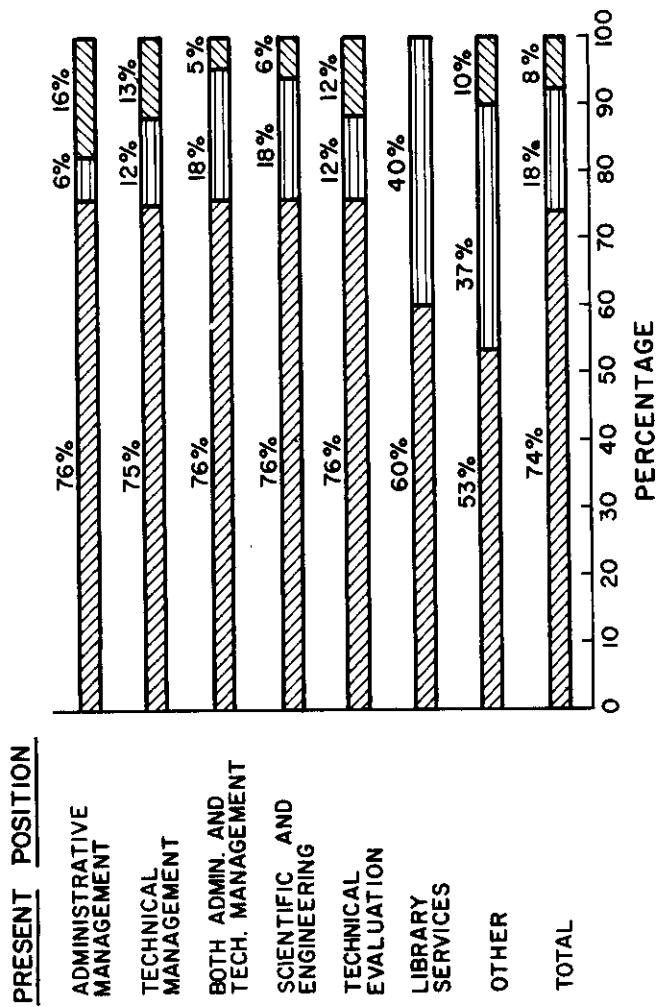
Table XXII Present Position Versus Source of Information
Public, Private or Academic Library (Question 10)

Present Position	Very Significant Source	Significant Source	Limited Significance	Insignificant Source	Not Available
Administrative Management	14.6	11.0	4.9	12.2	57.3
Technical Management	20.5	12.8	7.7	15.4	43.6
Both Administrative and Technical Management	13.2	16.9	9.6	8.8	51.5
Scientific and Engineering	12.7	19.7	11.3	8.5	47.8
Technical Evaluation	18.4	26.5	10.2	14.3	30.6
Library Services or Information	10.0	20.0	0.0	0.0	70.0
Other	22.9	11.4	8.6	2.9	54.2
Total	15.4	16.6	8.5	10.0	49.5
	Percentage				

Table XXIII Present Position Versus Source of Information
Special External Information Service (Question 11)

Present Position	Very Significant Source	Significant Source	Limited Significance	Insignificant Source	Not Available
Administrative Management	9.1	9.1	9.1	15.6	57.1
Technical Management	15.0	5.0	30.0	7.5	42.5
Both Administrative and Technical Management	4.4	11.0	21.3	9.6	53.7
Scientific and Engineering	7.4	14.7	23.5	8.8	45.6
Technical Evaluation	12.5	8.3	25.0	10.4	43.8
Library Services or Information	9.1	18.2	27.3	9.1	36.3
Other	8.1	8.1	24.3	5.4	54.1
Total	8.2	10.3	21.1	10.1	50.3
	Percentage				

Table XXIV Present Position Versus Source of Information
Document Centers or External Library Research Services (Question 12)



QUESTION 18. WHICH BEST DESCRIBES YOUR UTILIZATION OF JOURNALS AND OTHER PUBLICATIONS ?




-  A. READ ARTICLES OF INTEREST AS MATERIAL IS RECEIVED AND FILE FOR FUTURE REFERENCE
- OR
-  B. FILE MATERIAL AS IT IS RECEIVED. SEARCH FOR RELEVANT MATERIAL AS NEEDED
-  NO RESPONSE

Figure 35

Present Position	Very Useful Source	Useful Source	Limited Significance	Seldom or Never Used	Not Applicable
Administrative Management	14.0	31.0	21.0	14.0	20.0
Technical Management	38.6	27.3	15.9	15.9	2.3
Both Administrative and Technical Management	23.5	35.6	23.5	10.7	6.7
Scientific and Engineering	36.0	25.3	26.7	10.7	1.3
Technical Evaluation	38.5	28.8	26.9	5.8	0.0
Library Services or Information	27.3	27.3	27.3	18.1	0.0
Other	24.4	28.9	15.6	13.3	17.8
Total	19.8	42.5	16.6	8.7	6.2
	Percentage				

Table XXV Present Position Versus Source of Information
Trade Journals (Question 21)

Present Position	Very Useful Source	Useful Source	Limited Significance	Seldom or Never Used	Not Applicable
Administrative Management	7.4	33.7	22.1	13.7	23.1
Technical Management	9.3	37.2	37.2	14.0	2.3
Both Administrative and Technical Management	11.6	41.1	28.8	11.6	6.9
Scientific and Engineering	18.7	25.3	37.3	17.3	1.3
Technical Evaluation	15.4	38.5	32.7	11.5	1.9
Library Services or Information	9.1	27.3	27.3	36.3	0.0
Other	11.1	40.0	15.6	13.3	20.0
Total	12.0	36.0	28.7	13.9	9.4
		Percentage			

Table XXVI Present Position Versus Source of Information
Trade Magazines (Question 22)

Present Position	Very Useful Source	Useful Source	Limited Significance	Seldom or Never Used	Not Applicable
Administrative Management	12.6	28.4	15.8	20.0	23.2
Technical Management	38.6	27.3	20.6	9.1	4.4
Both Administrative and Technical Management	31.5	35.6	14.8	10.1	8.0
Scientific and Engineering	41.5	32.5	15.6	7.8	2.6
Technical Evaluation	47.3	27.3	16.4	5.5	3.5
Library Services or Information	18.2	36.4	18.2	27.2	0.0
Other	31.8	15.9	11.4	15.9	25.0
Total	31.6	30.1	15.6	12.0	10.7
	Percentage				

Table XXVII Present Position Versus Source of Information
Handbooks (Question 23)

Present Position	Very Useful Source	Useful Source	Limited Significance	Seldom or Never Used	Not Applicable
Administrative Management	19.0	23.0	16.0	18.0	24.0
Technical Management	28.6	23.8	19.0	23.8	4.8
Both Administrative and Technical Management	19.2	36.3	24.0	12.3	8.2
Scientific and Engineering	28.4	43.2	18.9	6.8	2.7
Technical Evaluation	43.4	32.1	15.1	3.8	5.6
Library Services or Information	18.2	45.5	27.3	9.0	0.0
Other	20.5	38.6	9.1	11.3	20.5
Total	24.3	33.4	18.7	12.5	11.1
	Percentage				

Table XXIX Present Position Versus Source of Information
Project Reports (Question 25)

Present Position	Very Useful Source	Useful Source	Limited Significance	Seldom or Never Used	Not Applicable	
Administrative Management	0.0	8.3	23.9	40.6	27.2	
Technical Management	2.3	11.4	22.7	54.5	9.1	
Both Administrative and Technical Management	2.1	6.8	39.0	41.8	10.3	
Scientific and Engineering	1.3	8.0	25.3	48.0	17.4	
Technical Evaluation	0.0	7.5	35.8	41.5	15.2	
Library Services or Information	0.0	9.1	18.2	54.5	18.2	
Other	0.0	4.5	25.0	40.9	29.6	
Total	1.1	7.7	30.1	43.9	17.2	
		Percentage				

Table XXXI Present Position Versus Source of Information Printed Advertising (Question 27)

Present Position	Very Useful Source	Useful Source	Limited Significance	Seldom or Never Used	Not Applicable
Administrative Management	3.2	14.7	23.2	29.5	29.4
Technical Management	4.9	17.1	34.1	34.1	9.8
Both Administrative and Technical Management	7.6	17.4	36.8	26.4	11.8
Scientific and Engineering	7.0	18.3	25.4	28.2	21.1
Technical Evaluation	3.8	9.6	38.5	25.0	23.1
Library Services or Information	18.2	18.2	18.2	27.2	18.2
Other	7.0	13.9	18.7	30.2	30.2
Total	6.1	15.8	30.0	28.2	19.9
	Percentage				

Table XXXII Present Position Versus Source of Information
Catalogues (Question 28)

Present Position	Very Useful Source	Useful Source	Limited Significance	Seldom or Never Used	Not Applicable
Administrative Management	3.2	12.9	10.7	29.0	44.2
Technical Management	0.0	26.2	14.3	26.2	33.3
Both Administrative and Technical Management	5.7	25.0	24.3	25.7	19.3
Scientific and Engineering	13.5	23.0	23.0	24.3	16.2
Technical Evaluation	3.8	36.5	21.3	19.2	19.2
Library Services or Information	10.0	40.0	30.0	20.0	0.0
Other	11.6	11.6	16.3	32.6	27.9
Total	6.4	22.7	19.4	26.0	25.5
	Percentage				

Table XXXIII Present Position Versus Source of Information
Abstract or Citation Bulletin (Question 29)

interviewed personally and 9.7 percent of those who responded by mail thought that they were a very useful source of information. The same data were re-analyzed and a fairly large deviation of answers was again observed, i.e. 38.6 percent of technical management thought that the trade journals were a very useful source, while only 14.0 percent of administrative management thought so. (Table XXV)

Table XXXIII is of great interest in this project since it evaluates the usefulness of abstracts or citation journals. Figure 23(a) (page 73) indicated that 32.5% of those interviewed personally thought that the abstracts or citation bulletins were a "useful source" while 22.7% of those interviewed by mail answered "none applicable."

Table XXXIII shows that majority of administrative management "seldom or never uses" this source of information. In contrast the technical evaluation personnel and the library services or information people find it a "useful source."

Question 39.

