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Civil Defense Information Systems Analysis

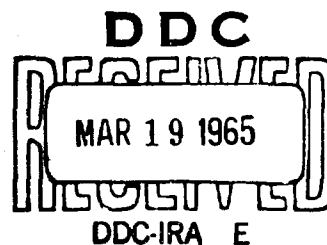
(A Feasibility Study of Research Information Exchange)

Volume I of a Two Volume Final Report

by

W. T. Herzog
J. E. Jenkins

January, 1965



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W. T. Herzog
J. E. Jenkins

January, 1965

Prepared for

Department of the Army
Office of the Secretary of the Army
Office of Civil Defense
Research Directorate

under

OCD Contract OCD-PS-64-56
OCD Subtask 4631B
RTI Number R-OU-158-1

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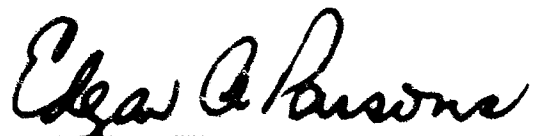
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January, 1965

ABSTRACT

A feasibility study was performed of a civil defense scientific and technical information system that will insure the ready availability of information to all pertinent OCD elements and to contract research personnel. A brief analysis of scientific information systems is presented as background for a discussion of the present civil defense information system. The potential sources of civil defense information are listed. The civil defense information system is defined to be the relationships or exchange between the sources of civil defense information and the users of this information. Methods for improving this exchange are presented. These suggestions include the establishment of an information analysis center, the printing of a quarterly technical progress review, and the use of standard report format and indexing procedures. To foster standard indexing procedures, a Thesaurus of Civil Defense Descriptors is provided. This Thesaurus forms the second volume of this two volume report.

FOREWORD

The research described herein was supported by contract OCD-PS-64-56, beginning 1 December 1963 and terminating 15 January 1965. Approximately two and one-half man years were expended on this work, 40% of which was allocated to the development of the Thesaurus of Civil Defense Descriptors. The thesaurus is bound separately as Volume II of this two volume final report.

This Research Directorate Subtask (4631B) was under the guidance of George F. Divine, Systems Evaluation Division (OCD).

In addition to the listed authors, several other Research Triangle Institute staff members contributed to the research:

Herbert E. Campbell - test of the thesaurus on selected civil defense research documents;

Gordon H. Otto - analysis of computer indexing techniques;

George R. Pappas - analysis of Office of Civil Defense contractor research report format and of pertinent DOD directives.

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I. SUMMARY AND CONCLUSIONS

A. Summary

The objectives^{*} of this research were to (1) "Complete a feasibility study of a Civil Defense Scientific Information and Research Coordination System that will insure the ready availability of appropriate scientific and technical information to all pertinent OCD elements and contract research personnel, and that will also facilitate optimum coordination, direction, and application of the more promising research developments and findings," and (2) to develop a controlled descriptor vocabulary suitable for indexing civil defense scientific information.

The feasibility study was to be made within the objectives of compatibility with the Defense Documentation Center and appropriate OCD liaison to other documentation coordination requirements of the Department of Defense. "For the design and feasibility study of the system, the initial point of departure (was) the key word or "descriptor" index of the Civil Defense Matrix as developed by the Systems Analysis Division."

To meet these objectives, modern methods of scientific information handling, retrieval, and dissemination were reviewed (Chapter III) as a basis for evaluating the present provisions for civil defense scientific information exchange (Chapter IV).

^{*}As extracted from OCD Contract Number OCD-PS-64-56.

From this evaluation, several feasible improvements in the civil defense information system were selected and described in Chapters V and VI, and in the Appendices.

In particular, a major result of this study is the definition of three alternative information centers provided in Chapter VI. An information analysis center is needed to provide central reference and document control for all researchers interested in the field of civil defense.

The information center should collect, index, analyze, announce, and disseminate scientific information pertinent to civil defense.

The minimum information center alternative is utilization of the present Civil Defense Unit of the Army Library, with a continued policy of document collection and regular accession list announcements. In addition, indexing arrangements should be improved to provide periodic subject bibliographies. If the necessary space and personnel arrangements can be provided by the Army Library and the Office of Civil Defense, the added cost of this minimum information center should not exceed \$10,000 per year.

For an added \$90,000 per year, a moderate information center alternative that expands the minimum center's services can be established as described in Chapter VI. A technical consulting or reference staff is added to aid in indexing and announcing important technical findings, to keep up with research in progress, and to aid researchers in their quest for the latest pertinent information.

The third alternative, or high service information center, would provide automatic computer searches of the available research

information. In addition, a quarterly review journal would be published to keep subscribers abreast of general progress in many fields of civil defense research. An added expenditure of \$370,000 per year is estimated for this alternative.

A second major result of this study is the Thesaurus of Civil Defense Descriptors which is Appendix E to this report, and is bound separately as Volume II. This Thesaurus presents a controlled or standardized subject vocabulary for indexing civil defense research information. This vocabulary was built upon the Civil Defense Matrix and the Defense Documentation Center Thesaurus.

B. Conclusions

1. A more effective means for exchange and retrieval of civil defense scientific and technical information is needed. The suggested means or steps are described below.
2. Standard document format and indexing information represent a fundamental step in systematic research report handling. This standardization should be required of contractors.
 - a. A standard report format is described in Army Regulation 70-31, 22 June 1964. As applicable it should be adopted by the Office of Civil Defense. (Reference 1)
 - b. Document control forms (DD-1473) should be bound into the back of each research report. Contract and report data, a brief abstract, and suggested subjects for report indexing can be placed on these forms.

- c. Index terms or subject headings for the document control forms should be chosen in a systematic manner. A Thesaurus of Civil Defense Descriptors has been developed during this study to provide an initial indexing terminology. All contractors authorized to publish reports for OCD should be required to use this thesaurus as a guide when completing DD Form 1473 Document Control Data - R&D.

Since the Thesaurus of Civil Defense Descriptors is compatible with the Defense Documentation Center Thesaurus, indexing suggestions to DDC should be useful in unifying their treatment of civil defense reports. The CD thesaurus should be revised after one year of use to meet the indexing needs and problems which will naturally arise.

3. One central information center is needed to provide a focus for the civil defense information system. This center should collect, index, and disseminate research information pertinent to civil defense. In other words, one place should contain or have reference to everything that is or has been done on a particular research field.

The investment and services from an information center may vary widely. Three alternative centers are described in this report to illustrate the increased services available as the funding rate is increased.

The minimum immediate need for an information center can be filled by the Civil Defense Unit of the Army Library by

adding the services described under the Minimum information center alternative in Chapter VI. Additional space, personnel, and indexing equipment are suggested to improve the present information control exercised by the Civil Defense unit.

4. A more advanced information center is desirable to meet the increasing civil defense information exchange needs. Once the minimum center of conclusion (3) is established, the two other improved alternatives should be considered.

- (a) With increased investment, a moderate information center can be established with a staff of technical consultants to provide information searches and other services.

- (b) A high service information center might be established in the future to take advantage of the latest computer search techniques and to provide critical review of the research literature. These alternatives are described in Chapter VI.

5. Document announcement and review are important services of an information center. The present civil defense accessions list is useful to researchers and should be continued. In addition, subject bibliographies of reports and subject lists of research contracts in progress would be useful services from the proposed information center.

A technical progress review journal, published under contract, should be considered by OCD. The announcement and critical review of research work in this manner was recommended by the President's Science Advisory Committee in 1963. (Reference 2)

6. Interdisciplinary research worker conferences should be continued to expedite interchange of research information. The conferences should serve three purposes: (1) the direct exchange of research information, (2) the creation of a feeling of a community of research, and (3) the facilitation of productive informal contacts (people get to know each other). These conferences should be well-planned to make the best use of research time and money.

II. INTRODUCTION

A. The Problem

The general information dissemination problem was recognized in Department of Defense Instruction 5100.45, 28 July 1964:

"The growth of published and unpublished scientific information that must be assimilated by technically trained managers, scientists, and engineers has resulted in ever-expanding requirements for organized screening, filtering, and reduction of such information to insure that those who need it are provided with the best, the most pertinent, and the most succinct information."

In the specific area of civil defense, research has expanded greatly under the Office of Civil Defense. A more organized means of control and analysis of this information was deemed desirable by the Research Directorate. Therefore, this feasibility study of a Civil Defense Scientific Information and Research Coordination System was initiated in December, 1963.

B. Approach to the Problem

The approach taken was to identify the organizational and procedural constraints on a civil defense information system, to identify the mission and requirements of the system, to identify the organizations, people, and information inputs pertinent to the system, and finally to integrate the organizations and mission in a

functioning information system. The initial approach to the problem was modified as the research progressed, and as changes occurred in the information handling organizations. The approach is discussed more fully below.

1. Organization and Procedural Constraints

- a. The "state-of-the-art" in information retrieval was determined by literature survey and by visits to existing information systems and to equipment demonstrations. The "state-of-the-art" denotes the mechanical, procedural, or cost limitations of information systems.
- b. The Office of Civil Defense's organization and mission was identified as it relates to its information needs and users.
- c. Department of Defense directives and instructions regarding information procedures were evaluated and the conclusions reached in this study were checked for compatibility with the directives.

2. The Mission of an Information System

The mission of an information system is to expedite the flow and interchange of scientific information. Several information systems were examined, including those of the National Aeronautics and Space Administration, the Atomic Energy Commission, and the University of Pittsburgh: The Knowledge Availability Systems Center. The methods by which these example systems accomplished their mission were incorporated, as appropriate, in this report.

3. The Organizations, Users, and Information Pertinent to a Civil Defense Information System

- a. Organizations such as the Defense Documentation Center, the Government Printing Office, and the Science Information Exchange have specified roles in the handling of government financed research information. These organizations must be included in a Civil Defense Information System in addition to those more closely related organizations such as the Army Library and the various Directorates of the Office of Civil Defense.

Many organizations such as the delegate agencies and the National Academy of Science have information services which are occasionally useful in civil defense research. A description of 19 selected sources or organizations is provided in Appendix B.

- b. Users of civil defense information were categorized by Mr. Wayne W. Johnson, Executive Assistant to the Assistant Director of OCD for Research, as follows: (Reference 15)
- "(1) Office of Civil Defense
 - (2) State and local civil defense
 - (3) Other elements of DOD
 - (4) All OCD contractors
 - (5) Other DOD contractors
 - (6) Other government agencies
 - (7) Professional personnel not included above
 - (a) In industry or other private research organizations
 - (b) In colleges and universities

(8) Foreign (NATO or foreign individuals)

(9) General public" (particularly interested or qualified to receive civil defense information).

c. Information occurs in many forms both written and spoken. A brief look was taken at all forms of research information pertinent to civil defense, but the emphasis was upon OCD research reports.

C. Brief Explanation of the Chapters and Appendices

1. Chapter III describes information systems in general and particularly stresses those services pertinent to a civil defense information system.
2. Chapter IV describes the present flow of civil defense information and provides an estimate of the costs now incurred for information transfer.
3. Chapter V lists some opportunities which exist for improving the information system. Several potential improvements are identified specifically; others may be seen from an analysis of Figure 5.
4. Chapter VI describes one specific improvement: the establishment of an information center to control and direct the flow of research information. Three alternative centers are described, in order of increasing services.
5. All references cited in this report are listed after Chapter VI.
6. Appendix A provides a bibliography of books and reports pertinent to the establishment of a civil defense information system. There are a number of good reports and books available on information systems to supplement this report.

7. Appendix B lists the sources of civil defense information which we examined, and describes how to use these sources.
8. Appendix C illustrates KWIC indexing with the 1961-1963 OCD reports prepared for the Systems Evaluation Division.
9. Appendix D describes the values, usage, and implementation of a civil defense review journal.
10. Finally, Appendix E (bound separately as Volume II) presents a civil defense vocabulary of descriptors which can be used to standardize the indexing of research information.

III. THE FUNDAMENTALS OF INFORMATION SYSTEMS

A. Background for this Chapter

This chapter describes the fundamentals of scientific and technical information systems. This description is pertinent to the selection of a feasible system for the Office of Civil Defense.

A generalized information system is discussed to provide a frame of reference for discussion of the selection of specific system components. The selection of components hinges upon the system design factors and parameters and their cost relationships. These are discussed in Section C.3., page 13.

Throughout this section comments are provided to relate this general information system background to the requirements for civil defense research information.

Numerous publications and reports on the theory and "state-of-the-art" in scientific and technical information systems are available. Several of these publications are listed in the References section and in the Bibliography (Appendix A).

B. The Purpose of an Information System

The primary purpose of a scientific and technical information system is to enable the best use to be made of available information: (a) by storing information in such a way that it can be retrieved in response to specific queries; and (b) by augmenting communication between scientists, policy makers, and operational planners.⁶ The value of such a system is often not quantifiable.⁷ The costs of duplication of effort (overlooking significant findings) due to an

inadequate information system usually cannot be documented.^{8,9} The field of civil defense has been fortunate in this respect because of the limited CD research and operational efforts. Within the larger scientific community, however, communication between scientists has become a critical problem.¹⁰ The large quantity of information in the form of technical reports, journal articles, and books has defied any easy solution.¹¹ In this chapter we will discuss several choices available to OCD in designing an information system best suited to the requirements of the field of civil defense. Unfortunately there is no single low cost system which can fulfill the information requirements of all disciplines or operational units involved in civil defense work.

In Appendix C we have outlined three of the many possible information centers which could be adopted by OCD to serve as the keystone of an information system.

C. Scientific Information System Fundamentals

1. Information Forms, Users, and Flow

a. Forms of Scientific Information

Information may be obtained in several manners or forms.

Nine forms are considered in this report.

- (1) Reports & Books (Including all documents and films).
- (2) Review Articles (Consolidating and evaluating several reports or papers).
- (3) Abstracts (Indicating the report contents, or giving information from the report).

- (4) Accession Lists (Announcing titles, and perhaps abstracts, of documents received at a library or information center).
- (5) Bibliographies (Lists of titles, perhaps with annotation, of reports pertinent to a particular subject).
- (6) News Releases (For popular consumption).
- (7) Formal Meetings (Including conference speeches and papers).
- (8) Discussions (Informal communications in person, by telephone, or by letter).
- (9) Work in Progress (Descriptions of the subjects and the personnel involved in current research work).

b. The Users of Scientific Information^{12,13}

The users of information may desire planning or policy guides, operating guides, data for further research, or simply interesting background.¹⁴ An example list of the potential users of scientific information was given on page 9, earlier, and in Reference 15.

c. The Flow of Information

The forms of information have been listed and the potential users mentioned. An information system fosters the flow of information in these many forms to the users of the information. The stages in this flow process are listed below as they apply to civil defense information:¹⁶

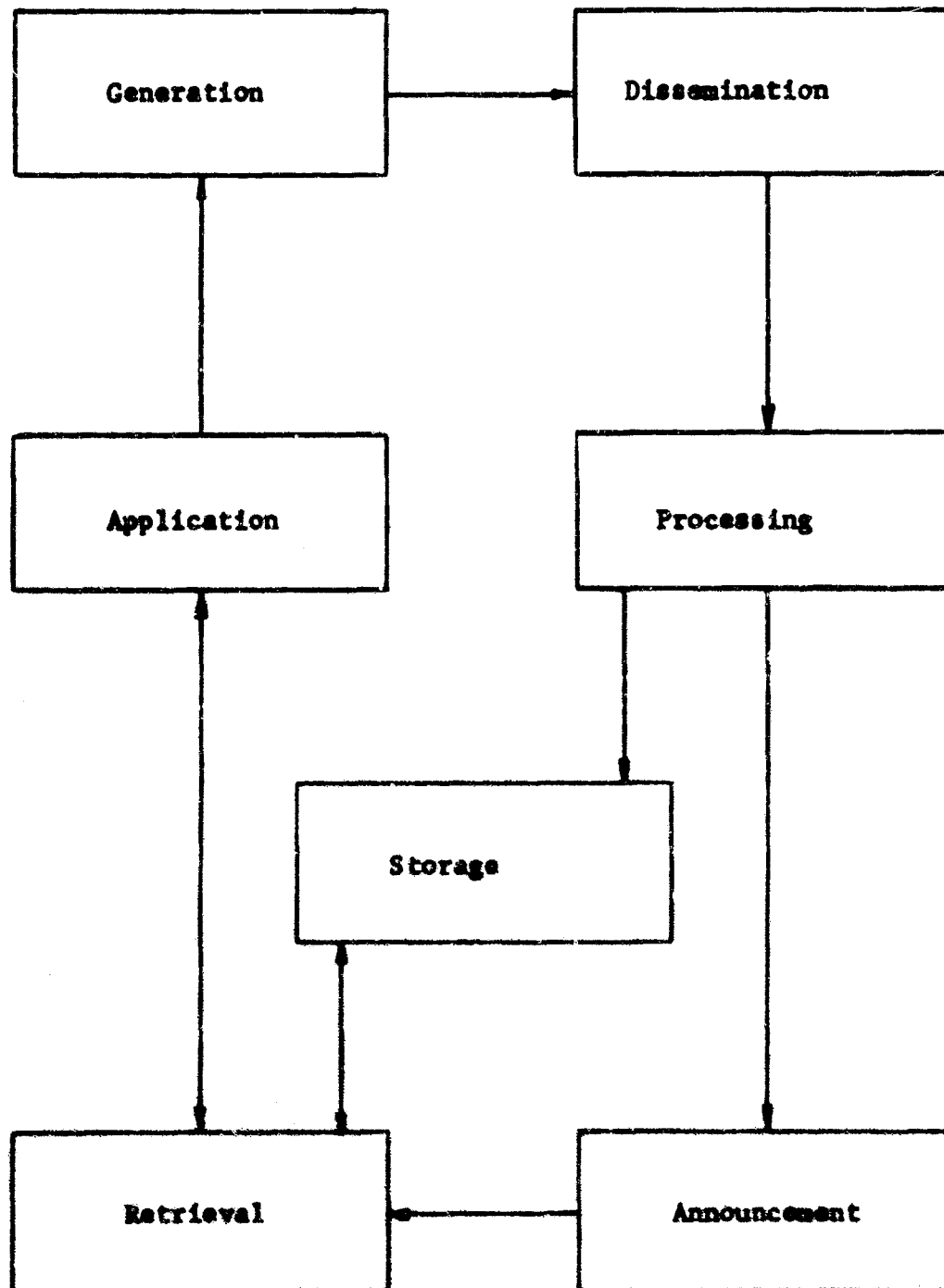
- (1) Generation - preparation of reports by research contractors.
- (2) Dissemination - distribution of the reports by the contractor according to the required distribution list (primary distribution); and distribution by Defense Documentation Center, upon request (secondary distribution).
- (3) Processing - indexing, cataloging, abstracting, classifying and possibly reducing reports to microfilm;
- (4) Storage - assembly of reports in a central file in original form or as microfilm;
- (5) Announcement - notification that reports are available as in accessions lists, abstract bulletins, newsletters, etc.;
- (6) Retrieval - search of the central file to retrieve information on a particular topic;
- (7) Application - the use of information provided by the system in further research, policy making, or operational planning. The relations among these stages is illustrated in Figure 1, and further explained in Part 2 of this section.

