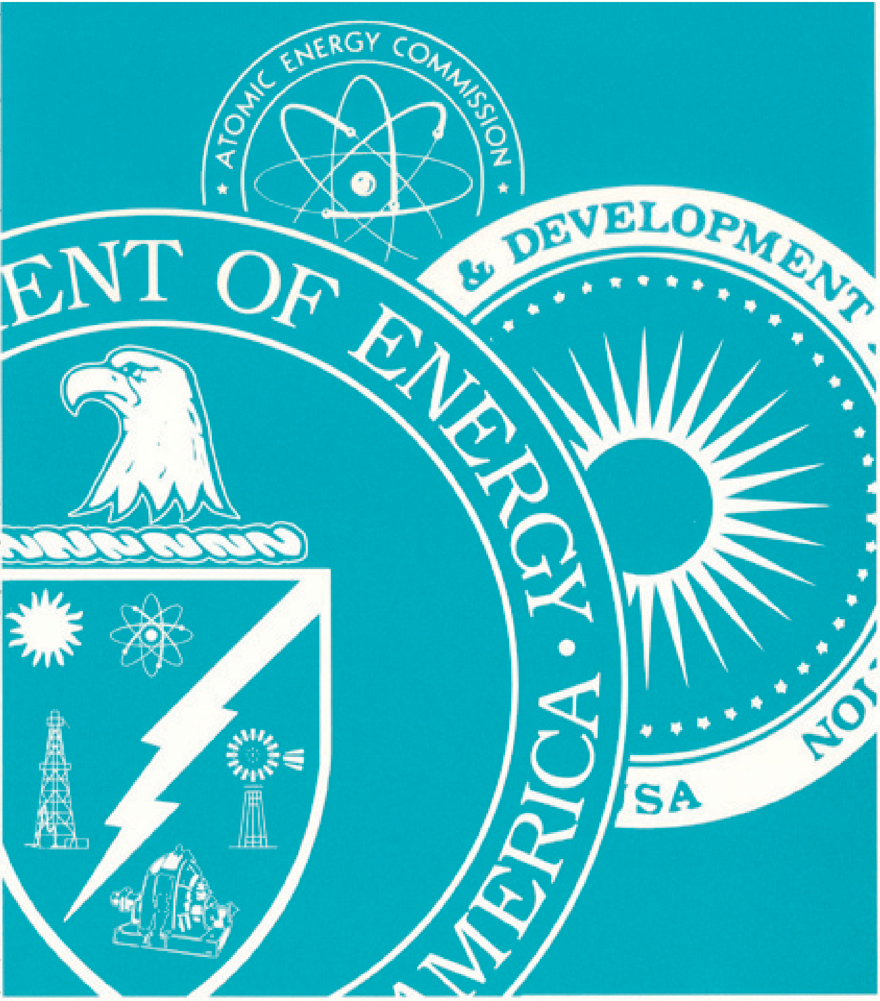

The Oak Ridge Technical Information Center

A Trailblazer in Federal Documentation

USDOE Office of Scientific and Technical Information

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William McGill Vaden

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PREFACE

Reported in the Minutes of the 1962 AEC Technical Information Panel Meeting is an account of a discussion among members who had long felt that experience gained by the Division of Technical Information in science information handling should be recorded. It was their view that much of value to others entering the field had already been developed by the Oak Ridge Center but was not readily available. In considering ways to provide such information, the group recommended that an editor should be found who would be willing to collect suitable papers that would cover this experience and arrange for their publication in an appropriate form.

Unfortunately, no formalized recording of "science information handling," as desired by the AEC Technical Information Panel, was ever accomplished.

In 1988, Joseph G. Coyne, Manager of the Department of Energy's (DOE) Office of Scientific and Technical Information (OSTI), successor to the Technical Information Center (TIC), revived the idea of establishing a record of the Center's past. At the time of this suggestion, I had just returned to the OSTI facility to assist in the implementation of the International Energy Agency's Energy Technology Data Exchange. Since my work with the AEC's technical information program covered the period from 1947 until 1985 (the year of my retirement), Coyne proposed that I assume an additional task of chronicling this record. The essential highlights would map in time the events, programs, policies, and management decisions that shaped and gave personality to the organization surviving today as the DOE Office of Scientific and Technical Information (OSTI). The effort would be restricted, however, to that portion of the Center's history that ended with the termination of the Energy Research and Development Administration (ERDA).