This question dealt with preferences with regard to various information services. It will be recalled that the majority preferred the abstract services if only one service were available, and abstract and SDI services if two were available and abstract, SDI and retrospective machine search if three were available. Figures 36 and 37 summarize the results of further analysis of data. The administrative management would prefer the SDI services while all the other groups would prefer the abstracts. The administrative

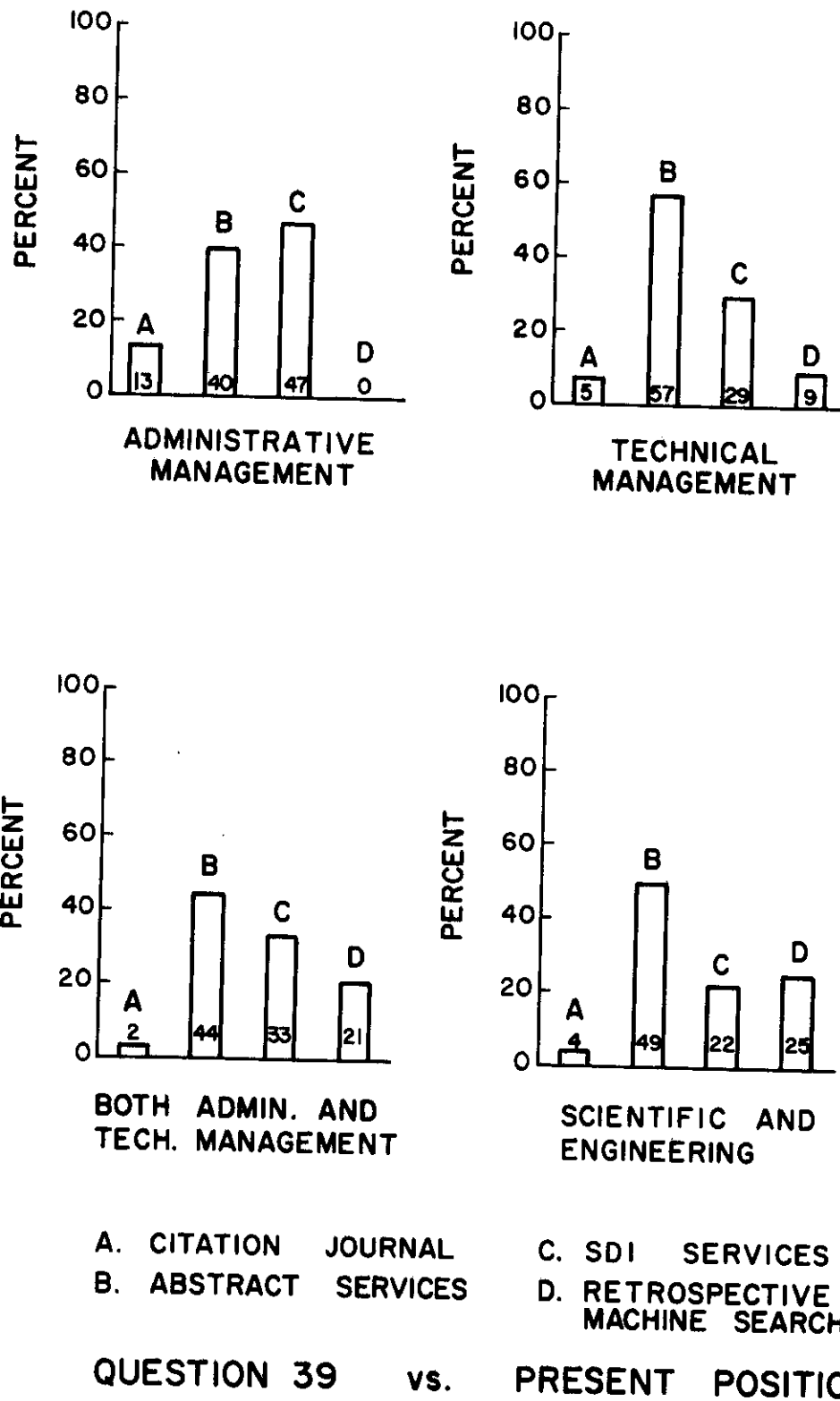
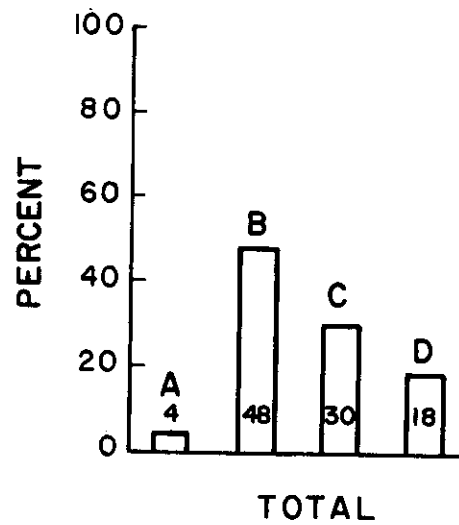
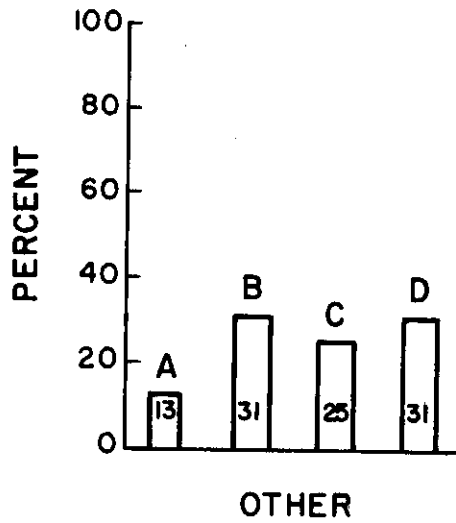
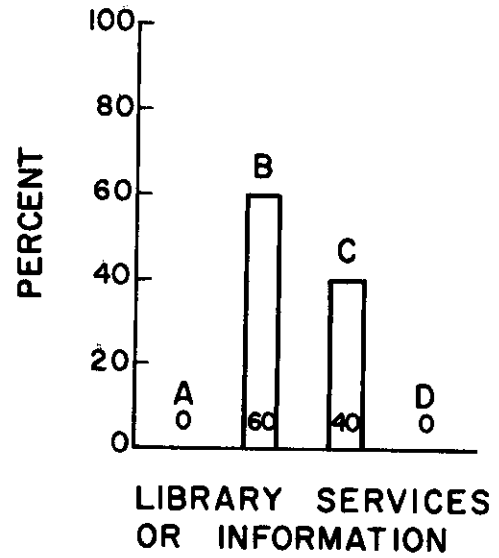
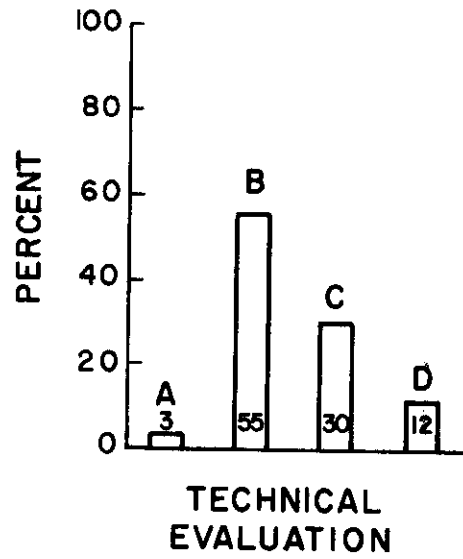


Figure 36



A. CITATION JOURNAL
 B. ABSTRACT SERVICES

C. SDI SERVICES
 D. RETROSPECTIVE MACHINE SEARCH

QUESTION 39 vs. PRESENT POSITION

Figure 37

management also prefers the citation journal to the retrospective machine search while all the other groups have just the opposite preference.

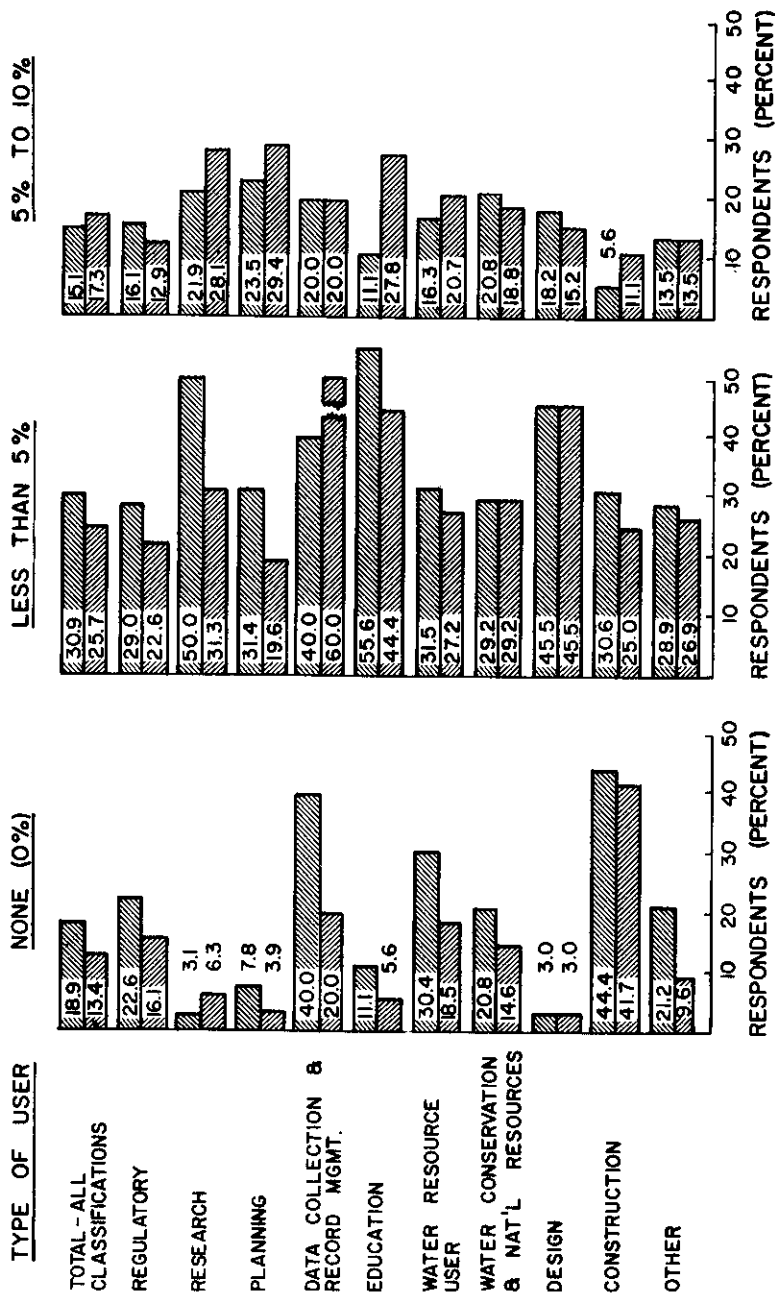
b. Purpose of organization

Questions 5 and 6

In these questions the various agencies were analyzed as to the percentage of time devoted to search of information and the percentage of time which should be devoted to search of information. The results are shown in Figures 38-41. Considering the search time of "less than 5 percent" the supervisory or administrative personnel engaged (Figure 38) in research, data collection, education and design all spend more time and should spend more time on information search than the regulatory agencies, water resources user, construction etc. This was expected. Figures 39 and 40 presents the results for professionals and Figure 41 for sub-professionals.