2. Discussion of the Information Flow Process

The information flow cycle shown in Figure 1 is approached in numerous ways depending on the nature of the organization and the orientation of the information system personnel. The flow is

FIGURE 1

The Information Cycle



reviewed here to point out the operations involved and the potential range of approaches.

a. Generation of Research Information

In discussing generation of information, we will comment only on the measures taken by report authors to enhance the distribution, processing, storage, and retrieval of the report. Historically, authors have participated by titling reports and by preparing a summary of the document. Also, the author's name, his employer, the publisher, date of publication, and the location of the publisher have become useful tags or identifiers in storing and retrieving the document. The more modern technical systems expand the author's role to include pre-indexing, more accurate titling, and preparing an abstract.¹⁷ These simple steps can be invaluable in reducing processing time, and in improving the accuracy of indexing. Even such simple steps as standardizing the size of documents and titling the spine or binding of a report, so it can be easily located on a shelf, can greatly enhance the storage, retrieval, and subsequent use of the document.

b. Dissemination (and Acquisition)

The step of dissemination can be looked at from two viewpoints - the viewpoint of the sender and that of the receiver. In the latter case it is more logically called acquisition, one of the more important operations in a

technical library or information center. Distribution lists and acquisition policies should be such that all reports of vital interest to an agency are initially sent to, or received by that agency.¹⁸ Although widespread initial distribution of documents is costly, it is one of the more effective ways of assuring that the right agencies receive a report. It also reduces the time lag in processing.

c. Processing

In very small systems, such as those adopted for personal use, few of the above mentioned steps are followed. Documents are acquired as needed, they are generally not indexed, and they are often stored in random order. Often in small systems, which are used infrequently, the time spent in processing would exceed that spent in a search of a random file for specific documents.¹⁹

Processing is mainly concerned with indexing the document, i.e., preparing it for announcement and storage. The indexing may be under a classification scheme such as the Dewey Decimal System or under a coordinate indexing scheme such as the Defense Documentation Center (DDC) Thesaurus.^{20,21}

The indexing rationale of these two systems is discussed further under Storage (Paragraph e).

d. Announcement

The techniques for announcing the availability of documents, reports, or journal articles have undergone wide expansion in existing information systems. Such techniques include: the abstract bulletin; key-word-in-context (KWIC) indexes of permuted titles; subject bibliographies (often annotated); accession lists; publication of technical reviews or research newsletters; and selective dissemination of citations and abstracts. These techniques are discussed below.

(1) The Abstract Bulletin

The abstract bulletin, such as the Defense Documentation Center Technical Abstract Bulletin (TAB) presents a list of citations and abstracts of reports received. This enables the reader to browse through the abstracts in search for reports on a specified subject, and to order the reports desired. Often the abstracts include substantive information (informative abstracts) which in itself can be useful to the reader without obtaining the report.

(2) Key-Word-In-Context Indexes²²

Key-Word-In-Context Indexes are useful if the reader knows:

- (a) a word in the title of a document he is searching for;
- (b) the author's name;
- (c) the document source; or
- (d) the document number.

An example of a KWIC index is provided in Appendix C.

(3) Bibliographies

Bibliographies may be prepared covering a specified time period. They may be prepared as documents are received, or they may be prepared in response to a request for a search of the central files. They enable the reader to review a list of available documents on a particular subject area, such as Fallout Shelter Construction. Notes on document contents or abstracts are often included to give the reader a better idea of document contents.

(4) Accession Lists

Accession lists are simply lists of the documents received by a library or information center over a given period of time. They may list documents in the order received, or, for the convenience of the reader, they may list them according to some hierarchical classification scheme. Annotations may be provided.

(5) Review Articles

Technical review journals are recommended in highly technical fields.² Well qualified reviewers examine and comment on available publications on specified subjects. These reviewers not only report the availability of documents, but they also comment on their significance and worth to the field of inquiry. The use of a review

journal for civil defense research is discussed extensively in Appendix D. The research newsletter is an abbreviated publication using this comment technique.

(6) Selective Dissemination

Selective dissemination of citations and abstracts is a refinement of the techniques used in preparing abstract bulletins. Selective dissemination is currently used in large organizations, such as IBM and the Bureau of Mines, to replace the company-wide routing of documents and journals.

Individual citations or abstracts are sent to the persons whose interests match the topic of the report cited or abstracted.²³

e. Storage^{24,25}

(1) By Hierarchical Classification

In a large traditional library, documents are stored on shelves in a hierarchical order, i.e., all the books on mathematics are placed in one location. However, since a single document might logically be stored in more than one location, it is necessary to utilize the cross-referencing capabilities of a simple card file.²⁶ For example, a book entitled, A Mathematical Treatise on Genetics in the Amphibians, might logically be placed in the general areas of Mathematics, Genetics,

or Amphibians. Therefore, an index card under each of these titles can be used to compensate for overlaps in the hierarchical scheme, thus furnishing "keys" to the actual document. By adding cards for the author, title, source, and one or more subject headings, a method for systematic search of the available documents is provided.

(a) Advantages

The advantages of such card catalog systems are:

- (i) they can handle very large collections of documents (e.g., the Library of Congress contains over 12,000,000 books);
- (ii) they offer the opportunity for the user to look at shelves of related documents.

(b) Disadvantages

The disadvantages of the traditional library system are:

- (i) library indexers are often not knowledgeable in the specialized fields of many documents;
- (ii) subject headings assigned are often too few and too general, the document may become "lost" in the collection;
- (iii) much time is required in indexing and much specialized training of indexers is necessary for full understanding of the classification scheme.

(2) Storage by Accession Number²⁷

In many current technical libraries, such as DDC, documents are stored according to the date of acquisition. Documents are indexed according to the "coordinate system". For example, the document, "Mathematical Treatise on the Genetics of Amphibians" would be assigned certain identifying terms, such as Mathematics, Genetics, Biology, Reproduction, Biophysics, and Amphibians.

(a) Advantages

The advantages of this type of system are:

- (i) indexing can be more comprehensive by assigning a large number of identifying terms;
- (ii) the coordinate process is easily adapted to several semi-automated or automated data processing techniques; and
- (iii) the indexer need not be familiar with a complex classification scheme.

(b) Disadvantages

The disadvantages of the coordinate system are:

- (i) the user cannot look at related documents directly, since they are put on the shelves in the order received; therefore, he is highly dependent on the reference file; and
- (ii) the simple coordination of terms ignores the interconnection between words in a given phrase.

f. Retrieval²⁸

The search and retrieval process is specified by the processing and storage methods employed.²⁹ These have been explained above. The output of the retrieval system may occur in increasingly complex and costly forms. For increasing cost you may retrieve; (in answer to a query):

- (1) References or document citations,³⁰
- (2) Pertinent documents and reports,³¹
- (3) Data from pertinent documents,³²
- (4) A digest of pertinent data and an answer to your question.

At present, this step must have human participation in an Information Analysis Center. The other three retrieval outputs may be automated.

g. Application

Application of information received may call for further searches for information, or the application may lead to the generation of new information.

3. Information System Component Selection

The preceding section examined the flow of information from generation through storage to retrieval. This section addresses itself to the design of a system to promote this flow.

a. Factors in Information System Design³³

A number of factors must be considered in designing a scientific information system for a given organization. Once

these factors are identified, the parametric relations among component functions and costs specify the operating regime for the system. The factors are:

- (1) Size and Nature of User Audience - whether the system should be designed to serve researchers only, or whether it should be extended to serve all scientists and administrators interested in the subject area of civil defense.
- (2) Scope of Collection - whether the collection should be restricted to documents prepared by the organization itself or whether it should include all relevant documents, or a combination of these approaches.
- (3) Depth of Services to be Provided - whether search replies will be in the form of citations, documents, data, or answers. For instance, DDC supplies citations and documents.
- (4) Form of Collection - whether in original form, microfilm, microcard, punched cards, or magnetic tape.

b. Parameters in Information System Design²⁴

The parameters interact with one another to narrow the system choices. For example, the storage and retrieval equipment selected will limit the choices of types of files and the indexing method. The interaction among the factors and parameters are illustrated in Figure 2. Important parameters are:

- (1) Centralization - whether a system will consist of a centralized file of references and documents or whether it will include sub-systems which are dispersed over a wide geographic area.
- (2) Type of Files - whether cross-reference card files, abstract files, or coordinate files are to be used.
- (3) Indexing Method - whether to index by using a hierarchical classification scheme or to index using the coordinate system.
- (4) Storage and Retrieval Equipment - whether processing, storage, and search and retrieval should be manual, semi-automatic, or fully automatic.
- (5) Announcement Techniques - whether announcement should be limited to the research community, extended to include all interested personnel, or to some intermediate size audience.
- (6) Lead Time - the delay from the generation of new information until its general dissemination. Lead time is composed of the delays in publishing results, in announcing the publication, and in retrieving the publication.

c. Cost Relationships in Information System Design

Variations in the design parameters cause the services and the cost of services to change. As Figure 2 has illustrated, the parameters are interrelated. A simple comment on costs is not possible. Instead, a few general cost relationships will be presented.³⁵

FIGURE 2

Interactions Among Information System Factors and Design Parameters

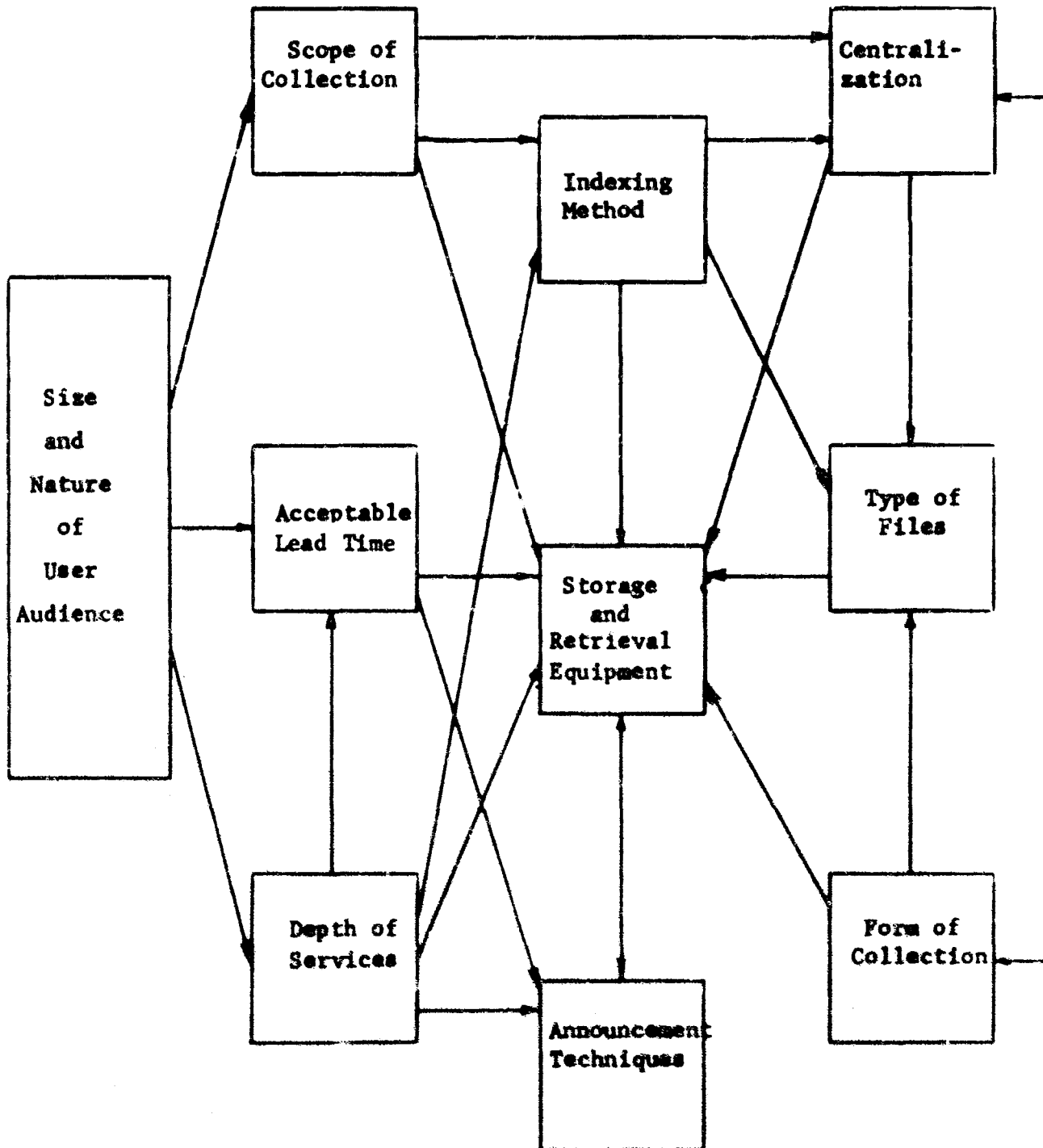


Figure 3 illustrates the effect of the acceptable lead time between generation and dissemination on the overall system cost.³⁶ In this illustration the costs of excessive delay in the form of duplication of effort or the unavailability of important information are shown schematically. The simultaneous publication and transfer of research results is almost impossible to achieve and would be very costly. At the other extreme, an extended lead time would result in high cost due to duplication and unavailability of the results of other completed research. There is a compromise or minimum point between these two extremes. This minimum point varies with the research advance rate in a field. A delay of one to two years is the current average. Figure 3, for illustration, shows an optimum near one year.

In many systems today, research results are reported annually. Therefore, the lead time from generation to publication is approximately six months. The lead time in announcement after publication is usually one to six months, and a similar lead time occurs from receipt of the announcement to retrieval of the document containing the research results.

Few systems include reporting of work in progress except in the form of contractor conferences and seminars.

The relationship between costs of manual and automated systems is illustrated in Figure 4. The manual system is generally the lower cost system for small systems.²⁶ The completely automated system (tape storage of text) cost could be expected to