The precedence of other work did not allow immediate attention to Coyne's proposal. Nonetheless, the notion of recording TIC's history was intriguing, and, at odd moments, I would find myself drawn to the OSTI Information Resource Center where the AEC's and successor agencies' information program records and other archival materials were located. From that information store, I began to request and was provided copies of such information as I felt was relevant to the creation of an eventual "history." My own personal files, which extended back to 1947 and included my twenty-two years as TIC's Deputy Manager, were also scrutinized for pertinent information. Almost imperceptibly, a large collection of information pertaining to the current Department's (and its predecessor agencies') information programs was organized chronologically by year. With Coyne's encouragement and approval, it was agreed that a writing program could be initiated on an unscheduled basis as time might become available. During the autumn of 1990 and again in mid-1991 to the end of the year, opportunities for writing did indeed arise. From a concentrated effort during these periods, the first manuscript drafts were produced.

I am particularly indebted to Joseph Coyne for providing the energizing force that initiated and abetted this recording of the Center's history. Unfortunately, within a few months of his review of the first drafts, Coyne announced his decision to retire from federal service, effective at the end of 1990. His subsequent departure did not leave the fate of the TIC history project without friends, however. Coyne's successor, Elizabeth V. Buffum (current OSTI Director), reiterated her desire (and the wishes of the OSTI Executive Committee) that work on the history be continued. With this renewed encouragement, the first completed manuscript was made available for review by the Fall of 1991. Much credit must therefore be given to Elizabeth Buffum and others of her staff whose interest in this historical project has remained firm and supportive.

Program planning documents, monthly progress and annual program reports, research documents, articles, books, recorded correspondence, and minutes of scores of meetings have been reviewed to obtain the historical record on which this book is based. Thanks are therefore extended to the many persons (DOE OSTI personnel as well as contractor staff) who assisted in various ways to provide the reference materials required for review. To Labat-Anderson employees Kathleen Ellis, Martha Knowles, Mary Jane Taylor, and Bernice Bullock in the OSTI Information Resource Center, grateful appreciation is expressed for locating and copying the many requested internal house records.

For providing helpful advice in organizing and structuring this history and reviewing various sections during its initial development, I owe special thanks to Dora H. Moneyhun, OSTI International Activities Manager. Internal manuscript review and Departmental approvals for publication were coordinated by Ms. Moneyhun.

I am especially indebted to the following individuals who willingly accepted the task of reading the initial manuscript and provided many constructive suggestions and helpful criticisms. For this much appreciated service, I extend special thanks to TIC retirees James D. Cape, Thomas E. Hughes, and Lee M. Thompson; to OSTI staff members Dr. Lorne T. Newman and Dr. Robert W. Rutkowski; and to Jean S. Smith and Thomas Daun Sample (Labat-Anderson Inc.).

The helpful advice of Dr. Raymond K. Wakerling, Berkeley, California, who read the initial manuscript in its entirety, is also gratefully acknowledged. As former Head of the Information Division, Radiation Laboratory, Dr. Wakerling served continuously as a technical information panelist beginning in 1946 [as a member of the Manhattan Project Editorial Advisory Board (PEAB)] to the final meeting of the AEC Technical Information Panel in December 1970.

Particular credit must also be given to the Labat-Anderson Publication Support Group who provided indispensable service in preparing the manuscript for final publication. Chief editor was Linda O'Hara, assisted by editors Jean S. Smith, Audrey Smith, Carol Gardner, and Michele Berkes. Compositors were Evelyn Gibson, Mary Scott, Doris Hillard, and Darlene Richmond.