Questions 7 to 12

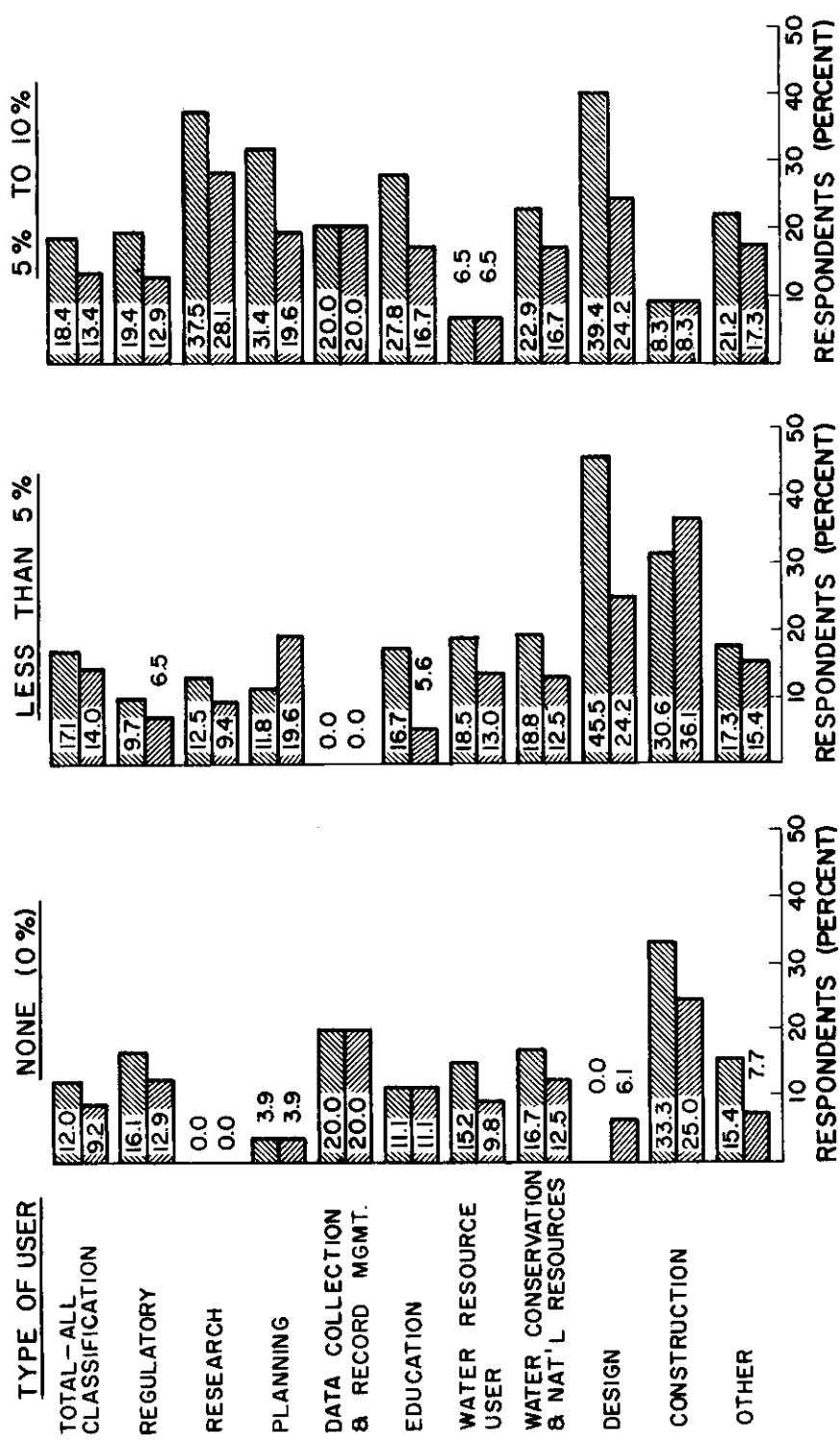
Tables (pages II-1 - II-4) summarizing the findings for Questions 7 through 10 are presented in Appendix II (Volume II). Tables XXXIV and XXXV were selected for inclusion in this part of the report because of interest in external specialized information service (Table XXXIV) and in document centers or external library research services (Table XXXV). Referring to table XXXIV the planning and education groups indicate that the external specialized informa-



PRIMARY PURPOSE OF ORGANIZATION vs. SEARCH TIME - ACTUAL AND NEEDED SUPERVISORY OR ADMINISTRATIVE PERSONNEL (QUESTIONS 5 AND 6)

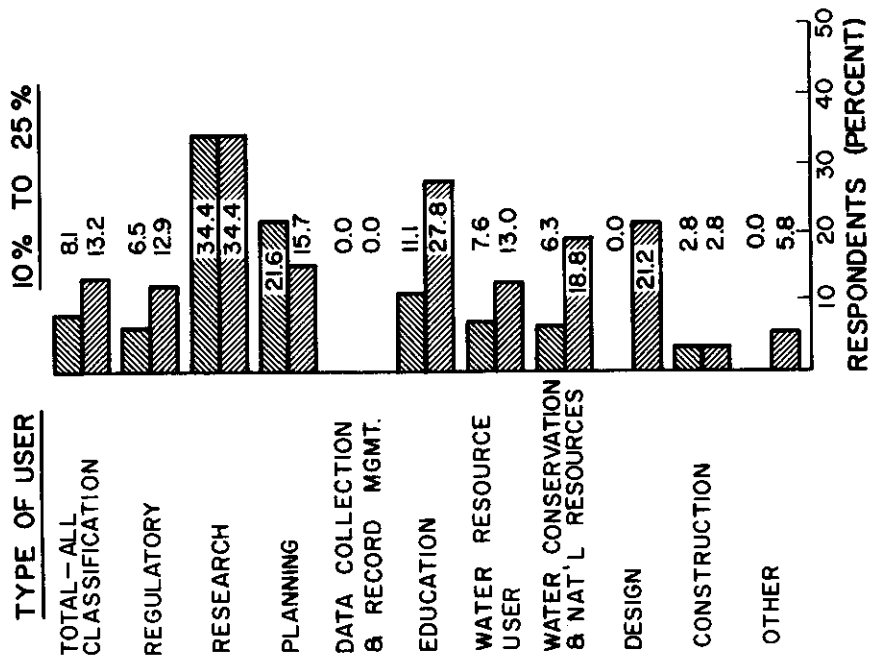
NOTE: PERCENTAGES ABOVE 10% ARE NEGLIGIBLE

Figure 38



PRIMARY PURPOSE OF ORGANIZATION vs. SEARCH TIME - ACTUAL AND NEEDED PROFESSIONALS (SUCH AS ENGINEERS) - (QUESTIONS 5 AND 6)

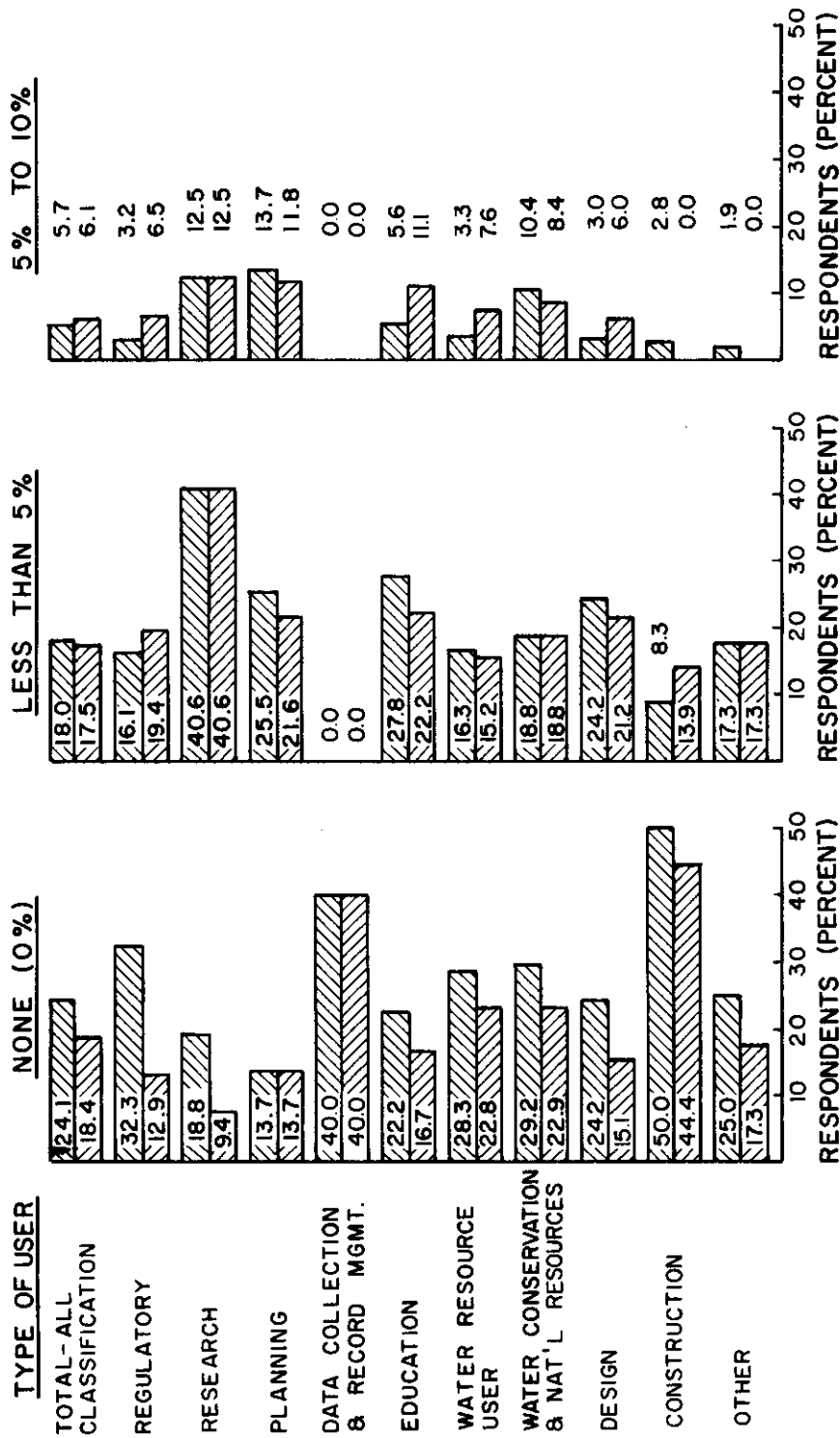
Figure 39



ACTUAL TIME
 NEEDED TIME

PRIMARY PURPOSE OF ORGANIZATION vs. SEARCH TIME - ACTUAL
 AND NEEDED PROFESSIONALS (SUCH AS ENGINEERS) - (QUESTIONS 5
 AND 6) - (CONTINUED)