FIGURE 3

Information System Cost Versus
Delay in Dissemination of the Information

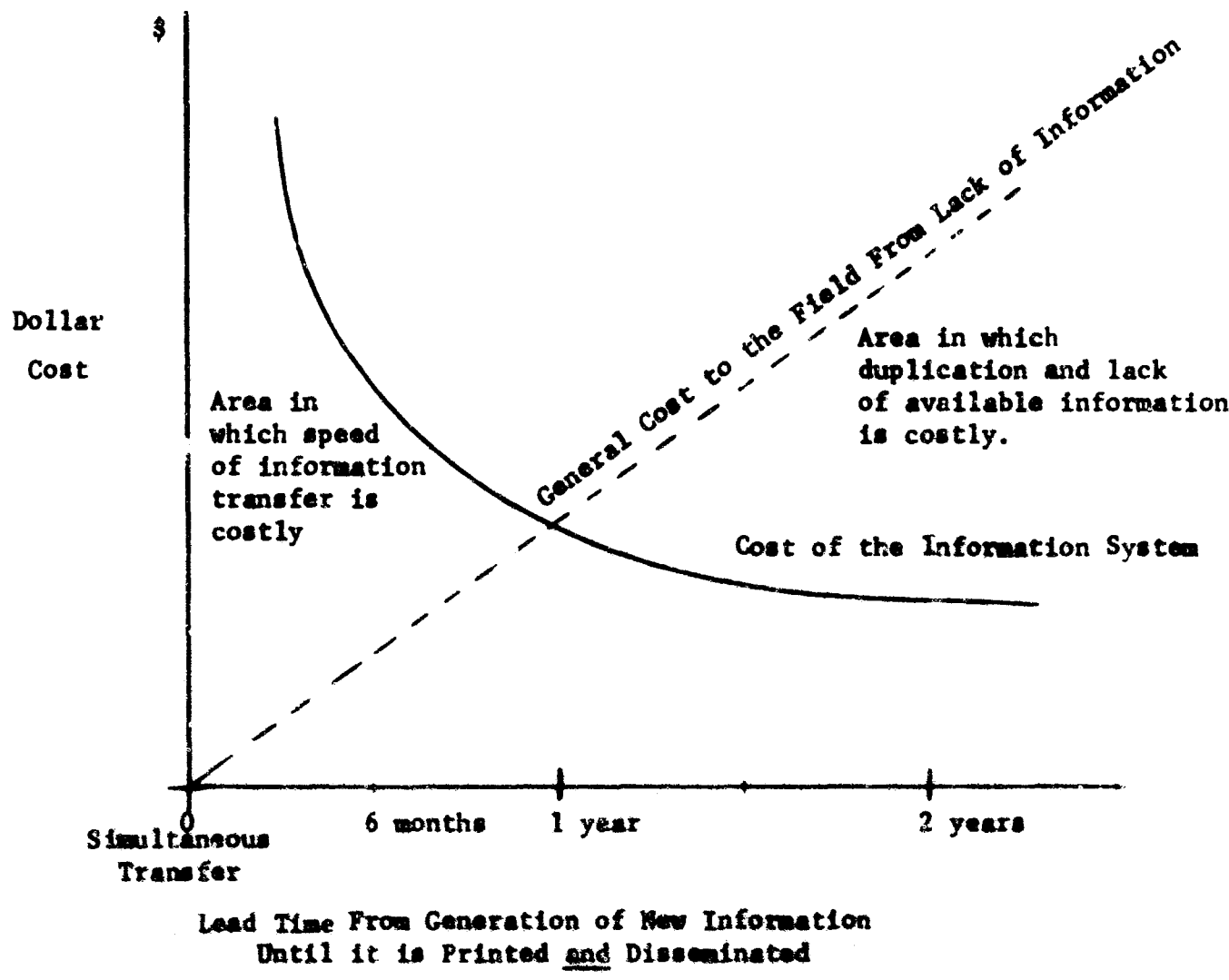
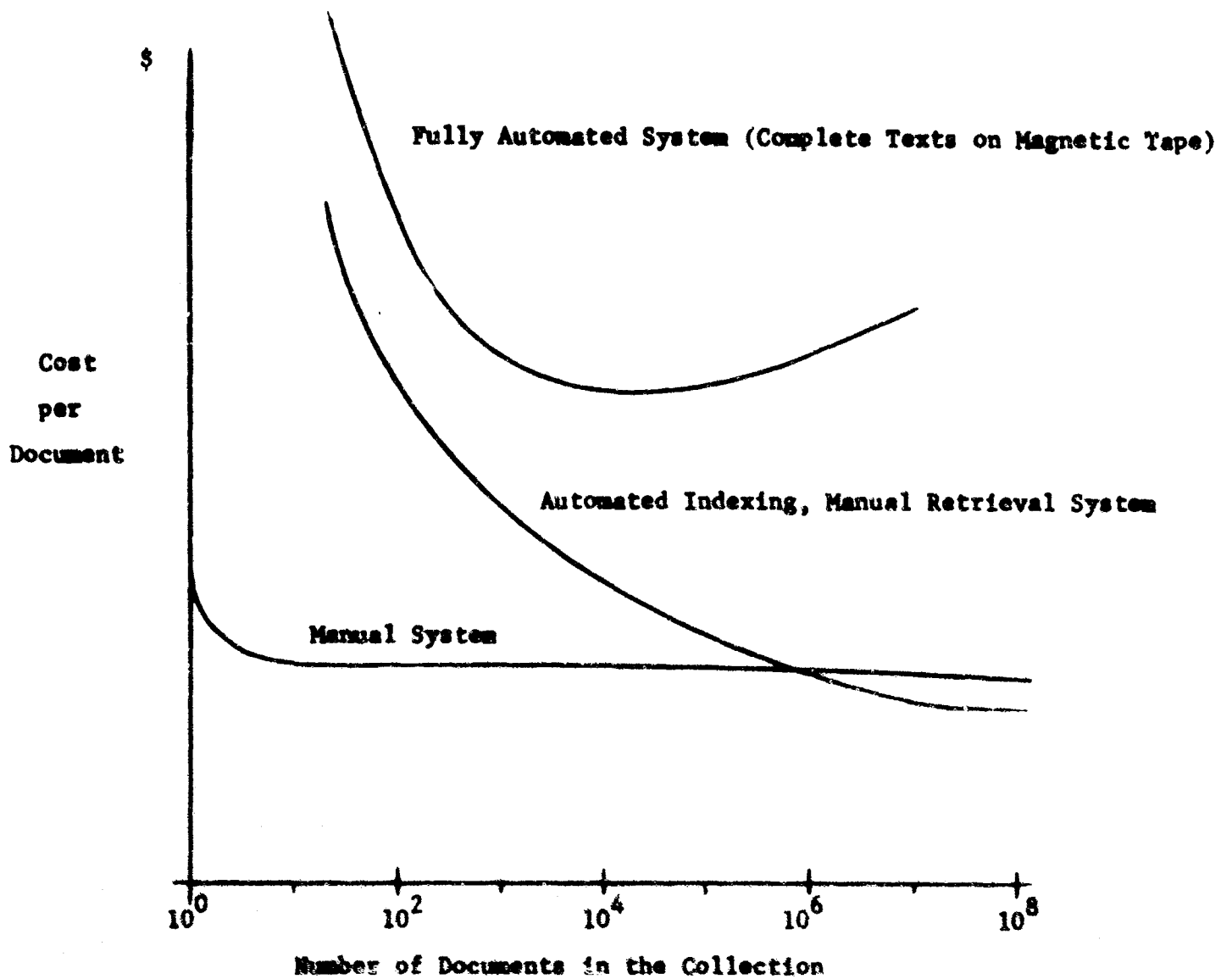


FIGURE 4

Information Storage and Retrieval Costs for Manual,
Semi-Automated and Automated Systems



be very high for small collections, reasonably low for moderate sized collections, say 10,000 or 1,000,000 documents, and high for very large collections. This rise in cost for large collections is due to the fact that such collections require many tape storage and control units and the interconnection costs cause the curve to rise. It is estimated, for example, that somewhere in the range of 12-24 books could be completely entered, word-by-word, on a single magnetic tape.³⁴ To reduce a collection the size of the Library of Congress to tape would therefore require somewhere between 500,000 and 1,000,000 reels of tape - or impressive amounts of solid state memory capacity; not to mention the cost of transferring the words to tape, or the borderline feasibility of transferring diagrams, blueprints, maps, pictures, etc.³⁸ On the other hand, the cost of transferring the reference card files to magnetic tape is relatively low, and the advantages of such an operation have led to efforts in this direction. This is the semi-automated system.^{39,40}

IV. THE PRESENT CIVIL DEFENSE INFORMATION SYSTEM

A. Background

The elements of information systems were discussed in Chapter III. Some comments were made on the present civil defense information system. This chapter will comment more specifically on civil defense information flow and note some of the gaps in the present flow. The comments are based on our discussions with about 60 OCD staff and contractor personnel and on an analysis of a sample of 100 research reports.

In Section B of this chapter, an information exchange matrix is presented to describe the exchange of information between five users and 19 information sources or depositories. This matrix should provide an overview of the entire transfer of civil defense scientific information.

Finally, cost data are provided on the present civil defense information system in Section E.

B. The Present Information Flow

1. Generation

OCD, DOD, AEC, and HEW staff and contractors generate most of the pertinent research information. These data are prepared in varied formats. Standard formats are being encouraged by the Department of Defense (References 1, 35, and 42). In addition to standard report size and printing, indexing aids are encouraged. These include abstracts, index cards, and a document control form (DD1473).

2. Dissemination

The OCD Research Directorate provides each contractor with a distribution list for his final report. The distribution list

includes OCD Directorates, the Army Library, the Defense Documentation Center (DDC), various Department of Defense units, and selected contractors. This list is described more fully in Appendix B, Section 1.

Secondary distribution is provided by the DDC and loans by the Army Library.

3. Processing

The Army Library copies of research reports are catalogued using standard library procedures and entered in the general collection.

The DDC copies of research are provided with an accession number and appropriate indexing descriptors, and these data are placed on a magnetic tape which can be computer searched. The documents are microfilmed. When the initial printed supply (received from the contractor) is exhausted, further copies are made by Xerox from the microfilm.

4. Announcement

The Army Library announces a few civil defense research documents on its Selected Current Acquisitions. The civil defense accessions list is a useful announcement technique. It was appreciated and used by a number of the research contractor personnel we contacted.

The DDC announces the research reports it receives in its bi-weekly Technical Abstract Bulletin, available to all government agencies and their contractors.

5. Storage

Research reports are stored by the Army Library and DDC, as mentioned above, and by research personnel in private collections.

6. Retrieval

The procedures to obtain research information vary, as the information exchange matrix (Figure 5) will show. There is presently no one place to go to get comprehensive information or to get comprehensive directions to obtain information.

C. Information Exchange Patterns

This section addresses itself to several questions concerning information transfer. These questions are:

- Who are the information users? (Section 1, below)
- How can the users know what information exists? (Section 2, below)
- Where are the information sources? (Section 3, below)
- How can the users get the information from these sources? (Section 3, below).

The answers are displayed on the exchange matrix in Figure 5.

1. The Users of Information.

For illustration, five users of civil defense information are shown on Figure 5. The frequency of demand of the users and an evaluation of the importance of their demands are shown in Table I.

The users illustrated are individuals in the:

- (a) Office of Civil Defense,
- (b) State and Local Civil Defense,
- (c) OCD Contractors,
- (d) Delegate Government Agencies,
- (e) General Public.

TABLE I

The Frequency of Demand and the Importance
of Selected Information Users^{*}

<u>User's Organization</u>	<u>Frequency of Demand for Research Information</u>	<u>Importance of Queries</u>
Office of Civil Defense	On regular distribution. Frequent additional demands.	Very
State and Local Civil Defense	Modest Number	Quite
OCD Contractors	On distribution for reports in their areas of research. Fairly frequent additional demands.	Very
Delegate Government Agencies	Seldom	Variable
General Public	Modest Number	Variable

^{*} Based on Reference 15

2. How to Know What Information Exists

A user can know what information exists by reading Review Articles, by regularly scanning Accession Lists, or by requesting Bibliographies on a particular subject.

The user may also be led to information by Discussions with individuals knowledgeable in the field, particularly those individuals with research Work in Progress. News Releases may also notify users of available information.

The information itself, may be contained adequately in Abstracts, or it may be necessary to read the Reports & Books themselves. The information also may be obtained by attendance at Formal Meetings where papers are presented.

The nine underlined terms are referred to in Figure 5 as the forms of information available to each of the five users. These forms correspond to the rows in the information exchange matrix.

3. The Sources of Information

Nineteen sources of information are listed across the top of Figure 5. Two of these sources are proposed, i.e., they don't exist at present, but would be useful as indicated in Figure 5. An Information Analysis Center and Depository Libraries are proposed as sources of information. The proposed Information Analysis Center is explained in Section VI.

The information services of the 19 sources are described in Appendix B in detail. These sources are:

- (1) Research Directorate - OCD
- (2) Other Personnel - OCD
- (3) Publications - OCD
- (4) Information Center - OCD (Proposed)
- (5) Depository Libraries - OCD (Proposed)
- (6) Contractors - OCD
- (7) Army Library - Pentagon
- (8) Defense Documentation Center
- (9) Delegate Agencies (including OEP)
- (10) Government Printing Office
- (11) Clearinghouse for Federal Scientific and Technical Information
- (12) Library of Congress
- (13) Atomic Energy Commission
- (14) NIH, NASA, NSF, etc.
- (15) Science Information Exchange
- (16) National Academy of Science (NRC)
- (17) Centers for Analysis of Scientific and Technical Information
- (18) Professional Societies and Journals
- (19) News Media

Legend to Figure 5

The Symbols		Explanation
The Acetate Overlay	A Clear Rectangle	Little or no information is presently provided to the user by the corresponding source.
	A Black Dot	There is limited to fair exchange of information at present.
	A Black Rectangle	There is satisfactory or good exchange of information at present
The White Sheet	A Clear Rectangle	There is little or no potential exchange of information.
	An Orange Dot	There is a limited to fair potential for information exchange in the future.
	An Orange Rectangle	There is good potential for information exchange in the future.
The Combined Figure (what appears when the overlay covers printed sheet)	A Clear Rectangle	There is little or no present or potential exchange of that form of information likely between the corresponding user and source.
	An Orange Dot	There is no present exchange, but there is a fair potential for exchange.
	A Black Dot	There is limited or fair exchange now and no potential improvement.
	A Black Dot on An Orange Rectangle	There is fair exchange now, but it could be improved.
	An Orange Rectangle	There is little or no exchange now, but the potential for exchange is good.
	A Black Rectangle	There is satisfactory or good exchange now.

NOTE: The cases where orange symbols are obscured by the black overlay are included above under explanation of the black symbols. Therefore, although there are three black and three orange symbols, there are only six pertinent combinations.

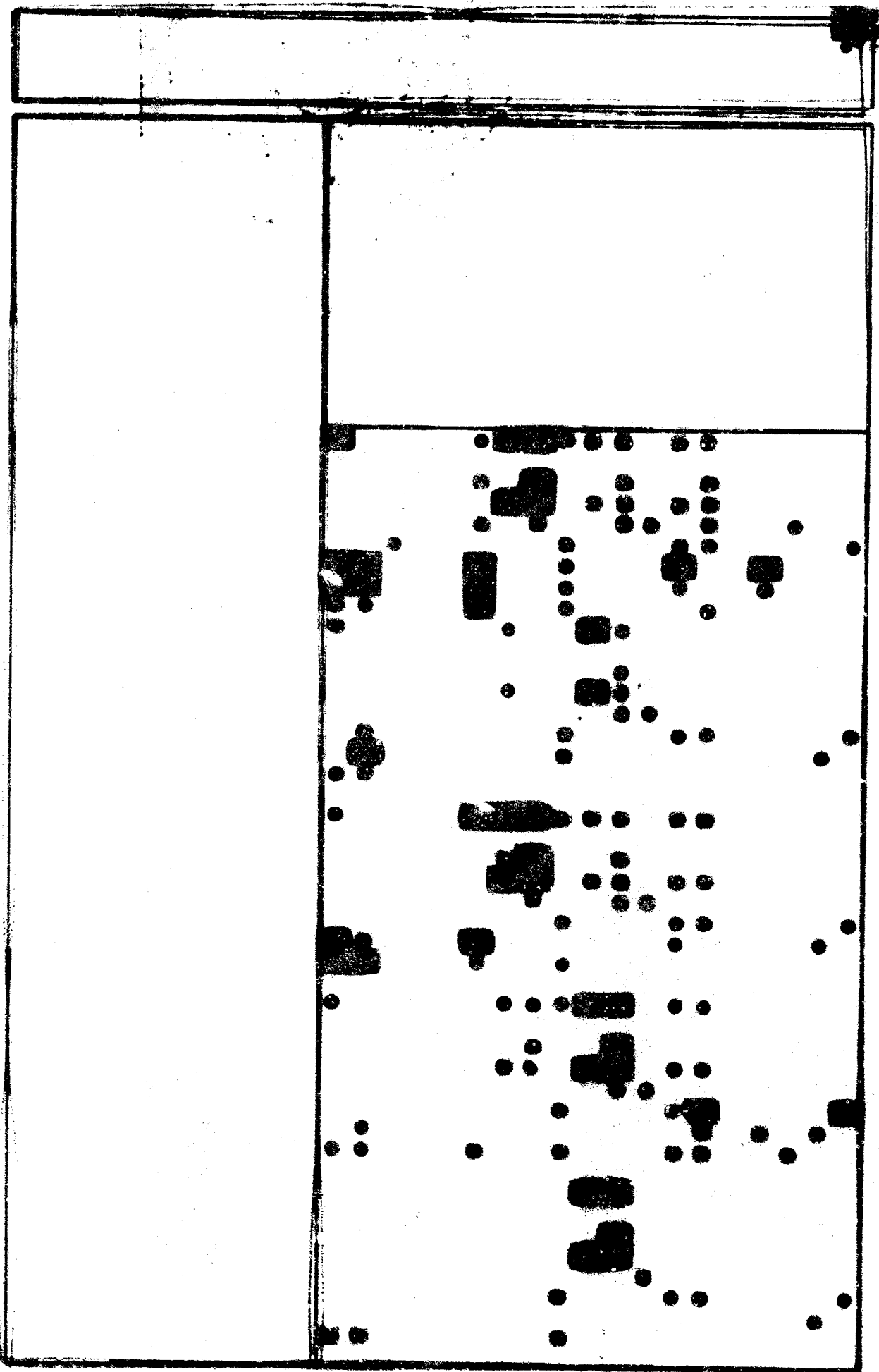


FIGURE 5

THE CIVIL DEFENSE INFORMATION SYSTEM

PRESENT TRANSFER

POTENTIAL TRANSFER

GOOD
FAIR
LITTLE
GOOD
FAIR
LITTLE

THE USERS OF CIVIL DEFENSE INFORMATION AND THE FORMS OF THIS INFORMATION		THE SOURCES OF INFORMATION USEFUL TO CIVIL DEFENSE RESEARCH																					
				OCD - RESEARCH DIRECTORATE	OTHER PERSONNEL	PUBLICATIONS	INFORMATION CENTER (PROP.)	DEPOSITORY LIBRARIES (PROP.)	CONTRACTORS	ARMY LIBRARY - PENTAGON	DEFENSE DOCUMENTATION CENTER	DELEGATE AGENCIES (INCLUDING OEP)	GOVERNMENT PRINTING OFFICE	CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION	LIBRARY OF CONGRESS	ATOMIC ENERGY COMMISSION	NIH, NASA, NSF, ETC.	SCIENCE INFORMATION EXCHANGE	NATIONAL ACADEMY OF SCIENCE (NRC)	CENTERS FOR ANALYSIS OF SCIENTIFIC AND TECHNICAL INFORMATION	PROFESSIONAL SOCIETIES & JOURNALS	NEWS MEDIA	
OFFICE OF CIVIL DEFENSE	REPORTS & BOOKS REVIEW ARTICLES ABSTRACTS ACCESSION LISTS BIBLIOGRAPHIES NEWS RELEASES FORMAL MEETINGS DISCUSSIONS WORK IN PROGRESS																						
STATE AND LOCAL CIVIL DEFENSE	REPORTS & BOOKS REVIEW ARTICLES ABSTRACTS ACCESSION LISTS BIBLIOGRAPHIES NEWS RELEASES FORMAL MEETINGS DISCUSSIONS WORK IN PROGRESS																						
RESEARCH CONTRACTORS	REPORTS & BOOKS REVIEW ARTICLES ABSTRACTS ACCESSION LISTS BIBLIOGRAPHIES NEWS RELEASES FORMAL MEETINGS DISCUSSIONS WORK IN PROGRESS																						
DELEGATE GOVERNMENT AGENCIES	REPORTS & BOOKS REVIEW ARTICLES ABSTRACTS ACCESSION LISTS BIBLIOGRAPHIES NEWS RELEASES FORMAL MEETINGS DISCUSSIONS WORK IN PROGRESS																						
PUBLIC AND OTHER USERS	REPORTS & BOOKS REVIEW ARTICLES ABSTRACTS ACCESSION LISTS BIBLIOGRAPHIES NEWS RELEASES FORMAL MEETINGS DISCUSSIONS WORK IN PROGRESS																						

D. The Civil Defense Information System

The present information transfer patterns are evaluated in the matrix presentation of Figure 5. This section explains that figure, in addition to the explanation given in the figure legend. The judgments made in preparing this figure are based upon our visits to examples of each of the listed sources and our visits to and discussions with about 60 information users (Reference 15).