The Subject Index and Name Index were produced by M. Catherine Grissom, OSTI Information Analysis and Management Division Director. Without her meticulous review of the final text in generating the indexes, this book's usefulness would be significantly diminished. Thanks are also extended to Kim Buckner of Ms. Grissom's staff who assisted in the indexing effort.

Finally, it is with gratitude that I acknowledge the help of three former directors of the AEC/ERDA technical information programs who reviewed the text in its final stages prior to publication. Special thanks are extended to Melvin S. Day, who, from 1959 to 1961, directed the Headquarters information program prior to his assuming the initial directorship of NASA's scientific and technical information program; to Edward J. Brunenkant, who directed the AEC's technical information program for an entire decade (1961 to 1971) and who subsequently served as Director, Scientific and Technical Information, International Atomic Energy Agency, Vienna; and to Edwin E. Stokely, who led the program through the difficult AEC/ERDA transition period (1972 to 1976). Their personal recollections of those periods of TIC's history with which they had been associated have been reassuring with respect to accounts presented herein. Their encouraging comments supporting this publication endeavor are also especially appreciated.

William McGill Vaden

Oak Ridge, Tennessee
May 1992

INTRODUCTION AND OVERVIEW

When the Atomic Energy Commission (AEC) began its operations in January 1947, no conscious preplanning had occurred to locate the operations arm of the AEC's technical information program in Oak Ridge. The Army's Manhattan Engineer District library operations and related technical information activities were responsibilities carried out by General Leslie R. Groves' staff already headquartered in Oak Ridge. Before the AEC changeover, General Groves' chief aide, Colonel Kenneth D. Nichols, had established an office to execute information compartmentation policies, and it was here that engineering and research information was collected for redistribution within and among Manhattan Engineer District research project offices.

It was also to this Oak Ridge office that Colonel Nichols directed area engineers to submit all relevant classified and unclassified research records related to the creation of the atomic bomb. Colonel Nichols' intent was to coalesce this information into one central file for possible publication once the basic facts about the bomb's development had been publicly released. As authorized by the Atomic Energy Act of 1946, these information activities, along with all other Manhattan Engineer District program functions, were absorbed by the AEC on site. From these early plans (particularly those involving the eventual publication of the National Nuclear Energy Series) the AEC's technical information program began to germinate.

Besides absorbing this nascent Manhattan Engineer District information program with its publication facilities and printing equipment intact, the AEC also acquired a number of personnel who, as previous Army staff, continued working in their information specializations under the new AEC program arrangement. Notable among these was Dr. Alberto F. Thompson, first director of the AEC's Technical Information Branch. In a very short period of time under his leadership, the erstwhile Manhattan Engineer District library and publications department had metamorphosed into a well-defined AEC technical information program.

At the beginning of the changeover, the AEC technical information program was managed by the Office of Oak Ridge Directed Operations [later identified as Oak Ridge Operations (ORO)]. As the new agency matured, however, this local Field Office relationship changed. In November 1948 the AEC General Manager directed that the Oak Ridge technical information function should report directly to the AEC's Division of Public and Technical Information, Washington, D.C., as an extension office. Until the 1980s, when the Office of Scientific and Technical Information (OSTI) was established at Oak Ridge, this Oak Ridge/Washington Headquarters bonding remained strong, with the larger Oak Ridge component (in terms of funding and staff numbers) accomplishing the operating functions of the program and the Headquarters office establishing technical information policy and performing Agency-wide coordinating roles.

The technical information activities highlighted in this book span three decades (1947–1977). For the period covered, the federally operated technical information organization that is the subject of this publication had several official names. Chosen from these for the book title is the "Technical Information Center," because this was the functioning organization at the time the AEC was folded into the Energy Research and Development Administration (ERDA). It was also this organizational name that was retained throughout the ERDA period and onward into the days of the Department of Energy. The Technical Information Center therefore links together all technical information program activities carried out by the Oak Ridge facility during these Agency transmutations.