Figure 40



PRIMARY PURPOSE OF ORGANIZATION vs. SEARCH TIME - ACTUAL AND NEEDED SUB-PROFESSIONAL (TECHNICIANS) - (QUESTIONS 5 AND 6)

NOTE: PERCENTAGES ABOVE 10% ARE NEGLIGIBLE

Figure 41

Type of User	Very Significant Source	Significant Source	Limited Significance	Insignificant Source	Not Available	No Response
Regulatory	0.0	12.90	3.23	6.45	41.94	35.48
Research	3.12	12.50	18.75	12.50	40.63	12.50
Planning	19.61	17.65	7.84	5.88	35.29	13.73
Data Collection	0.0	20.00	0.0	20.00	20.00	40.00
Education	16.67	16.67	5.56	11.11	38.89	11.11
M. R. User	7.61	11.96	4.35	2.17	52.17	21.74
Water Conservation	10.42	8.33	4.17	10.42	33.33	33.33
Design	9.09	6.06	18.18	3.03	54.55	9.09
Construction	0.0	11.11	0.0	5.56	27.78	55.56
Other	7.69	5.77	0.0	5.77	21.15	59.62
No Response	0.0	1.72	0.0	0.0	5.17	93.10
Total	7.24	10.09	5.26	5.48	34.65	37.28

Percentage

Table XXXIV Primary Purpose of Organization Versus Source of Information
External Specialized Information Service (Question 11)

Type of User	Very Significant Source	Significant Source	Limited Significance	Insignificant Source	Not Available	No Response
Regulatory	0.0	0.0	3.23	9.68	48.39	39.04
Research	9.37	15.62	28.13	9.37	31.25	6.25
Planning	3.92	11.76	21.57	7.84	41.18	13.73
Data Collection	0.0	0.0	20.00	20.00	20.00	40.00
Education	5.56	22.22	11.11	5.56	44.44	11.11
W. R. User	2.17	4.35	11.96	7.61	46.74	27.17
Water Conservation	6.25	0.0	20.83	6.25	31.25	35.42
Design	6.06	12.12	15.15	9.09	39.39	18.18
Construction	0.0	2.78	2.78	2.78	33.33	58.33
Other	0.0	5.77	5.77	3.85	26.92	57.69
No Response	0.0	1.72	0.0	0.0	5.17	93.10
Total	2.85	6.14	11.84	6.14	33.99	39.04
	Percentages					

Table XXXV Primary Purpose of Organization Versus Source of Information
Document Centers or External Library Research Services (Question 12)

tion service is a very significant source, while the research and design groups find it only of limited significance.

It appears that the use of certain types of information sources may appeal to certain groups of users but not to the others. Consequently, no simple answers are possible and different types of services may have to be designed for different users.

Question 15.

Figure 42(a) indicates that the majority of all types of organizations questioned have a library.

Question 16.

Figure 42(b) presents results of analysis regarding the federal and state reports. The large majority of all of the types of organizations with the exception of construction firms receive federal and state reports on a regular basis.

Question 21-30.

The results of analysis were tabulated and are presented in Appendix II (Volume II).

(a) Question 21: Research, planning, educational, groups find the trade journals a very useful source of information while the water resources users, designers and constructors find the trade journals a useful source. Only data collection groups replied that the trade journals are seldom or never used as a source of information.

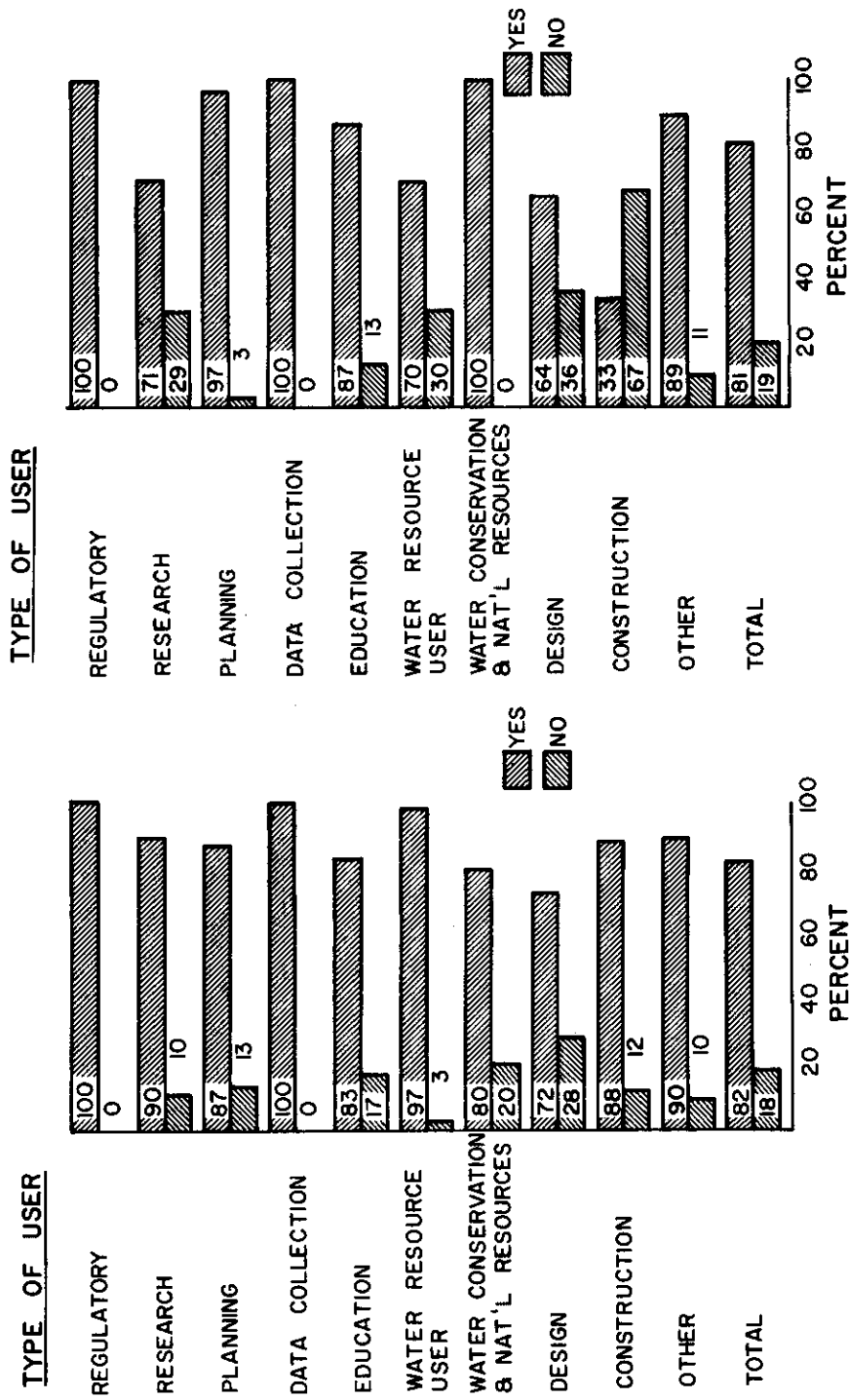


Figure 42 (a)

Figure 42 (b)

(b) Question 22: Planning, educational, water resource user, water conservation, design, construction groups report the trade magazines to be a useful source of information while the research groups, of limited significance as a source of information.

(c) Question 23: Regulatory, educational, water resource user and water conservation groups report that handbooks are a very useful source, while research, planning, data collection, design and construction find handbooks a useful source.

(d) Question 24: The majority of organizations reported that the reference books are a useful or a very useful source of information.

(e) Question 25: Research, planning, educational, water resources user, water conservation and design groups find the project reports a useful source. Only contractors find the project reports seldom or never used.

(f) Question 26: Planning, educational, water resource user and water conservation groups find the newsletters a useful source while the design and research groups of limited significance. Construction groups seldom or never use the newsletters.

(g) Question 27: Printed advertising is seldom or never used by most groups. Only water conservation groups find this to be of limited significance.

(h) Question 28: Regulatory, planning and water resources user find the catalogues of limited significance and research, educational and construction groups seldom or never use them as source of information. Only designers find the catalogues a useful source.

(i) Question 29: Research and educational groups find the abstracts useful for source of information, the planning and data collection groups report the abstracts of limited significance and water resources user, water conservation, design and construction groups report that the abstract bulletins are seldom or never used.

(j) Question 30: Research, educational, and design groups report the monographs to be a useful source of information. Planning, water resources user, water conservation and construction groups reports that they seldom or never use the monographs.

Questions 34-39.

The results of analysis were tabulated and are presented in Appendix II (Volume II).

(a) Question 34: The majority of planning, research, water conservation, design and educational groups would subscribe to the citation journal, while the regulatory and construction groups would not subscribe at any charge.

(b) Question 35: The majority of all groups, with the exception of construction would subscribe to an abstract bulletin at a cost of \$30 to \$40 per year.

(c) Question 36: The majority of planning and design groups would subscribe to an SDI service using a standard interest profile, while the majority of construction groups would not subscribe at any charge.