The orange, clear, or black rectangles and dots in Figure 5 are meant to illustrate the present and potential exchange patterns for CD information.

The first data to consider, the present situation, are shown on the black printed overlay.

Our evaluation of information exchange is placed in the rectangle formed by the intersection of a row and a column. For instance, row one describes the places a user in the Office of Civil Defense presently searches for a report copy: chiefly, the OCD research directorate, the Army Library, or the Defense Documentation Center. Occasionally this user requests the document from a Contractor, a Delegate Agency, the Government Printing Office, the Federal Clearinghouse, the AEC, or the NIH.

In other words, when a solid black rectangle falls at the intersection of a user row and a source column, it means that the user normally looks to that source for information. In the illustration above, a user in the Office of Civil Defense, when looking for reports normally looks to the Army Library (among others) for copies. Therefore, a black rectangle fills the space at the intersection of row one,

(Office of Civil Defense - Reports & Books) and column seven (Army Library).

When a black dot is placed at an intersection, it means that some limited exchange occurs. The limitation may occur because the source service is limited or because the users makes inadequate use of the available service.

When no black mark is placed at an intersection, little or no information exchange now occurs between the particular user and source combination.

E. Costs of the Present Information System

1. The Research Contractors

The first elements of information costs investigated were those costs, incurred by the research contractor, shown in Table II. These were obtained by interview and examination of project records at the Research Triangle Institute and consequently may not be representative.

The final report costs include only those of printing and mailing and do not include typing the master copy.

The formal conference costs include the direct costs of preparing for and attending formal meetings, briefings, etc.

The informal conference costs include all contacts for information exchange except the mailing of final reports and presentations at formal conferences. These costs were surprisingly low in the authors' opinion and may indicate some hesitancy among contractors to exchange data.

TABLE II

Estimated Annual Direct Expenditures by OCD
Research Contractors for Information Exchange*

Type of Expenditure	Average Percentage of Contract Cost	Range of Total Percentages (from Data)	Total Annual Cost for All Contractors (Based on \$10 million research budget)
Final Report Distribution:			
Printing	1.0%	(0.8 to 2.0%)	\$110,000
Handling and Mailing	<u>0.1</u>		
Total	1.1%		
Formal Conferences:			
Attendees Salaries	1.2%	(0.6 to 6.2%)	440,000
Travel and Per Diem	0.4		
Preparation Time	<u>2.8</u>		
Total	4.4%		
Informal Conferences:			
Salaries	1.5%	(1.0 to 4.1%)	<u>200,000</u>
Travel and Per Diem	0.3		
Telephone and Supplies	<u>0.2</u>		
Total	2.0%		
Subtotal (External Exchange Costs)	7.5%		\$750,000
Library Cost	0.9%		<u>90,000</u>
Total Information Exchange Cost	8.4%		<u>\$840,000</u>

* These figures are based upon the estimated Research Triangle Institute costs incurred on 15 separate subtasks totalling \$1,580,715 over a three year period. The results may not be applicable to all contractors.

The contacts may be visits, calls, or letters to contractors or to the Office of Civil Defense to obtain information.

The Table II dollar cost data are presented assuming a \$10,000,000 annual OCD research budget.

The Library cost is the normal library expense for retrieving and cataloguing documents for use by the corporate researchers. It does not include search costs.

2. The Total System Costs

Table III shows the estimated costs incurred by organizations spending \$10,000 or more annually in handling civil defense information. The organizations listed are the:

- (a) OCD Research Directorate
- (b) Other OCD Directorates
- (c) OCD Contractors
- (d) Army Library
- (e) Defense Documentation Center

The data for "other OCD Directorates" are guesses. The remainder of the estimates are based on analyses of the actual operations.

The major emphasis of this study is on research reports. The data on conferences and discussions are provided as added information. However, it should be noted that the comments we received on conferences indicated that they were worthwhile and should be continued. The total of column one, \$170,000, is the estimated present cost of printing and handling research reports. This cost is used as the basis for cost analyses of information centers in Section VI. In our judgment, this amount is accurate, plus or minus \$70,000.

TABLE III

Estimated Annual Direct Costs of Civil Defense Research Information
Exchange Among Major Sources and Users^{*}

The Major Organization	Report Printing and Handling Costs	Formal Conference Costs	Informal Discussion Costs
OCD Research Directorate	\$ 15,000	\$200,000	\$250,000
Other OCD Directorates	10,000	260,000	50,000
OCD Contractors	110,000	440,000	200,000
Army Library	25,000	-0-	-0-
Defense Documentation Center	10,000	-0-	-0-
	<u>\$170,000</u>	<u>\$900,000</u>	<u>\$500,000</u>

^{*} These direct costs are imputed to an organization. They may not be budget items.

V. OPPORTUNITIES FOR IMPROVING THE CIVIL DEFENSE INFORMATION SYSTEM

A. Introduction

The costs and present patterns of civil defense information exchange were discussed in Chapter IV. This chapter addresses itself to the question - What can be done to improve the system?

The opportunities for information transfer are described based on the analysis of Figure 5. The opportunities are then related to the present exchanges of information.

Suggested improvements in information exchange are described, but the need for these improvements has not been quantified. Justification of the improvements depends upon user need surveys not performed under this contract.

B. The Opportunities

The opportunities for improving and increasing the exchange of civil defense information are summarized on Figure 5, preceding. An explanation of the figure follows, showing how opportunities are illustrated.

As explained in Chapter IV, the sources of CD information are listed as column headings in Figure 5. The row headings refer to the forms of information sought by specific users of CD information. The black printed overlay was used to show the present information exchange. The orange printed sheet shows the potential exchange.

The data relating the users and the sources of CD information are presented in the rectangles formed by the column and row intersections.

If there is a good opportunity for data to be exchanged by a source and user, the appropriate intersection is an orange rectangle. For example, an employee of the Office of Civil Defense has a good opportunity to request reports from the OCD Research Directorate; therefore, the upper left rectangle on the matrix in Figure 5 is orange.

If there is some limited opportunity for exchange (limited because of the structure and organization of the source), there is an orange dot in the rectangle. For example, the General Public has a limited opportunity to discuss civil defense research with the OCD Research Directorate. Therefore, a dot appears in the lower left of the figure, opposite "Discussions" by the "General Public" in the column headed "OCD Research Directorate."

C. The Relation of Opportunities to the Present Transfer Pattern

When the clear, black-printed overlay is placed over Figure 5, six types of information appear in the intersection rectangles.

These may be explained as follows:

- | | |
|-------------------------------------|---|
| 1. Clear Rectangle | There is little or no present or potential exchange of that form of information likely between the corresponding user and source. |
| 2. Orange Dot in a Clear Rectangle | There is no present exchange, but there is a fair potential for exchange. |
| 3. Black Dot in a Clear Rectangle | There is limited or fair exchange now and no potential improvement. |
| 4. Black Dot on an Orange Rectangle | There is limited exchange now, but it can be improved. |
| 5. Black Rectangle | There is satisfactory or good exchange now. |
| 6. Orange Rectangle | There is little or no exchange now, but the potential for exchange is good. |

D. The Improvements Which Can Be Made

Figure 5 provides a background for selecting ways to improve the civil defense scientific information system. As an illustration of the results of the analysis of Figure 5, four areas of improvement are discussed below. These are: adding new information sources, encouraging the use of existing sources, encouraging sources to expand their services, and encouraging the preparation of new or improved information forms.

1. Adding New Information Sources

Three columns in Figure 5 referred to new or proposed sources of information.

a. OCD Publications

The existing publications might be used to disseminate research information, or new publications such as a research newsletter or a review journal might be added.

Appendix D describes a proposed review journal.

b. OCD Information Center

One or more information analysis centers might be provided to acquire, analyze, and announce information. The attractiveness of an information center is illustrated by the many orange rectangles in its column of Figure 5. It could serve as a central point to begin any information search. Such a center is needed because there is presently no complete collection of civil defense research reports (progress and final) and memoranda. The information control and analysis aspects of an information center are examined in detail in Section VI.

c. Depository Libraries

The Depository Libraries might be selected throughout the country to make research more generally available.

2. Encouraging the Use of Existing Services

- a. The Science Information Exchange (See Appendix B) stands ready to accept and disseminate work in progress data. At present, little or no civil defense research is registered with SIE.
- b. Many professional journals will accept articles arising from or related to research in civil defense. The OCD will allow page charges as reimbursable costs.
- c. The services listed in Appendix B, and others are not known to many researchers.

3. Encouraging Existing Sources to Expand their Services

- a. The Army Library, with management encouragement and monetary support could provide bibliographic services to researchers. It could also again aggressively acquire civil defense research information and publish an accessions list. The accessions list might be in the form of a KWIC index, as illustrated in Appendix C.
- b. Professional journal articles might be written by contractors or OCD staff to review work or to report research results.
- c. The results of the National Academy of Science deliberations about civil defense might be published as journal articles.

- d. Standard report format could be required on contractor reports. Abstracts and indexing information, including descriptors chosen from Appendix E, would aid in the processing of research reports.

4. Encourage the Preparation of New or Improved Information Forms

- a. A review journal or review articles in established journals may expand the information flow. The proposed review journal is discussed in detail in Appendix D.
- b. News releases which provide technical information are an increasing factor in modern scientific reporting. Use of technical releases to publications such as the New York Times, The Saturday Review, etc. would improve information flow to the general scientific community.
- c. Lists of contracts, project statements, or lists of active researchers provide useful information to contract researchers, government managers, and to the voting public. The "Internal Use Only" lists now prepared would be interesting information to many researchers. This information would indicate who is working on what, where, and when.

E. Summary

Many changes may be made in the civil defense information system as it now exists. The analysis presented has pointed to a few. The cost and implementation data for several of these changes are presented as appendices.

VI. THREE PROPOSED ALTERNATIVE CIVIL DEFENSE INFORMATION CENTERS

A. Introduction

The previous chapter described alternative ways for improving the existing civil defense information system. This chapter is devoted to describing one of the alternatives - the establishment of a civil defense information center.

Since a center may be established with any level of complexity desired, the choices available have been illustrated by formulating three proposed alternative centers and comparing them in tabular form (Table IV, page 61). These centers represent: (1) Minimum, (2) Moderate, and (3) High levels of user service and cost. The prototype centers were developed by selecting values of three design factors: the collection size, the number and type of users, and the services to be offered.

At any level of complexity, however, the function of the information center is clear: to provide a focus for all information searches and exchange - one place where you can begin all searches for pertinent research information.

To perform this function, the center must collect, analyze, index, abstract, announce, and disseminate the available scientific information pertinent to civil defense.

B. Center Design Parameters (Including Costs)

The design parameters of an information center include location, announcement techniques, start-up procedures and timing, indexing method and file equipment, type and quantity of staff, and all related

costs. In the tabulation of the alternative centers, a range of values of these design parameters was specified to illustrate the choices available in the design of an information center.

The choices illustrated are by no means immutable. Services, indexing equipment, etc., may be interchanged among the alternative types of centers. In particular, the locations shown may not be desirable, but they do illustrate the costs involved in moving to nongovernment facilities.

The Minimum center answers the question: What sort of center might be put together if one had the desire, but very little money (e.g., less than a 10% increase in annual direct costs)? The direct costs now incurred for printed civil defense research information exchange were estimated in Chapter IV to be about \$170,000 per year, (Table III, page 45).

The next center, Moderate, answers the question: What could be done with a moderate increase in funding (about \$90,000 per year, or about a 50% increase over the present direct costs)?

The High alternative center presented would result from a significant increase in funds (over 200% increase or an added annual expenditure of up to \$370,000 per year). This funding level allows all of the state-of-the-art features of information handling, but not "world of the future" features.

C. Discussion of the Information Centers

1. General Discussion

Descriptions of the alternative information center factors and parameters are provided in Table IV (page 61). This table contains the essential data of this chapter. The first column of the Table lists the titles of the factors and parameters pertinent to information system design. These items are defined and discussed in Chapter III.

Other general comments on the table might be made on services and costs.

The services provided by the information centers are shown in cumulative fashion. That is, the services of the Minimum center are assumed to be provided by the Moderate center. It is instructive to read the description of the High center to see the goals toward which all the centers strive.

The costs which are not shown on the table are assumed to be of three types:

- a. The services would be performed by existing, funded organizations.
- b. The service would be furnished as part of the center staff's duties.
- c. The costs are relatively insignificant.

The costs listed are only approximate and would vary with the persons hired, location chosen, equipment selected, etc.

The staff costs are salary-related costs with overhead. The rates used for estimating staff costs were: clerical-\$10,000 per year and technical-\$25,000 per year.

With this general introduction, the remainder of this section discusses the alternative information centers individually.

2. The Minimum Information Center

The Army Library, under the direction of the Adjutant General, has been delegated the library service function for OCD. It is the only Army library permitted in the Pentagon. Therefore it should be considered as the immediate, though minimum, alternative civil defense information center.

Several functions of the Minimum information center are currently available from the Army Library. An Army Reference Librarian is

located in the Civil Defense Unit to answer queries and to acquire pertinent documents. While acquiring these documents, she accumulates the OCD Library Accessions List.

Under present procedures all documents received are integrated into the Army Library collection and catalog.

Four additional functions are suggested to provide a minimum information center. These suggestions are taken from Table V, Column Two, "Minimum Service Information Center Description."

Table item (h) Maintain a separate subject file of CD documents.

This file could be a simple card catalog.

(j) Assign OCD technical staff members, for two-week periods, for technical consulting in the library. Persons so assigned can help order reports, index, answer questions, and prepare bibliographies. In so doing, they will also learn about the library's research resources.

(d) Accumulate and provide selected subject bibliographies.

(j) Provide a clerk-typist to help with the filing and clerical details which consume a librarian's time.

3. The Moderate Information Center

In this alternative, the OCD Staff College is the location listed to illustrate a site controlled entirely by OCD. However, the Army Library might also be the site of this alternative, although it would be controlled by the Adjutant General.

An expanded acquisition and indexing program is envisioned along with more technical analysis service.

The optical coincidence method of indexing, sometimes called a poor man's computer, was chosen as the illustrative indexing tool.

This type of subject indexing allows subject bibliographies to be prepared expeditiously, upon demand.

The optical coincidence technique employs coordinate indexing as explained in Chapter III, page 23. In brief, subject cards are drilled with holes whose location on the card correspond to the document accession number (an ordinal number assigned to the document by the librarian in addition to the library classification number). Thus, each subject card contains the accession number of all documents dealing with its subject area.*

In conjunction with the indexing equipment, it is suggested that an automatic microfilm reader be provided for document abstracts. To use this reader, the librarian or searcher first obtains a document accession number from the optical coincidence card. He then punches the number into a Recordak Image Control Keyboard which causes the abstract of the document to appear on a Lodestar Reader-Printer. If he wishes, he may make a reprint of the abstract for future reference.

The drilled index cards used in this type of system could be duplicated and placed in several locations (e.g., management contractors) so that researchers would know what is available, even if all locations did not have copies of all reports. Each location would have, as a minimum, a set of index cards and an automatic microfilm unit to retrieve abstracts of the reports.

* To test the Thesaurus, and to evaluate the optical coincidence indexing method, "Termatrex" equipment was rented from Jonkers Business Methods, Inc. (Gaithersburg, Maryland). Similar equipment can be obtained under the trade name, "Keydex," from the Royal McBee Corporation. Our tests indicate that document retrieval is facilitated by the expanded subject indexing available with this system. The time to index a document in this system is comparable to that required to prepare a standard card catalog entry.

The Army Library is presently using "Termatrex" equipment to index Army Studies under the ASDIRS Program (Army Study Documentation and Information Retrieval System). (Reference 61).

A full-time technical consultant, and increased clerical staff are needed to provide the services enumerated. In this center, a researcher would be able to come in and discuss his research topic with a technical consultant. The consultant would be familiar with or know how to find documents pertinent to the research topic and would know of similar or related research in progress.

4. The Maximum Service Information Analysis Center

a. The DOD Information Analysis Center Concept

This center is an embodiment of all of the features of Department of Defense Instruction 5100.45, "Centers for Analysis of Scientific and Technical Information," July 28, 1964. The previous alternatives provided only a portion of the services described here. Quoting from the instruction, the center characteristics are described as:

(1) "Has clearly defined, specialized area of interest.

It is concerned with clearly-defined and specialized subject matter, which may be oriented either to a scientific or engineering discipline or to a specific mission of the agency supporting it.

(2) "Gathers information.

The input comprises the world's applicable scientific and technical results drawn from published literature, unpublished documents, meetings or symposia, personal visits, or from any other sources or media available, both foreign and domestic. An aggressive acquisition program is a continuing requirement. Data are forms of information in this context.

(3) "Analysis by staff experts.

In addition to a staff technically trained in the field of specialization and in information processing, a distinguishing characteristic is the use by the center of laboratory personnel working in the area of specialization as consultants. This requires day-to-day contact between these specialists and significant research and development activities in their field.

(4) "Evaluates and condense.

The critical process of evaluation involves expert judgment of new information for value through analysis, comparison, and appraisal relative to information previously acquired. Information is condensed, summarized and retained. The information is screened, filtered, and reduced to meet user requirements ranging from highly condensed information for management to detailed information for bench scientists and engineers. This entails a continuous refinement of indexing and retrieval methods.

(5) "Provides individual user services.

Foremost, the center answers questions. Communications can consist of specific items of evaluated data or information, current summaries on technical trends, comprehensive state-of-the-art analyses, and specialized advisory services. Again, it should be noted that the center produces information in forms ranging from highly condensed information for management to detailed information for bench scientists and engineers. The center also provides services relating to identification and filling of gaps in information and to preparation of vocabularies for their area of specialization."

b. The Responsibilities of the Center are, quoting:

(1) "Input

- (a) Acquiring and storing, under bibliographic control, the available (1) world's literature in its subject area of technical specialization, and (2) unpublished reports, memoranda, and miscellaneous documents related to technical aspects of its subject area of specialization.
- (b) Developing and maintaining periodic contact, through personal visit or correspondence, with senior investigators or practitioners engaged in technical work related to its specialized area.