The many organizational titles accorded to the Oak Ridge federal information program resulted from efforts to reflect changing Agency technical information objectives and the varied structures set up at Headquarters to carry them out. Starting in 1947 as the Technical Information Division (Oak Ridge Directed Operations), the Oak Ridge facility has been known as the Technical Information Division (Oak Ridge Extension), Technical Information Service (Oak Ridge), Technical Information Service Extension, Office of Technical Information Extension, Division of Technical Information Extension, and, at the time of its emergence into the Department of Energy in 1977, the Technical Information Center. Presently (in 1992), the Office of Scientific and Technical Information (OSTI) is the Department of Energy's official title for this institution. The briefer, and perhaps more familiar, identifiers have been the initials for the cited organizations: TID(ORO), TID(ORE), TIS(OR), TISE, OTIE, DTIE, TIC, and OSTI.

The creation of a single organizational component to centralize and manage (on behalf of all the AEC's constituent parts) the myriad complicated and detailed issues related to the control and dissemination of technical information was both natural and wise. In its *Fifth Semiannual Report to Congress,* the Commission referred to technical information as one of its five major programs. Its mission was to "plan, develop, maintain, and administer all services and facilities required to accomplish the dissemination of scientific and technical information for the encouragement of scientific progress and to program the ultimate sharing on a reciprocal basis of information concerning the practical industrial application of atomic energy, as provided in the Atomic Energy Act of 1946."

This concept of centralizing the planning, developing, maintaining, and administering of services and facilities required to accomplish Departmental responsibilities relating to technical information control and dissemination has always been considered the fundamental justification for the Technical Information Center. The program, from the outset, was designed primarily to ensure that the results of U.S. taxpayers' investments in research and development (R&D) were properly reported and made available promptly and dependably to the funding agencies (i.e., AEC, ERDA, and DOE), their contractors, other government agencies, and the scientific community at large. Secondarily, it was considered necessary that information on reported research be maintained as part of a permanent reservoir of recorded scientific and technical data available for users upon request. This program responsibility has necessitated an appropriate archiving of these information products and, from them, establishing a means for their ready availability through public sales outlets or by other approved dissemination mechanisms.

One of the earliest concerns of the newly established Technical Information Branch in 1947 was to devise a means to handle the surge of public requests for declassified and unclassified information related to the atomic bomb. To respond to these requests, an office had to be organized quickly to handle reproduction of out-of-stock materials and to record sales. Although a printing and reproduction facility had existed at the Manhattan Engineer District headquarters in Oak Ridge, a printing plant adequately augmented with reproduction equipment and personnel was established to achieve production objectives.

Announcement journals also had to be developed to provide information about public accessibility of steadily increasing numbers of declassified and unclassified reports then being released. Thus an abstracting service was begun. First to be published on a scheduled basis, beginning July 1947, was *Abstracts of Declassified Documents (ADD).* This publication was followed within a year and a half by its replacement, *Nuclear Science Abstracts (NSA),* an announcement journal originated to include published (journal articles, books, etc.) as well as unpublished R&D information (reports). For the first full *NSA* volume year (1948) 4,619 abstracts were indexed and announced; in a single year forty years later (1988), more than 40 times that number were added to the Department of Energy's Energy Science and Technology database.

Through representation by a Technical Information Panel (consisting of scientists, researchers, librarians, and managers appointed from the various AEC contractor, laboratory and project sites), varied and broad viewpoints were obtained for integration into the AEC's technical information program as it evolved over the decades. With the advice and guidance of the Panel, the technical information program became an instrument for ensuring execution of Atomic Energy Act requirements relating to disposition of AEC R&D results as well as a vehicle for Project-wide technical information program enhancement.

As Congress created and modified energy legislation through the years (the Atomic Energy Act of 1954, the Energy Reorganization Act of 1974, and the Department of Energy Organization Act of 1977), initiatives by the different administrations and their newly appointed Secretaries and Directors caused new information programs to be developed and old ones to be modified to reflect changing administrations' aims and policies. In support of these new ideas and proposals, the Washington Headquarters staff designed and created information programs to fit changing policy objectives. The Oak Ridge Center provided the muscle and bone for the execution of these newly crafted or redefined information activities. (To match program directors and managers with administrations, see Appendix 1.)