(d) Question 37: The majority of all groups would not subscribe to an SDI service using an individual service profile at a cost of \$250 to \$300 per subscription cost per year; however, a large percentage (27-33%) of those in research and planning would consider this type of service but a lower cost. Thirty percent of those engaged in planning activity and 19 percent of those in research would subscribe to this service.

Question 38.

50 percent of those in construction, forty-eight percent of those in research, 32 percent of those in planning, and

28 percent of those in design would use the retrospective machine search service with an individual interest profile, but 37 percent of those in planning, 44 percent of those in water conservation and 33 percent of those involved in research would not subscribe to this service at any charge.

Question 39.

If only one information service were available the regulatory, research, planning, water conservation and design would select the abstract services, while the data collection and educational groups would select the SDI services. The water resources users were evenly divided in their selection between the abstract services and the SDI services.

Questions 42 and 43: Microform Readers and Media

Question 42.

The majority of regulatory agencies, all of the data collection and record management and 50 percent of educational group have the microform readers, while the majority of those in all other groups do not.

Question 43.

The majority of those in research and water conservation and construction and all of those in data collection, would plan to request microform copies rather than hard copies of information material. Obviously, those in research, water conservation and construction would have to acquire the microform readers.

4. Case Study

Five interviews with industrial firms were conducted by the staff of the Industrial Economics Research Division, Texas A&M University. Since only five firms were surveyed, no conclusions can be drawn nor inferences made concerning any industry or group of firms in any locality. Rather these interviews were conducted as case studies and should be interpreted as such. The questionnaire used in this study was prepared by the Water Resources Institute at Texas A&M University and is found in Volume II, Appendix I - 37.

The selection of the five industrial firms interviewed was made jointly by the Water Resources Institute and the Industrial Economics Research Division. A list of the firms contacted is shown in Appendix B. The five industries represented by the firms are pulp and paper, food, primary metal and metalworking, petroleum, and chemical and are all located in the highly industrialized Houston-Baytown area.

Table XXXVI indicates the size of the firms included in the survey and the number of supervisory or administrative, professional, and sub-professional personnel respectively. Hourly paid office clerks and plant workers are not included unless they are classified in one of the above mentioned categories.

COMPANY	EMPLOYMENT RANGE (TOTAL)	SUPERVISORY	PROFESSIONAL	SUB-PROFESSIONAL (TECHNICIANS)
1	1000-4999	350	350	350
2	1000-4999	150	25	50
3	1000-4999	1200	90	200
4	500-999	211	101	50
5	100-249	105	4	38

TABLE XXXVI - EMPLOYMENT RANGE WITH APPROXIMATE NUMBER OF SUPERVISORY, PROFESSIONAL, AND SUB-PROFESSIONAL PERSONNEL

In each firm there were those employees as shown in Table XXXVII who, in the normal course of their activities, needed access to recently published technical information on water resources. Of that number only a very small percentage of their time was actually devoted to the search for technical water resources information. In the opinion of the interviewee most employees were spending about the right amount of time in their search for technical information. However, one person interviewed thought supervisory and administrative personnel should not devote any time in the search for water resources information but this should be left to the professional employees such as engineers and chemists, and their time devoted to the search should be increased from less than five percent to between five and ten percent.

Company	1	2	3	4	5
No.	40	3	1	30	5
Supervisory % of Time Actual	0-5	0-5	0-5	0-5	0-5
Should Be	0-5	0-5	0	5-10	0-5
No.	30	2	2	15	2
Professional % of Time Actual	5-10	0-5	5-10	0-5	0-5
Should Be	5-10	0-5	10-25	5-10	0-5
No.	30	0	0	0	4
Sub-Professional % of Time Actual	0-5	---	---	---	0-5
Should Be	0-5	---	---	---	0-5

TABLE XXXVII - NUMBER OF EMPLOYEES REQUIRING WATER RESOURCES INFORMATION WITH TIME ACTUALLY DEVOTED TO AND WHAT SHOULD BE DEVOTED TO THE SEARCH FOR INFORMATION

There is a wide variety of information resources available to most organizations seeking technical information. Table XXXVIII indicates how each representative evaluated each resource in light of its usefulness to his firm. The Regional Information and Communication Exchange at Rice University and the Industrial Information Services at Southern Methodist University were named as specialized information services that had been used infrequently by two

firms and none by the other three. According to the survey the resources relied upon most often are internal reference libraries, information supplied by vendors, manufacturers, and suppliers, and corporate staff facilities at some central location servicing the entire company. Four of the five firms surveyed had an internal reference library.

INFORMATION RESOURCE	FIRM 1	FIRM 2	FIRM 3	FIRM 4	FIRM 5
Personal Reference Library	B	D	D	A	C
Internal Reference Library	B	B	B	B	E
Research Staff	C	E	A	B	E
Public or Academic Library	C	D	D	B	C
Specialized Information Service	B	D	D	C	D
Document Centers	B	D	A	C	D
Vendors, Manufacturers, Suppliers	A	B	B	B	C
Consultants or Laboratories	A	-	C	-	C
Technical Seminars	-	-	-	B	-
Corporate Staff Facilities	A	A	-	-	-

LEGENT: A--very significant; B--significant;
C--limited significance; D--insignificant;
E--not available

TABLE XXXVIII - EVALUATIONS OF INFORMATION RESOURCES

The most common forms of printed literature serving as sources of water resources information are listed in Table XXXIX. An evaluation of each information source by the persons interviewed is also included. Trade journals, trade magazines, handbooks and reference books were considered to be the most useful sources of information.

FORM OF PRINTED LITERATURE	FIRM 1	FIRM 2	FIRM 3	FIRM 4	FIRM 5
Trade Journals	A	A	A	A	A
Trade Magazines	A	B	C	A	C
Handbooks	B	A	A	A	B
Reference Books	B	A	C	A	B
Project Reports	C	A	D	C	A
Newsletters	C	A	B	B	C
Printed Advertising	C	B	C	C	D
Catalogues	B	B	C	C	C
Abstract or Citation Bulletins	C	B	C	D	B
Monographs	C	C	D	D	A

LEGEND: A--very useful source; C--source of limited significance;
 B--useful source; D--seldom, or never used.

TABLE XXXIX - EVALUATIONS OF SOURCES (PRINTED LITERATURE) OF
 WATER RESOURCES INFORMATION

Potential subscriptions to these types of services by the firms surveyed are indicated in Table XXXX. The abstract bulletin and the retrospective search services appealed the most to those surveyed. In some instances more than one subscription would be utilized by the firm.

SERVICE	SURVEYED	NO. OF FIRMS			TOTAL NO. OF SUBSCRIPTIONS
		YES	YES, AT REDUCED CHARGES	NO	
Citation Journal	5	1	--	4	1
Abstract Bulletin	5	4	--	1	8
Selective Dissemination:					
(1) Standard	5	--	1*	4	1
(2) Individual	5	2	1**	2	4
Retrospective Search	5	5	--	--	9

* \$50 per year

** \$150 per year

TABLE XXXX - POTENTIAL SUBSCRIPTIONS TO TYPES
OF INFORMATION SERVICES

The comments given most frequently for not wanting the services at any charge can be summed up as follows:

- (1) Availability in other types of services which are of more benefit, namely abstract bulletins and retrospective searches.

(2) Too broad in scope, not specific enough.

(3) Information distributed from corporate information center.

Preferences in information services are further shown in Table XXXXI based on supposition that not all services would be available. The abstract bulletin and the retrospective search are still considered to be the most desirable types of information services if only one or two services could be offered.

	NO. OF FIRMS		
	IF ONLY ONE AVAILABLE	IF ONLY TWO AVAILABLE	IF ONLY THREE AVAILABLE*
Citation Journal	-	1	1
Abstract Bulletin	3	4	4
Selective Dissemination:			
(1) Standard Profile	-	-	-
(2) Individual Profile	1	3	4
Retrospective Search	1	2	3

*One firm was interested only in two types of services

TABLE XXXXI - CHOICE OF INFORMATION SERVICES

Areas of Interest Relating to Water Resources

A wide range of interest exists with users of water resources information. Table XXXXII lists the number of firms having a parti-

cular area of interest. There was a wide range in areas of interest with users of water resources information.

NUMBER OF FIRMS	AREAS OF INTEREST
3	Water Supply
2	Surface and Ground Water
3	Water Usage
3	Water Treatment
2	Water Quality
2	Water Analysis
2	Waste Water Handling and Treatment
1	Waste Water Disposal

TABLE XXXXII - AREAS OF INTEREST IN WATER RESOURCES

SUMMARY AND CONCLUSIONS

1. A successful field evaluation study of user requirements for effective use of the Water Resources Information Center (WRSIC) was completed. A two-prong study was conducted: by mail using a 29-question Questionnaire and through personal interview employing a 46-question Interview guide. The response to the mail Questionnaire is considered good, 54.6 percent of the forms were returned, however some of the returned Questionnaires were not fully completed. The personal interviews were very successful; practically all of objectives sought were accomplished.
2. The majority of the supervisory and administrative personnel devote less than 5 percent of their time to search for water resources information while the majority of the professionals devote between 5 and 10 percent, and the majority of sub-professionals do not devote any time for information search.
3. The majority of the supervisory and administrative personnel feel that they should devote about the same percentage of the time for information search as they do now, and the sub-professionals felt that they should spend between 0 and 5 percent of their time on search for information.
4. The personal library and a reference library maintained by the organization are a very significant source of information. Most of the groups questioned by mail and personally reported that they find the document centers or external library research services of limited significance. Possibly the respondents were not aware of OWRR's existence or of services such as WRSIC or are not familiar of external library research services. This is

partly evidenced by the fact that the positive answer to this question was almost twice as high from the personal interview than from the mail Questionnaire - the interviewer had a chance to explain the WRSIC and show the samples of abstracts, citation journals, etc.

5. The majority of the organizations questioned by personal interview have an internal library.
6. The large majority of organizations with the exception of construction firms receive federal and state reports on a regular basis.
7. The majority of organizations receive newsletters in the water resources field.
8. Most respondents claim that they read the articles of interest and file them for future reference. However, based on personal interviews it appears that the majority wish to do this but have no time to read all articles of interest.
9. The majority of respondents interviewed in person find technical journals "a very useful source" of information while the mail respondents find it a "useful source."
10. The trade magazines are a "source of limited significance" to those interviewed personally and a "useful source" to the mail respondents. About 40 percent of technical management respondents thought that the trade journals are a "very useful source" while only about 15 percent of administrative management thought so.
11. Handbooks and reference books are a "very useful source" to those interviewed in person and "a useful source" to the mail interviewees.