- (c) Participating in and/or planning major technical conferences or symposia containing a sufficient number of competent papers in the center's subject area of technical specialization to attract the attendance of senior investigators or practitioners."

(2) "Processing

- (a) Identifying, collecting, and retaining those documents and other source material which provide useful additions to the knowledge or understanding of the center's subject area of technical specialization.
- (b) Abstracting and/or extracting each document retained or each source of knowledge (letter, phone call, etc.) which provides information concerning a significant technical event relating to the center's subject area.
- (c) Preparing critical reviews, monographs, or equivalent publications on the state-of-the-art in selected segments of the center's subject area."

(3) "Output

- (a) Distributing periodically a list of new and significant publications in its subject area, complete with abstracts or extracts, and reflecting an evaluation of the published work.
- (b) Answering inquiries for information from qualified persons.
- (c) Providing for visits to the center by qualified persons seeking information."

c. Discussion of the High Service Center on Table IV

The High alternative provides all of the services which are currently available from information centers. In addition, the computer could be improved or expanded at a later date to provide the instant information transfer envisioned in the world of the future.

However, the most important part of this High service center is the technical staff available to analyze the data.

Computers can search through reports and find words, phrases, and data to answer specific questions. Computers in their present state cannot make judgments or decisions (Reference 60).

A Contractor Manned Center is illustrated. This center would be under the direct control of OCD, but at a location which might be provided and staffed by an OCD contractor. The rent would be included in the total contract cost of the center, estimated at \$370,000 per year.

The collection in this information analysis center includes reports, books, newspaper articles, magazine articles, etc. This large quantity of data should facilitate sociological studies of opinion and influence.

The High Service Information Center would be receptive to inquiries from the entire scientific community. However, the center's special services would be supplied, in the main, to civil defense researchers, and OCD management. These services include special subject searches and selective distribution of document abstracts to individuals who have a high probability of being interested in the particular document.

A separate description of one service (compiling a technical review journal) is provided in Appendix D. In brief, the appendix describes the steps in preparing a quarterly state-of-the-art review of civil defense research.

The staff of the center would work together, but the equivalent of two technical consultants, 1 secretary, and 2 typists would be required for the review journal. This journal staff cost would be about \$80,000 per year.

The costs allotted for the computer may actually be insignificant if spare time on an OCD machine is used. The \$100,000 shown would allow rental of a complete computer system to be used for information processing only. The use of a machine solely for information dissemination would be inefficient.

Comparison of the Design Parameters of 7

Information Center Factors and Parameters	Minimum Service Information Center Description	Added Direct Costs	Modern Inform De
a. Illustrative Location	Army Library - Pentagon	Rent Free	OCD Staff Col
b. Collection Size After Five Years	Approximately 10,000 Reports and Books	Army pays acquisition costs	Approximately operating pro data, pamphlets
c. Users	OCD and its contractors	No charge for service costs included in item j.	Plus State an
d. Services	Acquire and loan reports; provide subject bibliographies, research program description, and contractor listing. Some aid in library searches.		Plus demand b in progress f sonnel file, technical que
e. Announcement Techniques	OCD Library Accessions List with brief abstracts included	OCD Prints	Plus individu abstracts
f. Time for Start-up and Lead Time on Services	Start-up time: one month. Accessions list: two months. Bibliographies: six months from receipt of request.	Start-up costs are \$1,000 (item h).	Start-up: on Accession lis Bibliographies
g. Indexing Method	Library of Congress classification system	Included in items h and j.	Accession num for coordinat
h. File Equipment	Army Library Card Catalog. (subject-title-author) CD Subject Card Catalog. Book Shelves	Existing \$1,000 Existing	Peek-a-boo ca Document abst on automatic Book and repo
i. Centralization	Mail, phone, and desk service from one location.	Included in item j.	Plus peek-a-b satellite loc each year by
j. Staff	Army Reference Librarian Technical Consultant from OCD. . . Clerk typist supported by OCD. . .	Army pays. On Loan. \$10,000/yr.	Librarian (\$2 Technical Com Secretary (\$1 Clerk typist
k. Annual Costs	Minimum Center based on less than a 10% increase in costs over the present \$170,000/yr. (item j)	\$10,000/yr	About 50% inc (includes ite



TABLE IV

Three Potential Civil Defense Information Centers

Low Service Information Center Description	Added Direct Costs	High Service Information Analysis Center Description	Added Direct Costs
Age	Rent Free	Contractor Manned Center	\$10,000/yr Rent
20,000 reports, books, educures manuals, survey s, etc.	\$10,000/yr. acquisition costs	Approximately 100,000 reports, books and documents including raw data, news, magazine, and journal articles	\$25,000/yr acquisition costs
Local CD Officials	No charge for service, costs included in item j.	Plus general scientific community	No charge for service, costs included in items h and j.
bibliography/ 3, work le, research per- nd answers to tions.		Plus automatic bibliographies, KWIC indexes, newsletters, consulting services, capability for full text document studies by computer, and CD quarterly technical review.	
1 and collected report	Included in item j.	Plus selective distribution of abstracts to pertinent individuals	Included in items h and j.
year. : two months. : two weeks from receipt of request.	Start-up costs are \$28,000 (items h and i)	Start-up: two years to establish all services. Accession list: one month. Bibliographies: one week. Review articles: six months (App.D)	Start-up costs are included in the annual costs
ers and descriptors indexing.	Included in items h and j.	Accession numbers and descriptors for coordinate indexing.	Included in items h and j.
is and equipment. . . act & indexing data icrofilm equipment. . . t shelves, tables, etc.	\$17,000 3,000 5,000	Computer with magnetic tape storage for indexing information. Documents on shelves, magnetic tape microfilm, and/or punched cards.	Rental up to \$100,000/yr
o index copies for six tions to be renewed he staff.	\$ 3,000	Plus computer index tape copies for satellite locations. Initial cost of tapes is negligible.	\$1,000
,000/yr) ultant (\$25,000/yr) ,000/yr) 2 @ \$10,000/yr)	\$80,000/yr for total staff, in- cluding all overhead.	Computer staff (2 @ \$25,000/yr) Secretary (2 @ \$10,000/yr) Clerk-typist (4 @ \$10,000/yr) Librarian (1 @ \$25,000/yr) Technical Consultants (4 @ \$25,000/yr)	\$235,000/yr including overhead.
ase in costs. s b and j).	\$90,000/yr	Over 200% increase in costs. (includes items a, b, h, and j. item i is negligible).	\$370,000/yr

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Quoting Mooer's Law (p. 34):

"Principle: An information retrieval system will tend not to be used where the overall rewards of not using information are generally greater than the rewards of using information.

Principle: An information retrieval system will tend not to be used where information carries negative rewards.

Corollary: Where an information retrieval system tends not to be used, a more capable information retrieval system may tend to be used even less."
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Appendix D - <u>Army Medical Service Data</u>	AD 445804
Appendix E - <u>Corps of Engineers</u>	AD 445805
Appendix F - <u>HQ-DA & Joint Activities</u>	AD 445806
Appendix G - <u>Army Material Command Summary</u>	AD 445807
Appendix H - <u>Munitions Command</u>	AD 445808
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Personnel Resources in the Social Sciences and Humanities. U. S. Department of Labor, U. S. Government Printing Office, Washington, D. C.: 1954

NSF. Current Projects on Economic and Social Implications of Science and Technology. (NSF Report No. 62-4). Washington, D. C.: USGPO.

Grant and Award Programs of the Public Health Service, Volume I, U. S. Department of Health, Education and Welfare, Public Health Services, Bethesda, Maryland, 1959.

12. Bibliographies on Information Systems Research

Rulon L. Thayne, Elizabeth H. Hall, and Herman Mills. Computers and Data Processing Systems, (AD 291850). Defense Documentation Center, Armed Services Technical Information Agency, Arlington, Virginia, August 1962.

Reathe E. Barnes. Report Bibliography: Department of Defense Supported Information Storage and Retrieval Programs, (AD 440230). Defense Documentation Center, Alexandria, Virginia: February 1964.

Information Retrieval: Systems and Technology, (AD 403826). A Literature Survey, Prepared by Technical Information Center, North American Aviation, Inc., Space and Information Systems Division, 15 January 1963.

C. P. Bourne. Bibliography on the Mechanization of Information Retrieval. Menlo Park: Stanford Research Institute, February 1958.

Josephine L. Walkowicz, National Bureau of Standards. A Bibliography of Foreign Developments in Machine Translation and Information Processing. U. S. Government Printing Office, Washington, D. C., 10 July 1963.

C. F. Balz and R. H. Stanwood. Literature on Information Retrieval and Machine Translation. Owego, New York: International Business Machines Corporation, November 1962.

Charles F. Balz and Richard H. Stanwood. Literature on Information Retrieval and Machine Translation. International Business Machines Corporation, November 1962.

Also see References 45, 46.

13. Information Systems Research - State-of-the-Art

NSF. Current Research and Development in Scientific Documentation
Washington, D. C.: USGPO, Annual.

Scientific Information Notes, National Science Foundation, Washington, D. C.,
Quarterly.

NSF. Nonconventional Technical Information Systems in Current Use.
Washington, D. C.: USGPO. September, Annual.

Annual Report, Council on Library Resources, Inc. Washington, D. C.

Rudolph Yulyevich Bershadskiy. "Soviet Developments in Information Storage
and Retrieval," (AD 400597) The Scientist Who Knows All. Moscow, 1962.
(Translation).

L. I. Gutenmakher. Electronic Information - Logic Machines. New York:
Interscience Publishers, John Wiley & Sons, 1963. (Translation from Russian)

Harold Wooster. Current Trends in Documentation Research, (AD 413394).
Symposium on Biomedical Information, 47th Annual Meeting, Federation of
American Societies for Experimental Biology. Atlantic City, New Jersey,
17 April 1963.

Information Sciences 1963 - Annual Report, (AD 600110). Washington, D. C.:
United States Air Force, Office of Scientific Research, January 1964.

Information Storage and Retrieval: A Survey, Aerospace Medical Research
Laboratories, Wright-Patterson AFB, Ohio., January 1963.

Helen L. Prownson. "Research on Handling Scientific Information,"
Science. Volume 132, No. 3444, 30 December 1960.

Also See Reference : 39

14. Research in Indexing and Retrieval

High-Speed Document Perusal - AF 49 (638)-1062. Yorktown, New York:
International Business Machines Corporation, Thomas J. Watson Research
Center, 1 May 1962.

Edward A. Janning. Establishment of a Coordinate Indexing Retrieval System
for the Air Force Materials Laboratory, (AD 428423). University of
Dayton Research Institute, November 1963.

V. Slamecka and J. Jacoby. Effect of Indexing Aids on the Reliability of
Indexers, (AD 410032). Griffiss Air Force Base, New York.

Jacques Harlow. Research in Information Retrieval, (AD 437924). Sixth
Quarterly Report 1 October - 31 December, 1963. U. S. Army Electronics
R&D. Lab., Ft. Monmouth, New Jersey.

Alfred Trachtenberg, Quentin A. Darmstadt, and George Greenberg, Research In Information Retrieval, (AD 400569). U. S. Army Electronics Research and Development Laboratory, Ft. Monmouth, New Jersey, 1 July 1962 - 30 September 1962.

Alfred Trachtenberg, Quentin A. Darmstadt, and George Greenberg, Research In Information Retrieval, (AD 401914). U. S. Army Electronics Research and Development Laboratory, Ft. Monmouth, New Jersey, 1 October 1962 - 31 December 1962.

M. E. Maron and J. L. Kuhns. "On Relevance, Probabilistic Indexing and Information Retrieval," J. Association Computing Machinery. Vol. 7, No. 3, July 1960, pp. 216-244.

M. E. Maron. Mechanized Documentation: The Logic Behind a Probabilistic Interpretation, (AD 437781). Rand Corporation, April 1964.

A. F. Parker-Rhodes and R. M. Needham. The Theory of Clumps. Cambridge, England: Cambridge Language Research Unit. 1960.

Walter I. Landauer. The Tree as a Strategem for Automatic Information Handling, (AD 293888). Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, 15 December 1962.

Terrence Eugene Hobbs. A Method for Improving Comprehension of Technical Communications Through Statistical Testing and Information Retrieval Procedures, (AD 438662). University of Pittsburgh.

15. Studies in Language Processing

Manfred Kochen. Some Problems in Information Science with Emphasis on Adaptation to Use Through Man-Machine Interaction, (AD 600113). Vol. I - 206 pp. Vol II - 386 pp. International Business Machines Corporation, Thomas J. Watson Research Center, Cambridge, Mass., 2 April 1964.

Jane J. Robinson. Automatic Parsing and Fact Retrieval: A Comment on Grammar, Paraphrase, and Meaning, (AD 43236). Rand Corporation, California: February 1964.

Franz L. Alt. Recognition of Clauses and Phrases in Machine Translation of Languages. National Bureau of Standards Report No. 6895. 11 July 1960.

Dan Payne, Sara J. Munger, James W. Altman. A Textual Abstracting Technique, (AD 285082). American Institute for Research, Pittsburgh, Pennsylvania: 23 August 1962.

Dan Payne, Sara J. Munger, and James W. Altman. A Textual Abstracting Technique, (AD 285081). A Preliminary Development and Evaluation Support - a Supplemental Volume. American Institute for Research, Pittsburgh, Pennsylvania, 23 August 1962.

Paul H. Klingbiel. Language Oriented Retrieval Systems, (AD 271600). Armed Services Technical Information Agency, February 1962.

16. Future Advances in Information Systems

See References: 55, 56, 57, and 60.

Appendix B

The Sources of Information Useful to Civil Defense Research

The Sources (from Figure 5):	Description on Page
1. OCD Research Directorate.	B- 5
2. OCD Personnel (Other Directorates).	B- 8
3. OCD Publications.	B-10
4. OCD Information Center (Proposed)	B-10
5. OCD Depository Libraries (Proposed)	B-11
6. OCD Contractors	B-12
7. Army Library - Pentagon	B-13
8. Defense Documentation Center.	B-15
9. Delegate Agencies (including OEP)	B-18
10. Government Printing Office.	B-21
11. Clearinghouse for Federal Scientific and Technical Information (formerly UTS).	B-22
12. Library of Congress	B-25
13. Atomic Energy Commission.	B-26
14. NIH, NASA, NSF, etc.	B-28
15. Science Information Exchange.	B-29
16. National Academy of Sciences National-Research Council.	B-30
17. Centers for Analysis of Scientific and Technical Information	B-31
18. Professional Societies and Journals	B-32
19. News Media.	B-33

Explanatory Note to Appendix B:

The following sources of civil defense information are described in the order they are listed across the top of Figure 5, "The Civil Defense Information System."

The data about these sources are listed in the following manner:

1. Name and address of organization

Name and address of individuals and/or offices responsible for research information.

- a. Comments about the organization.
- b. Methods are described for obtaining information in one or more of the following forms:
 - (1) Reports and Books (and films).
 - (2) Review Articles (consolidating and evaluating several reports or papers).
 - (3) Abstracts (of books, reports, articles).
 - (4) Accession Lists (announcing books, reports, articles, and films that have been received by a library or information center).
 - (5) Bibliographies (listing reports, etc., about a particular subject).
 - (6) News releases (giving descriptions of civil defense related work for general publication).
 - (7) Formal meetings (of technical personnel in professional societies, in contractor sessions, or in technical liaison roles).

- (8) Discussions (on an informal basis among technical personnel).
- (9) Work in progress (among research contractors and agencies).

Appendix B

The Sources of Information Useful to Civil Defence Research

1. Research Directorate
Office of Civil Defense
Department of the Army
Washington, D. C. 20310

Wayne W. Johnson
Executive Assistant to the Research Director
Room 3D 287, Pentagon
Washington, D. C.
Telephone 202-695-3370

Miss Rita M. McGinley
Technical Reports Analyst
Room 3D 287, Pentagon
Washington, D. C.
Telephone 202-695-3370

Miss Alice Cox, Librarian
Protective Structures Development Center
Office of Civil Defense
Building 2591
Fort Belvoir, Virginia

- a. Comment

Each contractor project is assigned a professional OCD staff monitor as the contractor's initial point of contact in the Directorate. Other users' questions may be referred to members of the Directorate Staff. A protective structures library is maintained at Fort Belvoir.

- b. Information Services

- (1) Reports

The Executive Assistant directs distribution of the approximately one hundred contractor reports produced each year. "Distribution of Reports of Research" is done in

consonance with Research Guidance No. 207. This Guidance specifies that the primary or initial report distribution will be performed by the research contractor. The general primary distribution list is:

<u>Number of Copies</u>	<u>Recipients</u>
21	Directors and Officials in the Office of Civil Defense
22	Project Monitor (for staff and request distribution)
3	Army Library
8 to 15	Various Department of Defense Components
20	Defense Documentation Center
22 (optional)	NATO and Canada
25	Selected contractors and research groups
<u>Others</u>	1. selected by the originating contractor
150	Approximate total primary distribution for a research report

The Engineering Development Division operates a protective structures test facility and related library which has over 1700 acquisitions. Documents may be borrowed in the normal manner from this library.

(4) Accession Lists

Bibliography of Research Reports Completed Under Auspices Directorate for Research, Office of Civil Defense. (Final Reports only).

Historical Summary: PCDA-GCDM-ODD Research Contracts FY 1950 through FY 1962. (Arranged according to contract number).

(5) Bibliographies

The Protective Structures Library has issued a protective construction bibliography and is preparing one on structural shielding.

(9) Work in Progress

In addition to the annual Research Program (on DD613 Forms) the Research Directorate has prepared the following lists.

Alphabetic List of Research Contractors, FY 1959 through FY 1964, December 30, 1963.

Research Contractors by Contract Number, Fiscal Years 1959-1962, December 6, 1963.

Research Contractors by Subtask Number, December 6, 1963.

2. Office of Civil Defense
Department of the Army
Office of the Secretary of the Army
Washington, D. C. 20310

a. Comment

A number of directorates furnish civil defense information.