Under President Eisenhower's administration, for example, the Center was the principal AEC resource for materials needed to implement the information requirements of the "Atoms-for-Peace" Program that was made possible under the Atomic Energy Act of 1954. On the domestic side, this effort involved ensuring accessibility of nuclear science information of possible or potential value to U.S. industry in support of the Civilian Application Program. The Atoms-for-Peace foreign proposals involved negotiating bilateral agreements for cooperation between the United States and other nations that included exchanging of information; drafting of an organizational structure that would establish the International Atomic Energy Agency (IAEA); organizing, under the aegis of the United Nations, a program of international conferences on the peaceful uses of atomic energy; and providing Atoms-for-Peace libraries of AEC-published reference materials on atomic energy to other nations of the world. These initiatives, in one way or another, created major impacts on the AEC's basic scientific and technical information program. All of them resulted in major workload increases.

At the height of the AEC depository library program (greatly enlarged to carry out the Atoms-for-Peace initiative), more than 80 domestic and an approximately equal number of foreign libraries received all the AEC unclassified and declassified R&D information gratis. These libraries continued to receive, as it became available, all AEC unclassified R&D information until expiration of the AEC depository library program in the late 1960s.

During the years of weapons testing, the Center was the principal document processor for all AEC and Department of Defense offices and their contractors who were engaged in preparation of reports emanating from research projects associated with U.S. weapons testing. The Oak Ridge Center responsibilities included editing, composing, printing, distributing, and indexing all weapon test (WT) reports, regardless of sponsoring agency, including Foreign Weapon Effects (FWE) reports.

Whereas the Eisenhower Administration was marked both by a strong national defense program (as expressed by atomic weapons testing) and the introduction of the Atoms-for-Peace Program, the Kennedy and Johnson Administrations reflected an advocacy of more educational assistance to public institutions and schools on the usefulness of the atom.

Educational assistance began to be provided the same year the AEC was activated. To help citizens become better aware of topics of particular concern to the AEC and to explain the intent and considerations underlying AEC decisions, the educational services and traveling exhibits programs were introduced. Exhibits, booklets, pamphlets, posters, and films were created and used for educational purposes. Attendance at exhibits for the 1949–1972 period, inclusive of all exhibit types, approached 75 million persons. The Technical Information Center assisted in this program by providing booklets or other kinds of literature and by answering information requests prompted by exhibitions. Booklets provided an information base that was factually consistent. With quantities of such materials readily available, it was possible for the Center to respond quickly and economically to the tens of thousands of public requests received each year.

At the time of the AEC's inception, an in-house publishing and printing capability had been inaugurated to manufacture specially derived information products on a timely basis and, when necessary, under security control. Extending beyond the publication of the National Nuclear Energy Series (NNES) were the special technical publications that were planned, initially, for the AEC Civilian Application Program. Included in this publishing activity were the Technical Progress Reviews, the Books and Monographs Program, the Critical Reviews Program, and the AEC Conferences Program. All these publications, although managed by the Headquarters Book Program office, were processed through the editorial offices of the Oak Ridge Center. At the time of the AEC's demise in January 1975, manuscripts for more than 200 books, monographs, and conferences had been processed through the Oak Ridge facility's editorial offices. Many titles became successful publication ventures through commercial publishers; others were fully edited, composed, made up, and printed as books at Oak Ridge using the Center's own publishing and printing facilities.

The TIC has been noted for its ability to search out and install efficient and economical systems for servicing the various technical information programs. Unique at the start of the National Nuclear Energy Series was "cold type" publishing, which proved to be the most economically feasible reproduction medium for AEC reports and books published by the Oak Ridge Center. To refine and expand this process, the Center encouraged manufacturers of office typewriters to add features on their machines that would facilitate improved text copy as well as introduce labor-saving devices not considered or intended in their original design.