12. The project reports are a "source of limited significance" to the mail respondents and "a useful source" to those interviewed in person.
13. The newsletters are a "source of limited significance" to personal interviews and a "useful source" to the mail respondents and to the administrative management.
14. Catalogues are "seldom or never used" by the personal interviewees but are a "source of limited significance" by the mail respondents and by both the administrative and technical management and by technical evaluators.
15. Abstracts or citation bulletins are "a useful source" to personal interviewees and to those in research and educational groups. Those engaged in planning and data collection reported that the abstracts are of "limited significance" and water resource users, water conservation, design and construction groups "seldom or never" use them. It should be pointed out that those interviewed in person were shown the Citation Bulletin and the Water Resources Abstracts while apparently many of those interviewed by mail were unaware of their existence, consequently a large percentage of mail respondents did not answer this question, or answered "not applicable."
16. Monographs are "seldom or never used according to the respondents' answers.
17. In the listing of five of the most useful sources of information to their organization were many federal and state publications.
18. The majority of respondents (53 percent) would subscribe to a Citation Journal at \$15-\$20 per year while 7 percent would consider subscribing at a lower charge and 49 percent would not subscribe at all.

19. The majority of respondents (66 percent) would subscribe to an Abstract Bulletin at \$30-\$40 per year while 15 percent would subscribe at a lower charge and 19 percent would not subscribe at any charge.
20. Thirty-seven percent of respondents would subscribe to an SDI service using a Standard Interest Profile at \$80-\$100 per year, 25 percent would consider the service at a lower charge and 38 percent would not subscribe to this service.
21. Fifty-seven percent of respondents would not subscribe to an SDI service using an Individual Interest Profile at a cost of \$250-\$300 per year, 20 percent would subscribe at the cost indicated and 23 percent would consider the service at a lower charge.
22. The majority of respondents would not subscribe to a Retrospective Machine Search Service with an Individual Interest Profile, however 48 percent of those in research, 43 percent of those in planning and 50 percent of those in construction would subscribe to this service at \$100-\$125 per request.
23. The majority prefer an abstract service if that were the only service available and an abstract service and SDI services if two were available.
24. The most desirable time period for providing information is one week (or less) but about half as many respondents would be satisfied with a two week (or less) time period.
25. Only twenty-nine percent of the respondents have a microform reader.
26. Forty-nine percent of the potential users of information services would request a microform copy and 42 percent would request hard-copies of information material. (9 percent did not answer)

27. Sixty-seven percent of respondents thought that it would be most desirable to order printed material from one central source.
28. Seventy-seven percent of respondents would be willing to complete and return short evaluation forms to assist in continuous evaluation of information services.
29. Case study results were similar to those of the mail Questionnaire and Personal Interview.

RECOMMENDATIONS FOR FUTURE WORK

This study resulted in the contact of over seven hundred individuals who work in the Water Resources field or have a close association with the field. It was evident from an analysis of the responses, that there is a significant need for more and better dissemination of information related to Water Resources. A list of recommendations which seem to best reflect the major findings of this study is given below.

1. It is recommended that, as funds permit, WRSIC services be expanded to include an SDI service and a capability for retrospective machine search. As may be noted in the results of Question 38, the stated order of preference of services: was first- abstract service, second- SDI service and third- Retrospective machine search. The results of the study show that different types of service appeal to different segments of the potential user population.

2. It is recommended that charges for the various services be considered as a means of partially funding an expansion of services by WRSIC. While many specialized information services, like public libraries, will not be able to function without a subsidy, it would seem that a large percentage of users would be willing to pay a modest fee for additional services.

3. It is recommended that a greater amount of effort be made to publicize the availability of WRSIC services. While the current

service is widely used there are a multitude of other potential users who could benefit from the availability of Water Resources Information. The case study gives some indication of the present need of water information by a variety of industrial firms. A considerable expenditure of funds is required to generate the basic data base and increased utilization of this information through wider usage and additional services would be beneficial.

4. It is recommended that additional emphasis be placed on those areas which were indicated as being of most interest to the potential industrial users. As noted in the case study these areas were:

- a. water supply
- b. surface and ground water
- c. water usage
- d. water treatment
- e. water quality
- f. water analysis
- g. water handling and treatment
- h. waste water disposal

This increased emphasis could include studies involving water problems and solutions by class or type of industry. State-of-the-art reports directed to individual industrial groups would help to satisfy their desire for information which is specifically for their particular area of interest.

5. It is recommended that consideration be given to the establishment of some mechanism whereby the users could order copies of most announced material through some central facility. While copyright laws do not provide for reproduction of much of the published material, it would appear to be better in many respects for a central location to at least provide copies of reports supported by federal funds. To some extent this might be accomplished by listing the publication number of those documents which are available through federal document centers. It should be noted that approximately 67 percent of the respondents indicated that a central acquisition facility would be most desirable.

6. It is recommended that consideration be given to the establishment of an expertise file. Such a file could identify outstanding talent by individual and by company, in a limited number of critical problem areas. Such a file could be established and maintained in conjunction with various professional societies.

7. It is recommended that consideration be given to providing a service for the small or periodic user. Many potential users have only an occasional need for a specific type of information relating to Water Resources. It is possible that these users could best be served by a retrospective search service or a state-of-the-art review service. Such users would have no need for either the Abstract Bulletin or the SDI service.

8. It is recommended that The Water Resource Research Institutes be encouraged to assume a larger role as an intermediary or interface between the user and WRSIC. Such an activity could benefit the occasional user in that he could obtain special assistance when WRSIC services are needed. The regular user could benefit by having an additional channel of communication to facilitate feedback.

It should be recognized that many of the findings of this study cannot be directly converted to meaningful recommendations. The results of this report should provide a valuable insight to the characteristics of potential users as plans are formulated to provide additional services.

(1) THE INFORMATION SHEET

A SURVEY OF USER REQUIREMENTS FOR WATER RESOURCES SCIENTIFIC INFORMATION

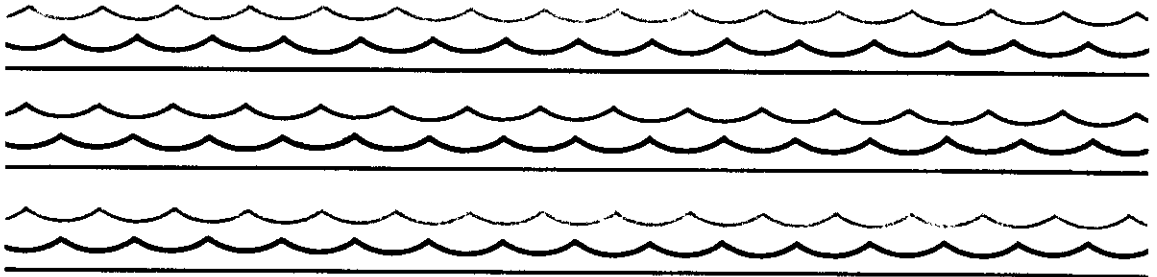
The Water Resources Scientific Information Center (WRSIC) was established by the Secretary of the Interior on January 25, 1966. Initial funding for WRSIC was provided by the Appropriation Act for the fiscal year 1968. The Center has been designated by the Federal Council for Science and Technology as the National Center for Water Resources scientific and technical information activities.

The objectives of the Water Resources Scientific Information Center are:

1. To serve as a focal point for national water resource technical information activities.
2. To initiate efforts to coordinate and complement existing technical information services.
3. To provide central operation of such water resource technical information services as can best be accomplished on a nationwide level.
4. To insure the rapid flow of technical information to interested individuals and agencies.

A user survey is being conducted by the Water Resources Institute of Texas A&M University under contract with the Water Resources Scientific Information Center. This most important survey is designed to obtain sufficient data needed for the development and evaluation of future WRSIC information services.

Your cooperation in the completion of the questionnaire will be greatly appreciated. In completing this questionnaire you will be performing an important task which will affect future information services.



Water Resources Institute
TEXAS A&M UNIVERSITY

(2) MAIL QUESTIONNAIRE
A SURVEY OF USER REQUIREMENTS
FOR WATER RESOURCES SCIENTIFIC INFORMATION

Name of person completing this form _____

Title of person completing this form _____

Name of organization _____

Address of organization _____

1. Describe your duties in your present position by checking the appropriate spaces.

- 1) Administrative management
- 2) Technical management
- 3) Both administrative and technical management
- 4) Scientific and engineering (non-management)
- 5) Technical evaluation
- 6) Library services or information
- 7) Other (specify) _____

2. What is the primary purpose of the organization in relation to water resources? List up to five purposes in order of priority.

- | | |
|----------|---|
| 1) _____ | A. Regulatory |
| 2) _____ | B. Research |
| 3) _____ | C. Planning |
| 4) _____ | D. Data collection and record maintenance |
| 5) _____ | E. Education |
| | F. Water resource user |
| | G. Water conservation and natural resources |
| | H. Design |
| | I. Construction |
| | J. Other (specify) _____ |

3. Approximate number of employees in the organization.

- 1) Supervisory or administrative
- 2) Professional (such as engineers)
- 3) Sub-professional (technicians)

4. What is the approximate number of employees who, in the normal course of their work, must have access to recently published technical information on water resources?

- 1) Supervisory or administrative
- 2) Professionals (such as engineers)
- 3) Sub-professional (technicians)

5. Of these employees, what percentage of their time is devoted to the search for technical water resources information? (Choose answer from the column at the right)

- 1) ____ Supervisory or administrative
- 2) ____ Professionals (such as engineers)
- 3) ____ Sub-professional (technicians)

- A. None (0%)
- B. Less than 5%
- C. 5 to 10%
- D. 10 to 25%
- E. 25 to 50%
- F. 50 to 75%
- G. More than 75%

6. In your opinion, what percentage of their time should be devoted to this search of the literature if they are to adequately cover material which is available in the field? (Note: In most cases, a limited search of local resources may not provide a true indication of the information which is available.) (Choose answer from column at right)

- 1) ____ Supervisory or administrative
- 2) ____ Professionals (such as engineers)
- 3) ____ Sub-professional (technicians)

Would you now evaluate the information resources 7 through 14 in light of their usefulness to your organization? (Indicate by placing the appropriate letter in the space provided)

- A) A very significant source (available and almost always used)
- B) A significant source (available and usually used)
- C) A source of limited significance (available but seldom used)
- D) An insignificant source (available but not used)
- E) Not available

7. ____ Personal reference libraries.