Among them are:

Directorate for Technical Liaison

Directorate for Industrial Participation

Directorate for Technical Services

Directorate for Policy and Programs

The OCD Telephone Directory is a good starting place to locate the person to contact for information.

b. Information Services

(4) Accession Lists

Publications Index MP-20
Office of Civil Defense

(6) News Releases

These are prepared by the Directorate for Public Information

(7) Formal Meetings - See (8)

(8) Discussions -

Formal training is provided under guidance from:

National Training Support Center
Training and Education Division
Directorate for Plans and Operations
Office of Civil Defense
Bailey's Cross Roads, Virginia

Training locations include:

OCD Staff College (and library)
Battle Creek, Michigan

Eastern Training Center
Brooklyn, New York

Western Training Center
Alameda, California

(9) Work in Progress

Annual Report, Office of Civil Defense

Annual Statistical Report, Office of Civil Defense

3. OCD Publications

These publications are produced by the Research Directorate (see 1. above) or by other Directorates (see 2. above). Present publications include statistical reports, promotional reports, etc., as listed in Publications Index MP - 20.

The Public Information Office also publishes a weekly Information Bulletin which is distributed to civil defense officials.

Individuals in the Research Directorate also publish results of their independent research at the rate of five to ten reports per year.

4. OCD Information Center (Proposed)

This Proposed Information Center is described in Section VI.

5. OCD Depository Libraries (Proposed)

Libraries throughout the United States have general collections which may be of interest to civil defense research. Of particular interest are the depository libraries which receive reports from the Government Printing Office, the Clearinghouse for Federal Scientific and Technical Information, the Atomic Energy Commission, the National Aeronautics and Space Administration, etc.

It has been proposed by several individuals in OCD that depository libraries be designated for civil defense reports.¹⁵

In addition to report lending services, translation and bibliographic search services may be offered by libraries. Two libraries offering lending, search and translation services are:

Engineering Societies Library
345 East 41st Street
New York 17, New York

John Crerar Library
Research Information Service
35 West 33rd Street
Chicago 18, Illinois

6. OCD Contractors

Contractors of the Office of Civil Defense often maintain internal libraries to supplement the personal collections of the staff members. Contractor fields of interest and the names of responsible researchers may be obtained through the OCD Research Directorate. Those contractors with large programs in civil defense include:

Nuclear Defense Laboratory
United States Army
Edgewood Arsenal
Edgewood, Maryland

Defense Atomic Support Agency
Department of Defense
The Pentagon
Washington, D. C.

Stanford Research Institute (See Reference 43)
Management Sciences Division
Menlo Park, California

ITF Research Institute
Chicago, Illinois

Hudson Institute, Inc.
Quaker Ridge Road
Harmon-on-Hudson, New York

U. S. Naval Radiological Defense Laboratory
San Francisco, California

Research Triangle Institute
Operations Research and Economics Division
Durham, North Carolina

7. The Army Library
Administrative Services Directorate
Office of the Adjutant General
Department of the Army
Washington, D. C. 20310

Librarian
Army Library - Attn: AGAL
1A 518 Pentagon - Telephone 202-697-3675

a. Comment

The 8,000 document civil defense collection which was moved from Battle Creek has been merged into the Army Library (or the documents have been disposed of). The original catalog for this collection has been retained, but no entries were made in this catalog for unclassified documents received after 1962. All documents received now are entered in the general Army Library Catalog Card File.

This is the only Department of the Army Library permitted in the Pentagon.

The Civil Defense unit occupies a space of about 600 square feet plus 13 four-drawer files in a separate classified area. About 100 document requests are handled each month. Of the requests, in January, 1963, 37 were from contractors, and the rest from individuals in OCD. Those Directorates using the library most heavily include Plans & Operations, Technical Services, and Policy & Programs.

Due to staff vacancies in the Reference Department the normal services of the Army Library Civil Defense Unit are

currently limited primarily to lending documents. The Civil Defense Unit Librarian normally adds about 1000 documents per year to the collection. These come chiefly from the Defense Documentation Center and, to a lesser extent, the Atomic Energy Commission. The Civil Defense Librarian also maintains a separate file of about 500 contractor research reports. These practices have been temporarily halted.

At present research reports are catalogued only in the Army Library General Catalog, a process requiring one to three months.⁴⁴

b. Information Services

- (1) Reports - are loaned in the normal manner.
- (3) Abstracts - brief abstracts are provided on the RESEARCH Library Accessions List which is accumulated by the Civil Defense Librarian, and published periodically by the Office of Civil Defense.
- (4) Accessions Lists - the Army Library produces two accession lists (these are not comprehensive):
 - Selected Periodical Literature (Monthly)
 - Selected Current Acquisitions (Bi-weekly)
- (5) Bibliographies - on a contract basis, the Army Library will provide bibliographic searches.

8. Defense Documentation Center (DDC)
Defense Supply Agency
Cameron Station
Alexandria, Virginia 22314

- a. DDC provides secondary technical report distribution for the (1) Department of Defense, (2) its contractors, (3) other government agencies doing related work, and (4) their contractors. (Primary distribution is that specified on the distribution list in the back of each report. All other distribution is secondary).

The DDC coverage of civil defense topics is illustrated on Table B-I. The announcement bulletins (TAB) for 6 months were analyzed, and the number of reports related to civil defense were recorded as shown in Table B-I.

b. Information Services

(1) Reports

Technical reports are supplied free to qualified requestors. A requestor is qualified if he is a government agency employee or contractor and he has a "Field of Interest Register," properly validated, on file with DDC. Xerox or printed copies of the documents are supplied within one to three weeks of receipt of the request.

(3) Abstracts

(4) Accession Lists

Technical reports are received from contractors at the rate of 50,000 per year. These reports are indexed, abstracted, and announced in the bi-weekly DDC publication, Technical Abstract Bulletin. Fewer than 1% are pertinent to civil defense.

(5) Bibliographies

DDC has a number of standard bibliographies gathered from its files.^{45,46} It will also prepare special bibliographies for qualified requestors, but this service requires one to three months.

(8) Discussions

DDC has offices in Dayton, Ohio; Boston, Massachusetts; Los Angeles, California; and Alexandria, Virginia. The DDC reports may be examined at these centers and copies may be obtained of selected pages. The staff at these offices will also aid in phrasing bibliography search questions. Retrieval is accomplished by computer search of a document citation tape, and by manual selection of the microfilm.⁴¹

TABLE B-I

Analysis of Defense Documentation Center Announcement
of Civil Defense Related Unclassified Reports

<u>Technical Abstract Bulletin (TAB)</u>		<u>Unclassified</u>	<u>Number of Reports</u>
<u>Date</u>	<u>Number</u>	<u>Reports Relevant</u> <u>to Civil Defense</u>	<u>Produced Under</u> <u>OCD Contract</u>
1 Nov. 1963	U-63-4-3	5	2
15 Nov. 1963	U-63-4-4	7	5
1 Dec. 1963	U-63-4-5	6	2
15 Dec. 1963	U-63-4-6	5	3
1 Jan. 1964	U-64-1	3	0
15 Jan. 1964	U-64-2	3	1
1 Feb. 1964	U-64-3	4	2
15 Feb. 1964	U-64-4	2	1
1 Mar. 1964	U-64-5	14	5
15 Mar. 1964	U-64-6	5	1
1 Apr. 1964	U-64-7	5	1
15 Apr. 1964	<u>U-64-8</u>	<u>16</u>	<u>6</u>
Total for Six Months (Approx. 5,000 listings) 75			29 (included in 75)
Average Price* of All Relevant Documents		\$7.32	
Average Price* of OCD Contractor Reports		\$8.91	
Average Number of Pages in OCD Contractor Reports-101 pages			

*The price is that charged to the general public for this document when purchased through the Clearinghouse for Federal Scientific and Technical Information. DDC service is free.

9. Delegate Agencies (Including OEP)

- a. A number of governmental agencies have been delegated civil defense responsibilities. The information services of two are mentioned below: Office of Emergency Planning and Department of Agriculture. The services of the Department of Commerce are listed in Section 11 of this appendix, the services of AEC, NIH, NASA, and NSF are mentioned in Sections 13 and 14.

Other delegate agencies are listed below. These agencies were rather arbitrarily grouped into areas of responsibility. None of these maintains an information service directly serving civil defense inquiries, but information may be gleaned from the Annual Reports each publishes, or directly from the Office of Public Information in the agency. The locations and organizational relationships of the agencies are shown in the current U. S. Government Organization Manual, sold by the Superintendent of Documents.

Scientific Information Activities of Federal Agencies

bulletins issued by the National Science Foundation are available from the Superintendent of Documents, Government Printing Office, Washington, D. C. They describe the agencies information services.

The NSF bulletin number, date, and price is listed after the appropriate delegate agency in the following list.

- (1) Those with responsibilities related to trade and finance:
- (a) Department of the Treasury (NSF 61-64) November 1961 (15c).
 - (b) Export-Import Bank
 - (c) Farm Credit Administration
 - (d) Federal Deposit Insurance Corporation

- (e) Federal Home Loan Bank Board
 - (f) Federal Reserve System
 - (g) Housing and Home Finance Agency
 - (h) Railroad Retirement Board
 - (i) Securities and Exchange Commission
 - (j) Small Business Administration
 - (k) State Department
 - (l) Veterans Administration (NSF 61-22) June 1961 (10¢)
- (2) Those with responsibilities related to manpower, registration and utilization:
- (a) Civil Service Commission
 - (b) Department of Labor
 - (c) National Science Foundation (NSF 60-56) October 1961 (10¢)
 - (d) Post Office Department
 - (e) Selective Service System
- (3) Those responsible for resources and facilities:
- (a) Department of the Interior (I. NSF 61-77 December 1961 25¢)
(II. NSF 62-35 October 1962 20¢)
 - (b) Federal Power Commission
 - (c) General Services Administration
 - (d) Tennessee Valley Authority (NSF 60-44) August 1960 (5¢).
- (4) Those with transportation and communications responsibilities:
- (a) Civil Aeronautics Board
 - (b) Department of Commerce
 - (c) Federal Aviation Agency (NSF 62-19) August 1962 (10¢).
 - (d) Federal Communications Commission (NSF 61-22) May 1961 (5¢).
 - (e) Interstate Commerce Commission
- (5) Those responsible for food and health:
- (a) Department of Agriculture (NSF 58-27) October 1958 (5¢).
 - (b) Department of Health, Education, and Welfare
- b. Office of Emergency Planning
Washington, D. C.

Miss Carol Wanner, Librarian
Executive Office Building
17th and Pennsylvania Avenue
Room 308 - Telephone 202-382-2991

This library contains items from the World War II mobilization agencies as well as data from OCDM. The civil defense collection of about 10,000 items was accumulated in the 1950's. In addition, there is an OCDM card catalog of magazine articles pertinent to civil defense. Pertinent legislation, and 1958 survival plans are also retained in this library. OEP was created to assist the President in coordinating and determining policy for all emergency preparedness activities of the government.

Department of Agriculture
14th Street and Independence Avenue, S. W.
Washington, D. C.

National Agricultural Library
Foster E. Mohrhardt, Director

The Department is responsible for acquiring and diffusing useful information on agricultural subjects. Research information is made available through the Library, and announced in the monthly Bibliography of Agriculture. (\$10.00/year)

Other publications include:

Agriculture Economics Research, Quarterly (75 cents per year).

Agriculture Statistics, Annual (\$2.00/year). Fire Control Notes, Quarterly (75 cents per year). Monthly List of Publications and Motion Pictures, (free).

10. Government Printing Office (GPO)
Washington, D. C.

Superintendent of Documents
North Capitol and H Streets
Telephone 202-783-6840

a. The GPO executes orders for all large volume printing and binding required by federal agencies. Selected documents are sold by mail or through GPO sales rooms.

b. Information Services

(1) Reports

The GPO prints and sells all popular distribution documents prepared at government expense. Their style manual is Reference 47.

(4) Accession Lists

Selected documents are announced biweekly. This service is free on request. A comprehensive Monthly Catalog of United States Government Publications may be purchased for \$4.50/year.

(5) Bibliographies

A series of free topical price lists are issued by the Superintendent of Documents. Number PL-84 in this series is "Atomic Energy and Civil Defense."

Number PL-36 is "Government Periodicals and Subscription Services."

These services are described in NSF Bulletin (NSF 60-9) March, 1960, available from the GPO for 5¢.

11. Clearinghouse for Federal Scientific and Technical Information
(Formerly Office of Technical Services)
National Bureau of Standards
U. S. Department of Commerce
Springfield, Virginia

- a. The Department of Commerce has been delegated transportation and production responsibilities during emergencies. Information relating to these plans may be obtained from the various divisions and bureaus of the Department. The technical information services of the Department are provided by the National Bureau of Standards, the Weather Bureau, the Coast and Geodetic Survey, the Bureau of the Census and the Patent Office. The Department of Commerce Field Offices offer report services; comments on the department services are given below.

The information services of the Department of Commerce are described in a two part NSF bulletin available from the GPO:

Department of Commerce

I. (NSF 59-58) November 1959 (10c)

II. (NSF 60-58) October 1960 (20c)

b. Information Services

(1) Reports

The Clearinghouse for Federal Scientific and Technical Information provides secondary distribution of technical reports to the general public. The reports are sold. All unclassified, unlimited distribution DDC reports and all similar reports of AEC, NASA, etc. are sold through the Clearinghouse.⁴⁸

(3) Abstracts

The Clearinghouse sells a biweekly list of abstracts of reports received: United States Government Research Reports, \$15.00/year.

The Clearinghouse also sells monthly selective digest of research reports containing developments for industry: Technical Reports Newsletter, \$1.00/year.

Translations are announced in the biweekly Technical Translations, \$12.00/year.

(4) Accession Lists

The publications of the Department of Commerce are listed in Department of Commerce Publications, 1790 to 1950, and in annual supplements thereafter.

The Catalog of United States Census Publications is published quarterly and costs \$1.25/year.

National Bureau of Standards publications are listed in:⁴⁹
NBS Circular 460 and its supplements; and in Miscellaneous Publication 240.

(5) Bibliographies

The Bureau of the Census, for a fee, will provide custom tabulations and searches.

The Clearinghouse sells printed Selective Bibliographies. Special bibliographies may also be obtained. For instructions, see Section 12 of this Appendix, Library of Congress.

(6) News Releases

These are provided by Public Information Offices. General background is provided in the Annual Report of the Secretary of Commerce.

(7) Discussions

The work of the Radiation Physics Division of NBS is an important input to the shielding calculation methods of OCD.

(8) Work in Progress

A synopsis of U. S. Government proposed procurement, sales, and contract awards is available in the Commerce Business Daily, published Monday through Friday (\$20.00/year).

The work of the NBS is digested monthly in the Technical News Bulletin of the NBS, \$1.50/year.

2. Library of Congress
First Street S. E. between East Capitol Street and Independence Avenue
Washington, D. C.

National Referral Center for Science and Technology
A Division of the Reference Department of the Library of Congress
Annex Floor 5
Telephone 202-783-0400
Second Street and Independence Avenue, S. E.

Science and Technology Division
Reference Department

- a. The Library of Congress maintains a complete collection of material copyrighted in the United States.

The National Referral Center maintains a file of sources of information.

They can say where to go and/or who to ask to get a question answered.

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- b. Information Services

- (1) Reports and books

Documents may be read in the Library only. They may not be checked out.

- (2) Review Articles

At the request of a member of Congress, articles will be prepared by the Reference Department.

- (5) Bibliographies

Searches are provided in conjunction with the Clearinghouse for Federal Scientific and Technical Information. The Clearinghouse collection and the Library collection will be searched for \$8.00 per search hour. This service is performed by the Science and Technology Division upon receipt of a "Request for Special Literature Search" form.

13. Atomic Energy Commission
Washington, D. C.

Edward J. Brunenkant, Director
Division of Technical Information
Germantown, Maryland

USAEC Division of Technical Information Extension
Post Office Box 62
Oak Ridge, Tennessee

a. Highlights of the extensive AEC information program are given below. The bulletin (NSF 63-38) October 1963 (15¢) describes AEC Information services.

b. Information Services

(1) Reports

The AEC research program covers the many facets of atomic energy. Research programs include radiation biology, reactor development, nuclear excavation, weapon design and test, and shielding analysis. The research information produced is detailed in AEC or contractor reports.

Reports produced under AEC security classification may be used by those holding an AEC L or Q clearance (depending on the level of classification) and having a need to know. Those with DOD clearances only must go through their sponsoring agency to obtain documents.

Unclassified reports may be purchased from the Clearinghouse for Federal Scientific and Technical Information. Classified reports may be obtained from the Office of Technical Information of the USAEC Division of Technical Information Extension at Oak Ridge.

The AEC also maintains 96 depository libraries throughout the country where documents may be borrowed.

(2) Review Articles

(See Appendix D)

(3) Abstracts

AEC reports are announced in the bi-weekly Nuclear Science Abstracts, \$22.00/year.

(4) Accession Lists

The reports are indexed quarterly in Nuclear Science Abstracts Indexes, \$22.00/year.

The coverage of the abstracts is explained in Subject Scope of Nuclear Science Abstracts, TIC 4552,

(6) News Releases

Background USAEC publications include:

Fundamental Nuclear Energy Research, December 1963, \$2.50.

Major Activities in the Atomic Energy Program, January-December 1963, \$1.75.

14. NIH, NASA, NSF, etc.

The scientific agencies of the government maintain varied information services. The services of the NASA closely parallel that of the AEC and are directed by the

Scientific and Technical Information Division
National Aeronautics and Space Administration
Washington, D. C.

The NSF and the NIH encourage contractors to publish their results in journals in lieu of writing final reports. The NIH literature service is handled through:

Frank B. Rogers, Director
National Library of Medicine
Public Health Service
Department of Health, Education, and Welfare
Washington, D. C.

The major announcement service of the Public Health Service is the monthly Index Medicus, \$26.00/year. The yearly National Library of Medicine Catalog provides a comprehensive listing which is cumulated every five years.

The NEW information services are described in a 3 part NSF bulletin available from the GPO.

Department of Health, Education, and Welfare

- I. (NSF - 63-50) December 1963 (25c)
- II. (NSF - 63-46) February 1964 (10c)
- III. (NSF - 63-52) February 1964 (15c)

15. Science Information Exchange (SIE)
Smithsonian Institution
Suite 300, Madison National Bank Building
1730 M Street, N. W. Telephone 202-381-5511
Washington, D. C. 20036

SIE provides work in progress information. The SIE receives and files brief summaries of research projects in progress at government and industrial laboratories. Any researcher may ask such questions as:

- a. Who is doing work in field A?
- b. Where is work being done in field A?
- c. What is Dr. J. Doe working on now?

The SIE staff scientist answer such questions by searching their file of current research projects, and selecting pertinent project summaries to furnish the questioner.⁵⁰ This service originated in 1949 to exchange medical research information and has gradually expanded through the biological and physical sciences. DOD is now encouraging the filing of briefs with SIE.

No charge is involved for services; questions may be asked by telephone or letter.

All of the Smithsonian information services are described in the following bulletin in the series: Scientific Information Activities of Federal Agencies: Smithsonian Institution (NSF 62-8) June 1962 (15¢) available from the GPO.

16. National Academy of Sciences
National Research Council
Washington, D. C. 20418

Printing and Publishing Office
2101 Constitution Avenue, N. W.

The NAS-NRC is a government chartered, private organization which advises on scientific matters. Its membership is divided into committees of particular competence. The committee participants include non-Academy members. Of particular interest is the Advisory Committee on Civil Defense. Publications of these committees and their work are detailed in the references below:

Science Information Activities of the National Academy of Sciences - National Research Council; Publication 1031, 1962.

Organization and Members 1962-1963; National Academy of Sciences - National Research Council; January 1963.

Publications; an annual catalog of the NAS-NRC.

17. Centers for Analysis of Scientific and Technical Information.^{51, 52, 53, 54}

Information Analysis Centers are discussed in Section VI. A number of organizations have the competence to serve as information centers, officially or unofficially. Several such groups with interests related to civil defense are:

- a. National Institute for Disaster Mobilization
475 Fifth Avenue, Suite 501
New York, New York 10017

Provides aid to business in planning for emergencies.

- b. Radiation Effects Information Center
Battelle Memorial Institute
Columbus, Ohio

Provides information about radiation effects on materials and equipments.

- c. Radiation Shielding Information Center
Oak Ridge National Laboratory
Oak Ridge, Tennessee

- d. United States Civil Defense Council
Municipal Auditorium
30 Courtland Street, S. E.
Atlanta, Georgia, 30303

- e. Disaster Research Center
Ohio State University
Columbus, Ohio

In addition to the information centers, several indexes to current literature may be useful:

Agricultural Index, New York, Wilson.

Applied Science and Technology Index, New York, Wilson. (Formerly Industrial Arts Index).

Engineering Index, New York, Engineering Index, Inc.

Public Affairs Information Service, New York, PAIS.

Science Citation Index, Philadelphia, Institute for Scientific Information.

18. Professional Societies and Journals

Civil defense research information may be disseminated through presentation of papers at professional society meetings and by publication of articles in professional journals.

The Department of the Army will reimburse page charges for publication.

19. News Media

The Science section of the better newspapers and magazines is an increasingly effective vehicle for communication of research results and techniques.

Appendix C

Example of a KWIC Index

Example of a KWIC Index²²Explanatory Note

This is an example of a computer prepared key-word-in-context (KWIC) index. The documents indexed are contract reports prepared for the OCD Systems Evaluation Division. The left column on this page contains an arbitrary accession number for the document and refers to the document list at the end of the index. In the right column, titles of reports are permuted so that each key word appears in alphabetical order. The full titles appear in the list of unclassified documents at the end of this index. The following is a copy of a computer printout:

227222

KWIC INDEX--DOCUMENT REFL

000021	LEAR DETONATIONS ABOVE	50-KM ALTITUDE
000023	LEAR DETONATIONS ABOVE	50-KM ALTITUDE
000017	TOWARD AND INFORMATION	ABOUT CIVIL DEFENSE
000016	COMMUNITY ATTITUDES AND	ACTION ON THE FALLOUT SHELTER ISSUE
000011	DEVELOPMENT OF A SHELTER	ALLOCATION AND USE PLAN FOR BOSTON
000021	DETONATIONS ABOVE 50-KM	ALTITUDE
000023	DETONATIONS ABOVE 50-KM	ALTITUDE
000006	PROGRAM PERSONNEL AND	APPENDICES
000004	AN	APPROACH TO THE STUDY OF SOCIAL AND
000002	STRATEGIC AND TACTICAL	ASPECTS OF CIVIL DEFENSE WITH
000010	NO. VOL. 2 - A SHELTER	ASSIGNMENT PROCEDURE
000023	MISSION OF THE EARTH'S	ATMOSPHERE OF THERMAL ENERGY FROM AN
000003	IONIC BURST HEIGHTS AND	ATMOSPHERIC CONDITIONS
000004	CAL EFFECTS OF NUCLEAR	ATTACK
000015	COMMUNITY	ATTITUDES AND ACTION ON THE FALLOUT
000017	ET: A REPORT OF PUBLIC	ATTITUDES TOWARD AND INFORMATION AND
000005	NOTATIONS OF POSTATTACK	BEHAVIORAL RESEARCH
000018	THE FALLOUT PROTECTION	BOOKLET: A COMPARISON AMONG FOUR GROUPS
000017	THE FALLOUT PROTECTION	BOOKLET: A REPORT OF PUBLIC ATTITUDE
000011	ATION AND USE PLAN FOR	BOSTON
000003	AR WEAPONS FOR VARIOUS	BURST HEIGHTS AND ATMOSPHERIC CONDITIONS
000003	IGNITION OF MATERIALS	BY LARGE YIELD NUCLEAR WEAPONS FOR VARIOUS
000002	D TACTICAL ASPECTS OF	CIVIL DEFENSE WITH SPECIAL EMP
000017	AND INFORMATION ABOUT	CIVIL DEFENSE
000020	ICIAL GOVERNMENTS FOR	CIVIL DEFENSE
000012	TOWARD EFFECTIVE	CIVIL DEFENSE IN MONTGOMERY COUNTY,
000009	TESTING	CIVIL DEFENSE PLANS AND OPERATIONS A
000001	CRASH	CIVIL DEFENSE PROGRAM STUDY

000004	PROGRAM FOR STATE LEVEL	CIVIL DEFENSE PROGRAM PERSONNEL AND
000007	NS FOR IMPROVING LOCAL	CIVIL DEFENSE TRAINING
000008	NS AND IMPROVEMENTS IN	CIVIL DEFENSE TRAINING
000015	TAL DATA FOR OFFICE OF	CIVIL DEFENSE USE
000002	TICAL ASPECTS OF CIVIL	CIVIL DEFENSE WITH SPECIAL EMPHASIS
000016		COMMUNITY ATTITUDES AND ACTION ON THE
000018	PROTECTION BOOKLET: A	COMPARISON AMONG FOUR GROUPS OF DIFF
000003	EIGHTS AND ATMOSPHERIC	CONDITIONS
000018	OF INTEREST IN SHELTER	CONSTRUCTION
000006		CORE TRAINING PROGRAM FOR STATE LEVEL
000012	DEFENSE IN MONTGOMERY	COUNTY, MARYLAND
000013	PLANNING IN MONTGOMERY	COUNTY, MARYLAND
000001		CRASH CIVIL DEFENSE PROGRAM STUDY
000002	TH SPECIAL EMPHASIS ON	CRISIS SITUATIONS
000015	ATION OF ENVIRONMENTAL	DATA FOR OFFICE OF CIVIL DEFENSE USE
000017	INFORMATION ABOUT CIVIL	DEFENSE
000020	GOVERNMENTS FOR CIVIL	DEFENSE
000012	TOWARD EFFECTIVE CIVIL	DEFENSE IN MONTGOMERY COUNTY, MARYLAND
000009	TESTING CIVIL	DEFENSE PLANS AND OPERATIONS AT THE
000006	FOR STATE LEVEL CIVIL	DEFENSE PROGRAM PERSONNEL AND APPEND
000001	CRASH CIVIL	DEFENSE PROGRAM STUDY
000007	IMPROVING LOCAL CIVIL	DEFENSE TRAINING
000008	IMPROVEMENTS IN CIVIL	DEFENSE TRAINING
000015	TA FOR OFFICE OF CIVIL	DEFENSE USE
000002	ASPECTS OF CIVIL CIVIL	DEFENSE WITH SPECIAL EMPHASIS ON CR
000021	TRANSFER FROM NUCLEAR	DETONATIONS ABOVE 50-KM ALTITUDE
000023	AL ENERGY FROM NUCLEAR	DETONATIONS ABOVE 50-KM ALTITUDE
000011		DEVELOPMENT OF A SHELTER ALLOCATION
000019	FOR SHELTER USE IN SAN	DIEGO
000018	N AMONG FOUR GROUPS OF	DIFFERING LEVELS OF INTEREST IN SHEL
000023	TRANSMISSION OF THE	EARTH'S ATMOSPHERE OF THERMAL ENERGY
000012	TOWARD	EFFECTIVE CIVIL DEFENSE IN MONTGOMERY
000004	CIAL AND PSYCHOLOGICAL	EFFECTS OF NUCLEAR ATTACK
000002	L DEFENSE WITH SPECIAL	EMPHASIS ON CRISIS SITUATIONS
000023	ATMOSPHERE OF THERMAL	ENERGY FROM NUCLEAR DETONATIONS ABOVE
000021	RADIATIVE	ENERGY TRANSFER FROM NUCLEAR DETONAT
000015	ON AND PRESENTATION OF	ENVIRONMENTAL DATA FOR OFFICE OF CIV
000014	READ FOLLOWING NUCLEAR	EXPLOSIONS (2 VOLS.)
000024	SYSTEMS TO RADIOACTIVE	FALLOUT AND METHODS OF INCREASING THE
000017	THE	FALLOUT PROTECTION BOOKLET: A REPORT
000018	THE	FALLOUT PROTECTION BOOKLET: A COMPAN
000016	UDPS AND ACTION ON THE	FALLOUT SHELTER ISSUE
000009	AND OPERATIONS AT THE	FEDERAL, STATE, AND LOCAL LEVELS
000014	PREDICTION OF	FIRE SPREAD FOLLOWING NUCLEAR EXPLOS
000014	DICTION OF FIRE SPREAD	FOLLOWING NUCLEAR EXPLOSIONS (2 VOLS
000003	THE	FOUNDATIONS OF POSTATTACK BEHAVIORAL
000019	ET: A COMPARISON AMONG	FOUR GROUPS OF DIFFERING LEVELS OF I
000020	ORGANIZING MUNICIPAL	GOVERNMENTS FOR CIVIL DEFENSE
000018	COMPARISON AMONG FOUR	GROUPS OF DIFFERING LEVELS OF INTER
000003	PONS FOR VARIOUS BURST	HEIGHTS AND ATMOSPHERIC CONDITIONS
000003		IGNITION OF MATERIALS BY LARGE YIELD

000000	INNOVATIONS AND	IMPROVEMENTS IN CIVIL DEFENSE TRAINING
000007	EMENTS AND METHODS FOR	IMPROVING LOCAL CIVIL DEFENSE TRAINING
000024	FALLOUT AND METHODS OF	INCREASING THEIR SURVIVABILITY
000017	C ATTITUDES TOWARD AND	INFORMATION ABOUT CIVIL DEFENSE
000008		INNOVATIONS AND IMPROVEMENTS IN CIVIL
000018	OF DIFFERING LEVELS OF	INTEREST IN SHELTER CONSTRUCTION
000016	ON THE FALLOUT SHELTER	ISSUE
000003	ITION OF MATERIALS BY	LARGE YIELD NUCLEAR WEAPONS FOR VARI
000006	NING PROGRAM FOR STATE	LEVEL CIVIL DEFENSE PROGRAM PERSONNEL
000009	ERAL: STATE: AND LOCAL	LEVELS
000018	UR GROUPS OF DIFFERING	LEVELS OF INTEREST IN SHELTER CONSTR
000010		LINCOLN SHELTER UTILIZATION STUDY MO
000007	METHODS FOR IMPROVING	LOCAL CIVIL DEFENSE TRAINING
000009	THE FEDERAL: STATE: AND	LOCAL LEVELS
000012	IN MONTGOMERY COUNTY:	MARYLAND
000013	IN MONTGOMERY COUNTY:	MARYLAND
000003	IGNITION OF	MATERIALS BY LARGE YIELD NUCLEAR WEA
000007	REQUIREMENTS AND	METHODS FOR IMPROVING LOCAL CIVIL DE
000024	RADIOACTIVE FALLOUT AND	METHODS OF INCREASING THEIR SURVIVAB
000012	CTIVE CIVIL DEFENSE IN	MONTGOMERY COUNTY, MARYLAND
000013	UTILIZATION PLANNING IN	MONTGOMERY COUNTY, MARYLAND
000020	ORGANIZING	MUNICIPAL GOVERNMENTS FOR CIVIL DEFE
000004	PSYCHOLOGICAL EFFECTS OF	NUCLEAR ATTACK
000021	ENERGY TRANSFER FROM	NUCLEAR DETONATIONS ABOVE 50-KM ALTI
000023	OF THERMAL ENERGY FROM	NUCLEAR DETONATIONS ABOVE 50-KM ALTI
000014	FIRE SPREAD FOLLOWING	NUCLEAR EXPLOSIONS (2 VOLS.)
000022	THE THERMAL THREAT OF	NUCLEAR WEAPONS
000003	MATERIALS BY LARGE YIELD	NUCLEAR WEAPONS FOR VARIOUS PURSUE
000015	ENVIRONMENTAL DATA FOR	OFFICE OF CIVIL DEFENSE USE
000009	CIVIL DEFENSE PLANS AND	OPERATIONS AT THE FEDERAL: STATE: AN
000015		ORGANIZATION AND PRESENTATION OF EAV
000020		ORGANIZING MUNICIPAL GOVERNMENTS FOR
000006	CIVIL DEFENSE PROGRAM	PERSONNEL AND APPENDICES
000011	TER ALLOCATION AND USE	PLAN FOR BOSTON
000019		PLANNING FOR SHELTER USE IN CAN DIFG
000013	SHELTER UTILIZATION	PLANNING IN MONTGOMERY COUNTY, MARYL
000010	OR SHELTER UTILIZATION	PLANNING, VOL. 2 - A SHELTER ASSIGNM
000009	TESTING CIVIL DEFENSE	PLANS AND OPERATIONS AT THE FEDERAL:
000005	THE FOUNDATIONS OF	POSTATTACK BEHAVIORAL RESEARCH
000014		PREDICTION OF FIRE SPREAD FOLLOWING
000015	ORGANIZATION AND	PRESENTATION OF ENVIRONMENTAL DATA F
000010	- A SHELTER ASSIGNMENT	PROCEDURE
000006	A CORE TRAINING	PROGRAM FOR STATE LEVEL CIVIL DEFENS
000006	TE LEVEL CIVIL DEFENSE	PROGRAM PERSONNEL AND APPENDICES
000001	CRASH CIVIL DEFENSE	PROGRAM STUDY
000017	THE FALLOUT	PROTECTION BOOKLET: A REPORT OF PUBL
000018	THE FALLOUT	PROTECTION BOOKLET: A COMPARISON AND
000004	THE STUDY OF SOCIAL AND	PSYCHOLOGICAL EFFECTS OF NUCLEAR ATT
000017	N BOOKLET: A REPORT OF	PUBLIC ATTITUDES TOWARD AND INFORMAT
000021		RADIATIVE ENERGY TRANSFER FROM NUCL
000024	TY OF WATER SYSTEMS TO	RADIOACTIVE FALLOUT AND METHODS OF I
000017	PROTECTION BOOKLET: A	REPORT OF PUBLIC ATTITUDES TOWARD AN

000007		REQUIREMENTS AND METHODS FOR IMPROVING
000010		REQUIREMENTS FOR SHELTER UTILIZATION
000005		RESEARCH
000010	L. 1 - A REVIEW OF THE	REVIEW OF THE REQUIREMENTS FOR SHELTER
000019	POSTATTACK BEHAVIORAL	SAN DIEGO
000011	ATION STUDY VOL. 1 - A	SHELTER ALLOCATION AND USE PLAN FOR
000010	ING FOR SHELTER USE IN	SHELTER ASSIGNMENT PROCEDURE
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000014	N PLANNING. VOL. 2 - A	SHELTER ISSUE
000016	LEVELS OF INTEREST IN	SHELTER USE IN SAN DIEGO
000019	ACTION ON THE FALLOUT	SHELTER UTILIZATION STUDY VOL. 1 - A
000010	PLANNING FOR	SHELTER UTILIZATION PLANNING. VOL. 2
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000014	PREDICTION OF FIRE	STATE LEVEL CIVIL DEFENSE PROGRAM RE
000006	E TRAINING PROGRAM FOR	STATE AND LOCAL LEVELS
000009	ATIONS AT THE FEDERAL	STRATEGIC AND TACTICAL ASPECTS OF C
000002		STUDY
000001	CIVIL DEFENSE PROGRAM	STUDY OF SOCIAL AND PSYCHOLOGICAL EF
000004	AN APPROACH TO THE	STUDY OF THE VULNERABILITY OF WATER
000024	A	STUDY VOL. 1 - A REVIEW OF THE REQUI
000010	LN SHELTER UTILIZATION	SURVEY OF THE THERMAL THREAT OF NUCL
000022		SURVIVABILITY
000024	DS OF INCREASING THEIR	SYSTEMS TO RADIOACTIVE FALLOUT AND M
000024	VULNERABILITY OF WATER	TESTING CIVIL DEFENSE PLANS AND OPEN
000009		THERMAL ENERGY FROM NUCLEAR DETONATI
000023	EARTH'S ATMOSPHERE OF	THERMAL THREAT OF NUCLEAR WEAPONS
000022	SURVEY OF THE	THREAT OF NUCLEAR WEAPONS
000022	SURVEY OF THE THERMAL	TOWARD AND INFORMATION ABOUT CIVIL U
000017	RT OF PUBLIC ATTITUDES	TOWARD EFFECTIVE CIVIL DEFENSE IN MO
000012		TACTICAL ASPECTS OF CIVIL CIVIL DEF
000002	STRATEGIC AND	TRAINING
000007	NG LOCAL CIVIL DEFENSE	TRAINING
000008	MENTS IN CIVIL DEFENSE	TRAINING PROGRAM FOR STATE LEVEL CIV
000006	A CORE	TRANSFER FROM NUCLEAR DETONATIONS AB
000021	RADIATIVE ENERGY	TRANSMISSION OF THE EARTH'S ATMOSPHE
000023		USE
000015	FFICE OF CIVIL DEFENSE	USE IN SAN DIEGO
000019	PLANNING FOR SHELTER	USE PLAN FOR BOSTON
000011	SHELTER ALLOCATION AND	UTILIZATION PLANNING. VOL. 2 - A SHE
000010	QUIREMENTS FOR SHELTER	UTILIZATION PLANNING IN MONTGOMERY C
000013	SHELTER	UTILIZATION STUDY VOL. 1 - A REVIEW
000010	LINCOLN SHELTER	VARIOUS BURST HEIGHTS AND ATMOSPHERI
000005	LD NUCLEAR WEAPONS FOR	VULNERABILITY OF WATER SYSTEMS TO RA
000024	A STUDY OF THE	WATER SYSTEMS TO RADIOACTIVE FALLOUT
000024	F THE VULNERABILITY OF	WEAPONS
000022	RMAL THREAT OF NUCLEAR	WEAPONS FOR VARIOUS BURST HEIGHTS AN
000005	BY LARGE YIELD NUCLEAR	YIELD NUCLEAR WEAPONS FOR VARIOUS RU
000005	OF MATERIALS BY LARGE	

List of Unclassified Documents

The key words in the document titles are listed on the previous pages.