8. ____ An internal reference library maintained by your organization for use by its employees.

9. ____ A research person (or staff) whose primary duty is to provide assistance in literature searches.

10. ____ A public, private, or academic library which is readily accessible to members of your organization.

11. ____ A specialized information service external to your organization? If available, please specify _____

12. ____ Document centers or external library research services available to your organization? If available, please specify _____

13. ____ Information supplied by vendors, manufacturers, or suppliers.

14. ____ Significant resources of information for your organization other than those mentioned in questions

7-13. Please specify _____

Questions 15 through 25 are concerned with the sources of water resources information (i.e. printed literature) utilized by your organization and their value. Please evaluate each by choosing the appropriate response from the column at the right.

- 15. ____ Trade Journals
- 16. ____ Trade Magazines
- 17. ____ Handbooks
- 18. ____ Reference Books
- 19. ____ Project Reports
- 20. ____ Newsletters
- 21. ____ Printed Advertising
- 22. ____ Catalogues
- 23. ____ Abstract or Citation Bulletins
- 24. ____ Monographs

- A. A very useful source
- B. A useful source
- C. A source of limited significance
- D. Seldom, or never used
- E. None applicable

25. Please list the titles of five of the most useful sources of information to your organization.

26. Yes ____ No ____ Does your organization publish information which would be worthwhile and available for addition to WRSIC's data base?

If yes, please specify _____

27. Would you, as a potential user of the Water Resources Scientific Information Center, please give a brief statement as to some function(s) it might perform or service(s) it might provide which would be of significant value to your organization? _____

28. In the columns below, please indicate 5 to 20 specific topics which you feel best describe your organization's interest in water resources. Use asterisks to indicate your primary interests.

For example, a person interested in a **HYDROLOGICAL CYCLE** might list:

Atmospheric circulation
 *Base Flow
 Cloud Physics
 Energy Budget
 Evaporation
 Groundwater
 *Hydrologic Budget
 Infiltration
 Precipitable Water
 Precipitation

Percolation
 Recharge
 *Runoff
 Saline Water Intrusion
 Solar Radiation
 Water Storage
 Sublimation
 *Surface Water
 Transpiration
 *Water Balance

1) _____	11) _____
2) _____	12) _____
3) _____	13) _____
4) _____	14) _____
5) _____	15) _____
6) _____	16) _____
7) _____	17) _____
8) _____	18) _____
9) _____	19) _____
10) _____	20) _____

29. Yes ____ No ____ A summary report of the results obtained from this questionnaire will be made available to those who have completed a questionnaire. Do you wish to receive a copy of this report?

NOTE: Please return the completed questionnaire in the postage-paid envelope provided.

2. What is the primary purpose of the organization in relation to water resources? List up to five purposes in order of priority.
- | | |
|----------|---|
| 1) _____ | A. Regulatory |
| 2) _____ | B. Research |
| 3) _____ | C. Planning |
| 4) _____ | D. Data collection and record maintenance |
| 5) _____ | E. Education |
| | F. Water resource user |
| | G. Water conservation and natural resources |
| | H. Design |
| | I. Construction |
| | J. Other (specify) _____ |
3. Approximate number of employees in the organization.
- 1) _____ Supervisory or administrative
 - 2) _____ Professional (such as engineers)
 - 3) _____ Sub-professional (technicians)
4. What is the approximate number of employees who, in the normal course of their work, must have access to recently published technical information on water resources?
- 1) _____ Supervisory or administrative
 - 2) _____ Professionals (such as engineers)
 - 3) _____ Sub-professional (technicians)
5. Of these employees, what percentage of their time is devoted to the search for technical water resources information? (Choose answer from the column at the right)
- | | |
|--|--|
| 1) _____ Supervisory or administrative | A. None (0%)
B. Less than 5%
C. 5 to 10%
D. 10 to 25%
E. 25 to 50%
F. 50 to 75%
G. More than 75% |
| 2) _____ Professionals (such as engineers) | |
| 3) _____ Sub-professional (technicians) | |
6. In your opinion, what percentage of their time should be devoted to this search of the literature if they are to adequately cover material which is available in the field? (Note: In most cases, a limited search of local resources may not provide a true indication of the information which is available.) (Choose answer from the column at right)
- | | |
|--|--|
| 1) _____ Supervisory or administrative | A. None (0%)
B. Less than 5%
C. 5 to 10%
D. 10 to 25%
E. 25 to 50%
F. 50 to 75%
G. More than 75% |
| 2) _____ Professionals (such as engineers) | |
| 3) _____ Sub-professional (technicians) | |

Part II. Current Sources of Information

Would you now evaluate the information resources 7 through 14 in light of their usefulness to your organization? (Indicate by placing the appropriate letter in the space provided)

- A) A very significant source (available and almost always used)
- B) A significant source (available and usually used)
- C) A source of limited significance (available but seldom used)
- D) An insignificant source (available but not used)
- E) Not available

7. _____ Personal reference libraries.
8. _____ An internal reference library maintained by your organization for use by its employees.
9. _____ A research person (or staff) whose primary duty is to provide assistance in literature searches.
10. _____ A public, private, or academic library which is readily accessible to members of your organization.
11. _____ A specialized information service external to your organization?
If available, please specify _____

12. _____ Document centers or external library research services available to your organization? If available, please specify _____

13. _____ Information supplied by vendors, manufacturers, or suppliers.
14. _____ Significant sources of information for your organization other than those mentioned in questions 7-13. Please specify _____

15. Does your organization have a library?

Yes _____ No _____

If Yes a. Approximately how many separate identifiable documents are received each year? _____

b. Approximately how many periodical titles are received each year? _____

c. List major water resource areas covered.

16. Yes _____ No _____ Do you regularly receive (without individually requesting) various state and federal reports dealing with some area of water resources?

17. Yes _____ No _____ a. Do you receive newsletters which contain water resources information?
If yes, please specify _____

Yes _____ No _____ b. Are these a useful source of information for current-awareness?

18. _____ Which of the following best describes your utilization of journals and other publications? Do you:

A) Read the articles of interest as the material is received and then file it for later reference.

--or--

B) File the material as it is received. When a problem is presented, perform a search and read those articles which are relevant to the particular problem at hand.

19. _____ hours How much time do you use each week engaged in current-awareness activities? (Average number of hours)

20. List any programs or special services that the organization has to keep personnel current in terms of recent published material on technical aspects of water resources.

Questions 21 through 31 are concerned with the sources of water resources information (i.e. printed literature) utilized by your organization and their value. Please evaluate each by choosing the appropriate response from the column at the right.

- | | |
|---|---|
| <p>21. _____ Trade Journals</p> <p>22. _____ Trade Magazines</p> <p>23. _____ Handbooks</p> <p>24. _____ Reference Books</p> <p>25. _____ Project Reports</p> <p>26. _____ News letters</p> <p>27. _____ Printed Advertising</p> <p>28. _____ Catalogues</p> <p>29. _____ Abstract or Citation
 Bulletins</p> <p>30. _____ Monographs</p> <p>31. _____ Other (please specify)</p> <p>_____</p> | <p>A. A very useful source</p> <p>B. A useful source</p> <p>C. A source of limited
 significance</p> <p>D. Seldom, or never used</p> <p>E. None applicable</p> |
|---|---|

32. Please list the titles of five of the most useful sources of information to your organization.

33. Yes _____ No _____ Does your organization publish information which would be worthwhile and available for addition to WRSIC's data base? If yes, please specify (also charges, if any)

Part III. Information Services

Two types of information services which may possibly be offered by WRSIC in the foreseeable future include current awareness and retrospective search procedures. A description of some possible variations of these services is given below:

- A. Current Awareness - Current awareness services are designed to make the user aware of the existence of current literature which is available in his field. Possible services include:
1. Citation Journal - based on titles of publications, it would probably make use of permuted keyword indexes. For example, a keyword-in-context index to literature normally consists of three main sections: A keyword index, a bibliography, and an author index.
 - a. Keyword Index - Keywords in the title of a publication are arranged alphabetically down the center of each column. Within the limits of the column each title is shifted one word to the right, one keyword at a time, and placed in alphabetic order with all other key-words. Words which are not considered of interest are excluded from the keyword list. Associated with each title is a coded reference to more complete information which may be found in the bibliography.
 - b. Bibliography - The bibliography would contain, in reference number order, the author, title, publication reference, source of hard copy and/or microfiche copy, and cost of the copies.
 - c. Author Index - The Author Index would list the authors in alphabetic order and the associated coded references to each of his publication entries.

Normal use would involve referencing the key word index or the author index and then locating complete information on the entry in the bibliography.

2. Abstract Bulletin - Current abstracts which are designed to indicate content or provide a summary of selected articles involving water resources information will be assembled into a booklet published twice monthly. Bibliographic information will be provided with each abstract to provide the user with information as to the cost and source of the desired documents.

This publication could have several indexes which would provide a ready reference to select subsets of the abstracts which are included. Such indexes could include those described above in the KWIC Index, as well as indexes according to subject categories. Other variations could include several abstract bulletins which contain selected subsets of the total abstracts available arranged by subject categories. (References - Selected Water Resources Abstracts)

3. Selective Dissemination of Information (SDI) - SDI systems provide notification of significant publications in the area of interest of a particular user or a particular category of users. Notification is in the form of abstracts. Interest profiles will be used in the selection of these abstracts.

Interest profiles may consist of up to 20 terms which describe an area of interest. WRSIC is considering two types of profiles for use with their SDI system. They are:

Standard Interest Profiles: A large number of standard interest profiles will be developed to cover a variety of interests based on either specific subject areas of specific categories of users. These standard profiles are useful primarily due to economy of operation. It is less expensive to prepare current awareness distribution material where one profile may serve many users.

Individual Interest Profiles: For those users who do not feel that the standard interest profile will adequately cover their information needs, the individual interest profile can be used. This profile is tailored to the specific interest areas of the user and can, in some cases, provide a better focus for the search procedures.

- B. Retrospective Services- Retrospective searches are designed to provide a complete search of all abstracted articles which are contained in the historical data file to select those items which are of interest to a particular user.