The document list on the following pages provides a description of each report.

For illustrative purposes, only three items are listed:

1. Column one - the accession number arbitrarily assigned to the document,
2. Column two - the full title of the document,
3. Column three - the classification number assigned to this document in the Army Library (Pentagon).

In addition, the author, corporate originator, date, contract number, subtask number, etc., might be listed for each document.

LIST OF UNCLASSIFIED DOCUMENTS

000001	CRASH CIVIL DEFENSE PROGRAM STUDY	UA 927.R43
000002	STRATEGIC AND TRACTICAL ASPECTS OF CIVIL CIVIL DEFENSE WITH SPECIAL EMPHASIS ON CRISIS SITUATIONS	UA 929.H88
000003	IGNITION OF MATERIALS BY LARGE YIELD NUCLEAR WEAPONS FOR VARIOUS BURST HEIGHTS AND ATMOSPHERIC CONDITIONS	UF 767.R72
000004	AN APPROACH TO THE STUDY OF SOCIAL AND PSYCHOLOGICAL EFFECTS OF NUCLEAR ATTACK	UF 767.H91
000005	THE FOUNDATIONS OF POSTATTACK BEHAVIORAL RESEARCH	UF 767.H91
000006	A CORE TRAINING PROGRAM FOR STATE LEVEL CIVIL DEFENSE PROGRAM PERSONNEL AND APPENDICES	UA 927.A999
000007	REQUIREMENTS AND METHODS FOR IMPROVING LOCAL CIVIL DEFENSE TRAINING	UA 927.A9992
000008	INNOVATIONS AND IMPROVEMENTS IN CIVIL DEFENSE TRAINING	UA 927.S999

000018	THE FALL-OUT PROTECTION PROBLEM: A COMPARISON AMONG FOUR GROUPS OF DIFFERING LEVELS OF INTEREST IN SHELTER CONSTRUCTION	UA 926.5.M421
000019	PLANNING FOR SHELTER USE IN SAN DIEGO	UA 928.5 .19875
000020	ORGANIZING MUNICIPAL GOVERNMENTS FOR CIVIL DEFENSE	UA 927.8.3
000021	RADIATIVE ENERGY TRANSFER FROM NUCLEAR DETONATIONS ABOVE 50-KM ALTITUDE	QC 795.M44
000022	SURVEY OF THE THERMAL THREAT OF NUCLEAR WEAPONS	CLASSIFIED
000023	TRANSMISSION OF THE EARTH'S ATMOSPHERE OF THERMAL ENERGY FROM NUCLEAR DETONATIONS ABOVE 50-KM ALTITUDE	QC 795.P28
000024	A STUDY OF THE VULNERABILITY OF WATER SYSTEMS TO RADIOACTIVE FALLOUT AND METHODS OF INCREASING THEIR SURVIVABILITY	UA 929.95.W31P19

Best Available Copy

000009	TESTING CIVIL DEFENSE PLANS AND OPERATIONS AT THE FEDERAL, STATE, AND LOCAL LEVELS	UA 927.0929
000010	LINCOLN SHELTER UTILIZATION STUDY VOL. 1 - A REVIEW OF THE REQUIREMENTS FOR SHELTER UTILIZATION PLANNING. VOL. 2 - A SHELTER ASSIGNMENT PROCEDURE	UA 928.5.N96
000011	DEVELOPMENT OF A SHELTER ALLOCATION AND USE PLAN FOR BOSTON	UA 928.5.87
000012	TOWARD EFFECTIVE CIVIL DEFENSE IN MONTGOMERY COUNTY, MARYLAND	UA928.M39578
000013	SHELTER UTILIZATION PLANNING IN MONTGOMERY COUNTY, MARYLAND	UA 928.M296781
000014	PREDICTION OF FIRE SPREAD FOLLOWING NUCLEAR EXPLOSIONS (2 VOLS.)	TH 9111.U523
000015	ORGANIZATION AND PRESENTATION OF ENVIRONMENTAL DATA FOR OFFICE OF CIVIL DEFENSE USE	UA 927.A228
000016	COMMUNITY ATTITUDES AND ACTION ON THE FALLOUT SHELTER ISSUE	UA 926.5.C42
000017	THE FALLOUT PROTECTION BOOKLET: A REPORT OF PUBLIC ATTITUDES TOWARD AND INFOR- MATION ABOUT CIVIL DEFENSE	UA 926.5.M42

Appendix D

A Proposed Civil Defense Quarterly Technical Progress Review

Appendix D

A Proposed Civil Defense Quarterly Technical Progress Review

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1. Introduction	D-3
2. The Need for Technical Progress Reviews	D-3
3. A Suggested Start-up Sequence	D-4
4. Relevant AEC Cost Experience	D-6
5. A Dummy of the Proposed Review	D-8

Appendix D

A Proposed Civil Defense Quarterly Technical Progress Review

1. Introduction

This appendix describes a proposed review journal which would cover all civil defense research. A discussion of the need for such a review journal is provided and a start-up sequence is listed, based on Atomic Energy Commission experience. Finally, a preliminary dummy of such a journal is provided for illustration.

2. The Need for Technical Progress Reviews

A pertinent excerpt from:

Science, Government and Information, A Report of the President's Science Advisory Committee, The White House, January 10, 1963 (p.42).

"Because there are so many technical reports, and most of them are unreferenced and of uneven quality, reviews of technical reports can be particularly useful as discriminating guides to the literature.... Experience has already demonstrated the value of critical reviews of the related open literature. The Atomic Energy Commission issues five quarterly review journals, Nuclear Safety, Power Reactor Technology, Nuclear Materials, Reactor Fuel Processing, and Isotopes and Radiation Technology. These reviews, written by working experts have been received enthusiastically by the technical community. What has worked so well in atomic energy ought to work well in other areas where government agencies lead in the development of technology, such as space and military technology. Therefore, we commend NASA's plan to establish such critical review journals, and we urge DOD to do the same in appropriate fields."

A further explanation of the proposed Civil Defense review journal is provided in the dummy Foreword.

The AEC feels that a minimum readership of 6000 potential readers is needed to publish its quarterly journals. One new AEC review journal is currently planned for only semi-annual publication until the demand and the pertinent literature grow large enough to support quarterly publication.

We feel that a review of civil defense research would be of interest to 6,000 people. Substantiation of this feeling must await a user need survey.

3. A Suggested Start-up Sequence

- a. Decide that the journal would be of sufficient interest and usefulness to justify its publication.
- b. Develop rough format, contents, and publishing plan.
- c. Obtain approval of the Director of Civil Defense.
- d. Establish the journal as an OCD budgetary item.
- e. Obtain approval of the Secretary of the Army.
- f. Obtain approval of the Secretary of Defense (through DDR&E).
- g. Submit a form letter requesting publishing approval from the Bureau of the Budget. In this letter, it will be necessary to state such items as the number of copies to be printed, the number to be given away, the number of pages, the printing and preparation cost, etc.
- h. Establish a publishing office in OCD to direct the publication of the review. The duties will be to:
 - (1) Supervise the contractor who prepares the journal.
 - (2) Approve the journal dummies from the contractor and eliminate proprietary data.
 - (3) Clear published material with the OCD security officer. (To avoid compromising security, the contractor classifies the dummy Confidential, and it is cut and downgraded after review by the security office.)
 - (4) Prepare the final dummy for submission to the printer (editing, typing, and art work). (The contractor does not see or approve changes made.)
 - (5) Work with the Government Printing Office to supervise printing and mailing.
 - (6) Distribute free copies to appropriate government employees and selected users.

- i. Choose a contractor to prepare and edit the journal contents. The contractor should have broad staff capability to handle material in all phases of civil defense.

In preparing a journal, the contractor may use from 4 to 25 people to review relevant material. In addition, he may pay a \$200 to \$300 honorarium to an outside expert for a review article

The duties of the contractor are:

- (1) Collect all relevant reports and literature published within the last year.
 - (2) Assign technical experts to review literature in their fields of competence, as the literature is obtained.
 - (3) Edit the review to conform with journal format.
 - (4) Work in close liaison with the Publishing Office.
- j. Staff the OCD Publishing Office. The staff might include:
 - (1) Manager-editor for style and contents.
 - (2) Two typists.
 - (3) Part-time artist.
 - (4) Part-time security officer.
 - k. Publish the first issue.
 - l. For normal operation, the cycle of a journal would be (giving elapsed time per operation):
 - (1) Collect and review articles - three months.
 - (2) Prepare journal dummy at contractor's facility - one month.
 - (3) Edit journal at OCD - one month.
 - (4) Prepare journal in proper format - one month.
 - (5) Printing and distribution by Government Printing Office - one month
 - (6) In summary, an average of six months elapses between report receipt and review dissemination.

- m. Prepare journal indexes on a yearly basis.
- n. Insofar as government regulations allow, promote the use of the journal by subscribers.
- o. A logical follow-on step has been to draw on the contractor competence and literature familiarity generated above to provide information and bibliographic services on request. In essence, the contractor then becomes an information analysis center.

4. Relevant AEC Cost Experience

The previous pages described the steps necessary to establish a review, based on the experience of the U. S. Atomic Energy Commission. For this information we are indebted to Mr. Joseph G. Gratton, Chief of the Scientific Publications Branch, Division of Technical Information, U. S. Atomic Energy Commission; Germantown, Maryland. The following cost data were also supplied by Mr. Gratton.

a. Contractor Costs

The AEC contractors receive from \$25,000 to \$80,000 per year to prepare the journal copy. The lower figure excludes space, typing, art work, and document collection costs. The higher figure covers complete journal dummy preparation.

The contractor information analysis centers are funded at \$20,000 to \$100,000 per year by the AEC. These funds are in addition to the journal preparation funds. For further description of information analysis centers, see Section VI.

b. Printing Costs

The AEC pays the printing cost of \$1,500 to \$3,000 per year for a journal. The \$2.00 to \$2.50 annual subscription price merely pays mailing and handling costs.

Typically, the AEC has 4,000 copies of a journal issue printed. Of these, 2,000 are stocked and sold by the Superintendent of Documents and 2,000 are given away by the AEC. An issue of the journal averages 125 to 150 pages.

c. Start-up Costs

Publication of the first issue, (step (k) in Section 3), generally occurs about two years after the decision to proceed with a review journal. It takes about three more issues, or another year, for the system to shake down. At the end of three years, about \$250,000 will have been spent.

Appendix D

Section 5

CIVIL DEFENSE

A Quarterly Technical Review

The dummy of a proposed publication

CIVIL DEFENSE

A Quarterly Technical Review

Prepared for RESEARCH DIRECTORATE, OFFICE OF CIVIL DEFENSE. by
RESEARCH TRIANGLE INSTITUTE, Durham, North Carolina

March 1965

● volume I

● number I

Best Available Copy

Technical Progress Review

To meet the needs of those interested in civil defense in industry, research, and government, for concise summaries of current developments, the Office of Civil Defense of the Department of the Army is publishing this review. Issued quarterly, this review digests and evaluates the latest research findings and test results pertinent to the field of civil defense.

This journal may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. See back cover for remittance instructions and foreign postage requirements.

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- B. Assumes any liabilities with respect to the use of, or for damage resulting from the use of any information, apparatus, method or process disclosed in this report.

Foreword

This quarterly review of civil defense developments has been prepared at the request of the Director of Civil Defense of the Department of the Army. Its purpose is to assist interested private and government organizations in the task of keeping abreast of new results and new reports concerning civil defense.

The review covers noteworthy recently published reports dealing with civil defense studies or with engineering or scientific studies whose results are directly pertinent to the civil defense organization, facilities, and equipment. This journal does not try to assess current political implementation problems nor does it try to comprehensively report the status of civil defense in the United States. Its purpose is to disseminate information which may be useful to the design of a civil defense system; not to give orders or instructions.

The types of articles in this issue of Civil Defense are: reviews of current literature and special review articles on specific topics. The special review articles permit discussion of pertinent subjects which cannot be adequately considered by reference to only the current literature.

Current review articles, however, constitute the major portion of this issue. All incoming literature (including reports, books, American and foreign technical journals, and transactions) is examined for subjects within our area of interest. The material is collected, grouped, and reviewed by experts. Interpretations in any article, represent the opinion of the editors, who are employees of the XYZ Private Contractor Corporation. Readers are urged to consult the references to all original work listed at the end of the article for more complete information.

George X, Editor.
John Y, and
William Z, Assistant Editors.

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I. Shelter Research

II. Support Systems

III. Postattack Operations

IV. Systems Evaluation

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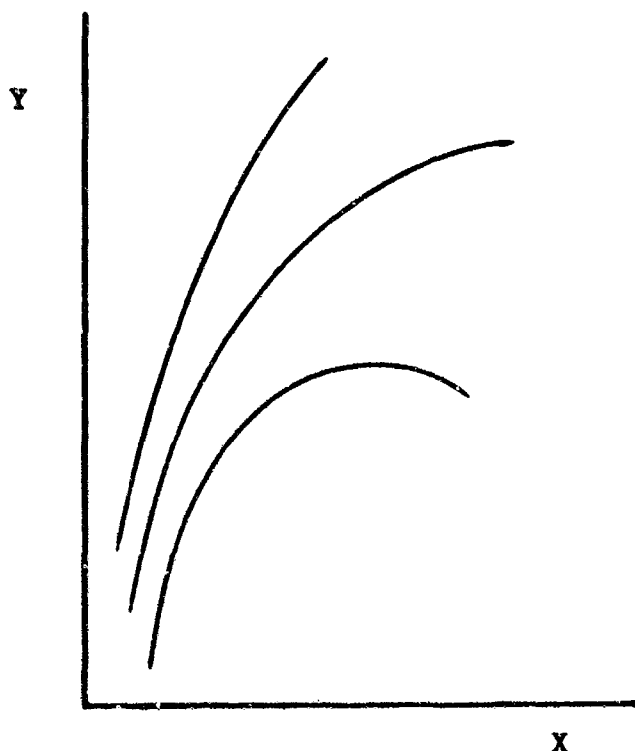
Issued quarterly by the U. S. Department of Defense. Use of funds for printing this publication approved by the Director of the Bureau of the Budget on Month 27, 196X.

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This quarterly Civil Defense review is proposed as a potentially useful vehicle to announce and review recent reports and developments pertinent to its subject field.

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Postattack Operations

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Section

4

Systems Evaluation

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1.

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Announcements:

Operational, organizational, and technical announcements may be provided in this section. In addition, letters to the editor may stimulate ideas and interest.

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Appendix E

A Thesaurus of Civil Defense Descriptors

This appendix is bound separately as Volume II. Its contents are listed below:

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Civil Defense Information Systems Analysis
OCD Subtask 44318
Final Report CD-158-1, Volume I
by W. T. Murray and J. E. Jenkins
January 1965, (UNCLASSIFIED) pp. 124

A feasibility study was performed of a civil defense scientific and technical information system that will insure the ready availability of information to all pertinent OCD elements and to contract research personnel. A brief analysis of scientific information systems is presented as background for a discussion of the present civil defense information system. The potential sources of civil defense information are listed. The civil defense information system is defined to be the relationships or exchange between the sources of civil defense information and the users of this information. Methods for improving this exchange are presented. These suggestions include the establishment of an information analysis center, the printing of a quarterly technical progress review, and the use of standard report format and indexing procedures. To foster standard indexing procedures, a Handbook of Civil Defense Descriptors is provided. This Handbook forms the second volume of this two volume report.

CIVIL DEFENSE SYSTEMS, INFORMATION SYSTEMS, LIBRARIES, DATA STORAGE SYSTEMS, DATA PROCESSING SYSTEMS, INFORMATION RETRIEVAL, DOCUMENTATION, SCIENTIFIC RESEARCH, ANALYSIS, REPORTS, ABSTRACTS & REVIEWS, BIBLIOGRAPHIES, INDEXES AND CLASSIFICATION.

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1 ORIGINATING ACTIVITY (Corporate author) Research Triangle Institute Post Office Box 490 Durham, North Carolina		2a REPORT SECURITY CLASSIFICATION Unclassified	
		2. GROUP	
1 REPORT TITLE CIVIL DEFENSE INFORMATION SYSTEMS ANALYSIS (A Feasibility Study of Research Information Exchange)			
4 DESCRIPTIVE NOTES (Type of report and inclusive dates) Volume I of a Two Volume Final Report			
5 AUTHOR(S) (Last name, first name, initial) Herzog, William T. Jenkins, J. Edward			
6 REPORT DATE January, 1965		7a TOTAL NO OF PAGES 152	7b NO OF REFS 60
8a. CONTRACT OR GRANT NO. OCD-PS-64-56		9a. ORIGINATOR'S REPORT NUMBER(S) OU-158-1 (Operations Research and Economics Division)	
8b. PROJECT NO. (Subtask) 4631B Systems Evaluation Division OCD Research Directorate		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) _____	
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