1. Abstract Bulletin - A comprehensive abstract bulletin with subject and author issue indexes and yearly cumulative author and subject indexes, constitutes a retrospective service readily available to all users.
2. Machine Search - Automated Retrospective searches, based on specific areas of interest, result in the identification and availability of the abstracted information which meets the criteria outlined by the user. Sophisticated variations to search techniques can involve such things as the selection of items published after a certain date, the elimination of items which have a certain descriptor and the assignment of extra importance to certain descriptors or combinations of descriptors.

Based on an analysis of these abstracts the user can obtain copies of those documents which are of sufficient interest.

Answer the following questions based on the assumption that the WRSIC data base contains all important technical information which has been published about the water resources problems which confront your organization.

Cost of services: Assuming the only means available for WRSIC to offer a service is through a charge for services rendered, consider the following questions:

34. A) Would you subscribe to a Citation Journal using a KWIC index format (distributed twice monthly), if one subscription cost \$15 to \$20 per year?
- 1) Yes
- 2) No, but would consider the service at a charge of approximately \$ _____ per year.
- 3) No, at any charge (please comment) _____
-
- B) What would be the probable total number of subscriptions within your organization?
35. A) Would you subscribe to an Abstract Bulletin (distributed twice monthly), if one subscription cost \$30 to \$40 per year?
- 1) Yes
- 2) No, but would consider the service at a charge of approximately \$ _____ per year.
- 3) No, at any charge (please comment) _____
-
- B) What would be the probable total number of subscriptions within your organization?
36. A) Would you subscribe to an SDI Service using a Standard Interest Profile (distributed twice monthly), if one subscription cost \$80 to \$100 per year?
- 1) Yes
- 2) No, but would consider the service at a charge of approximately \$ _____ per year.
- 3) No, at any charge (please comment) _____
-
- B) What would be the probable total number of subscriptions within your organization?

37. A) Would you subscribe to a SDI Service using an Individual Interest Profile (distributed twice monthly), if one subscription cost \$250 to \$300 per year?
- 1) Yes
 - 2) No, but would consider the service at a charge of approximately \$_____ per year.
 - 3) No, at any charge (please comment) _____

- B) What would be the probable total number of subscriptions within your organization?
38. A) Would you use the Retrospective Machine Search Service with an Individual Interest Profile, if the charge was \$100 to \$125 per request?
- 1) Yes
 - 2) No, but would consider the service at a charge of approximately \$_____ per request
 - 3) No, at any charge (please comment) _____

- B) What would be your probable number of requests per year?
- C) What would be the probable total number of requests per year within your organization?

39. The following is a list of the services which we have discussed:

- A. Citation Journal - highlighted keyword listing from current water resources titles.
- B. Abstract Services - Comprehensive condensed coverage of all water resources subject areas.
- C. SDI Services - Selective dissemination of current notices of articles based on user profiles.
- D. Retrospective Machine Search - State-of-the-art bibliography based on a specific search request.

Giving due consideration to cost factors and the relative utility of the services described, please indicate your preferences by answering the following questions. (Note: indicate your answers by choosing the appropriate letter(s) from the preceding list)

- 1) If only one service was available which would you prefer? _____
- 2) If only two were available? _____
- 3) If only three were available? _____

Since time is an important factor in the use of information services, consider the following questions: (Choose your responses from the column at the right)

40. Assuming you have need of the retrospective search service, what time period between request and receipt of the results would you consider:

- 1) _____ The most desirable time period?
- 2) _____ The maximum acceptable time period?

41. Assuming you request copies of materials as a result of the various services, what time period between order and receipt of the copy would you consider:

- 1) _____ The most desirable time period?
- 2) _____ The maximum acceptable time period?

- A) 1 week or less
- B) 2 weeks or less
- C) 3 weeks or less
- D) 1 month or less

Microform is becoming a popular form of document storage and transmission because of both cost factors and compactness in relative size (show samples). For example, a single sheet of microfiche may contain up to 60 pages of information and normally costs from 50 to 65 cents per sheet, while hardcopy normally costs from 6 to 10 cents per page with a minimum charge of \$3.00. Microform readers vary in price from \$2.50 for a cheap pocket model to \$500.00 for a deluxe table model. Good serviceable projector models may be obtained for \$50.00 to \$150.00 each.

42. Do you currently have microform readers?

Yes _____ No _____ (If yes, what types and how many of each? _____)

43. If you used these information services, would you plan to request microform copies of material rather than hardcopy? (Consider cost, storage, and ability to make in-house copies of hardcopy material)

Yes _____ No _____ Main reason (comment) _____

44. Availability of copies of printed material: Due to current copyright laws, certain material will only be available through the publishing source. The acquisition of material could be provided as a service of the central facility or could be left to the individual user. In any case, an indication of the source and cost of copies would be given with each abstract. What would be your feelings about being able to order all possible copies (where there is no legal restriction) from one central source? (Choose one of the following responses)

_____ This would be most desirable.

_____ Order source would make no difference.

_____ Ordering from original source would be most desirable.

45. Continual evaluation of services offered would promote improved quality of the services. Would you be willing to complete and return a short evaluation form:

_____ Periodically? (A few per year at irregular intervals)

_____ Regularly? (On receipt of material)

_____ No (please comment) _____

46. Would you, as a potential user of the Center, please give a brief statement as to some function(s) it might perform or service(s) it might provide which would be of significant value to you and your organization? _____

Part IV. Establishing User Profiles

An interest profile may be determined by providing up to 20 descriptor terms which describe a user's interest area. WRSIC is considering two types of profiles (Standard Interest Profiles and Individual Interest Profiles) for use with the various services. These profiles are established through a description of user needs and interests coupled with careful use of the Water Resources Thesaurus*.

In order to provide assistance in the establishment of a number of standard interest profiles, please provide the information as indicated on the interest profile worksheet. The sample worksheet will illustrate the type of data desired.

Part V. Summary Report

Yes _____ No _____ A summary report of the results obtained from this questionnaire will be made available to those who have completed a questionnaire. Do you wish to receive a copy of this report?

Thank you for your cooperation.

*This Thesaurus is a publication of the Office of Water Resources Research (OWRR), and copies may be obtained from the U. S. Government Printing Office at a cost of \$2.00. The Thesaurus is a word list containing cross references and relationships among the scientific and technical terms used by researchers and others. It is used in the indexing of material which is abstracted, as well as in the selection of this material for distribution to the user.

Part VI. Subjective Comments

The following section should be completed immediately after the completion of the interview, but not in the presence of the interviewee.

1. How would you describe the respondent's understanding of water information problems and the potential for automated information systems?

- 1) _____ Excellent perception of the problem
 2) _____ Aware of a large need
 3) _____ Aware of a moderate need
 4) _____ Aware of a small need
 5) _____ Not interested

2. Describe your evaluation of the interview including your thoughts on the accuracy of the data obtained. _____

3. Do you think this organization has a potential need to participate in WRSIC?
 No _____ Yes _____. If so, to what extent?

Quantity

- 1) _____ Potential use of Citation Journal
 2) _____ Potential use of Abstract Bulletin
 3) _____ Potential use of SDI service involving Standard Interest Profile
 4) _____ Potential use of SDI service involving individually tailored
 interest profile
 5) _____ Potential use of retrospective search services (per year)
 6) _____ Other (specify) _____


UNITED STATES
DEPARTMENT OF THE INTERIOR
WATER RESOURCES SCIENTIFIC INFORMATION CENTER
OPERATING FACILITY
 BUILDING 67, DENVER FEDERAL CENTER, DENVER, COLORADO 80225
CURRENT AWARENESS PROGRAM-SELECTIVE DISSEMINATION OF INFORMATION
INDIVIDUAL INTEREST PROFILE WORKSHEET

NAME John A Doe		SOCIAL SECURITY NUMBER 000-00-0000	
POSITION Supervisory Sanitary Engineer			
DEPARTMENT Interior		OFFICE/BUREAU Water Resources	
DIVISION Water Pollution		BRANCH Pollutant Action Studies	
SECTION Natural Streams		UNIT High-plains	
TELEPHONE (303)833-4872 Ext 9999		FTS 303-927-9999	
		INTERNAL MAIL CODE AGRUE	
MAILING ADDRESS →	High-plains Unit, Natural Streams Section		
	Water Pollution Division, Bureau of Water Resources		
	Building 68, Denver Federal Center		
	CITY Denver	STATE Colorado	ZIP CODE 80225
MY PROFESSIONAL INTERESTS ARE:			
<p>The sources, action, and effect of water pollution in the natural streams of the United States. The various sources of pollution, whether man-made or natural, including the major sources of industrial and municipal wastes, as well as such sources as agricultural wastes from feedlots, agricultural chemicals, erosion, acid mine drainage, street sweeping, snow melting chemicals, and organic pollution from swamplands. The action of pollutants in streams, including the path of pollutants, mixing and turbulence, dilution, self-purification, and the effect of new or additional pollutants on the existing pollutants at any point. The effect of pollutants in streams on the fish and wildlife in and adjacent to the stream, the effect on the ecology of the stream, and the effect on animal population using water in the stream.</p>		DESCRIPTORS	
		1.	pollutant identification
		2.	water pollution effects
		3.	*water pollution sources
		4.	effluents
		5.	industrial wastes
		6.	waste water (pollution)
		7.	sewage
		8.	thermal pollution
		9.	municipal wastes
		10.	management
		11.	path of pollutants
		12.	*self-purification
		13.	lotic environment
		14.	agricultural chemicals
		15.	farm wastes
		16.	acid mine water
		17.	streamflow
		18.	flow augmentation
		19.	*low-flow augmentation
20.	*waste dilution		

(Instructions on reverse side)

GPO 848-079

UNITED STATES
DEPARTMENT OF THE INTERIOR
WATER RESOURCES SCIENTIFIC INFORMATION CENTER
OPERATING FACILITY
BUILDING 67, DENVER FEDERAL CENTER, DENVER, COLORADO 80238
CURRENT AWARENESS PROGRAM-SELECTIVE DISSEMINATION OF INFORMATION
INDIVIDUAL INTEREST PROFILE WORKSHEET

NAME		SOCIAL SECURITY NUMBER	
POSITION			
DEPARTMENT		OFFICE/BUREAU	
DIVISION		BRANCH	
SECTION		UNIT	
TELEPHONE	PTS	INTERNAL MAIL CODE	
MAILING ADDRESS 			
	CITY	STATE	ZIP CODE
PROFESSIONAL INTERESTS ARE:	DESCRIPTION		
	1.		
	2.		
	3.		
	4.		
	5.		
	6.		
	7.		
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20.			

(Instructions on reverse side)