Document miniaturization, a program designed to facilitate rapid and inexpensive dissemination of AEC R&D reports to AEC depository libraries, other federal agencies, AEC contractors, and installations in foreign countries, was accomplished by the Microcard Corporation. It was a technological innovation that permitted the Oak Ridge Center to achieve full and prompt public access to the AEC's R&D reports. An AEC contractor that began work in 1952 on site at TIC, the Microcard Corporation, produced its 20 millionth microcarded report one decade later.

An outstanding example of the Center's boldness and willingness to adopt new strategies to enhance production and product quality was the installation of photomechanical techniques that were successfully introduced at the beginning of the *Nuclear Science Abstracts (NSA)* 1959 volume year. Besides providing improved currency of announcement of newly announced research, the innovation of publishing in-issue indexes to *NSA* and accumulating them allowed the termination of card catalogs that were being maintained at AEC project and depository libraries at great cost.

During President Nixon's Administration, the problems of regulating the atom became more clearly recognized and publicized, and it was during his term of office that public voices were heeded on a need to redirect the Nation toward an integrated national energy policy that would incorporate the atom as only one among a series of energy options to be developed. In his proposal to Congress in June 1971, President Nixon recommended a new agency that would consolidate in a new department all major energy programs. Under this plan, regulatory functions would be transferred to a separate agency.

At the time of the demise of the AEC and upon absorption of its technical information program into the Energy Research and Development Administration (ERDA), TIC began to undertake a variety of projects to aid the newly appointed Director of Regulation. Program objectives involved publication of Regulatory Adjudication Issuances and preparation of digests and indexes of regulatory decisions of the Commission and the Appeal and Licensing Boards. Until the Nuclear Regulatory Commission (NRC) technical information program was fully matured some years later, TIC continued this regulatory assistance.

To facilitate worldwide coverage of the nuclear literature through international cooperation, the Center coordinated a direct organization-to-organization information exchange program. It also participated in official bilateral exchange programs and in the development of information systems for the International Atomic Energy Agency and Euratom. Each arrangement created separate channels for the introduction of scientific and technical information into the Center's data files. With U.S. energy interests broadening under ERDA, international cooperation extended to nonnuclear energy fields as well. With the formation of the International Energy Agency in September 1974, TIC became the U.S. focal point for fulfilling cooperative information exchange mechanisms made under agreements with the IEA Coal Research Service and the IEA Biomass Information Service.

Agreements to exchange information with other nations, in general, proved to be advantageous to the United States through the introduction of foreign technical information that improved the quality and increased the size of domestic energy databases. Organizations that have regularly received TIC database products are the National Technical Information Service, the Superintendent of Documents' Depository Libraries, the Library of Congress, the National Aeronautics and Space Administration, and the Department of Defense.

In the mid-1960s, the Center committed itself to changing its method of capturing information. Before that time the printed product was the basic information interchange medium. With the advent of the computer, however, collected data could be manipulated in multiple ways for varied purposes, including printing. Databases were also being established for literature searching and electronic communication. Efficient use of the computer, however, demanded standardization of both data entry and output products. Document surrogates (i.e., elements of bibliographic citations and indexing) required professional care in their preparation, handling, and control. For reports, in particular, terminology needed to communicate information electronically was largely undeveloped when the Center's computerization efforts began.

Again, owing largely to TIC's pioneering work in establishing internal processing standards and communication routines for its own constituency, the TIC imprint became permanently fixed in external database systems that were based largely on early information interchange arrangements. Descriptive cataloging rules and regulations, lists of corporate authors and serial publications, and thesauri are examples of currently used standards that had their genesis in earlier TIC technical information programs.

Supplementing the technical information database effort (upon development and installation of computers into information systems) was the creation of one of the Federal Government's most responsive and best used online computer retrieval systems—RECON. Created in 1969 to provide rapid and dependable literature searching, RECON for more than a decade was used by AEC offices, national laboratories, major federal contractors, and other government agencies. No longer supported as a Center program, RECON has been supplanted by comparable commercial systems. These online systems are capable of providing services similar to RECON to the entire U.S. public using the same DOE database that now is in excess of two and a half million energy R&D items.

Except for a brief period, the Center's information program was under the direction of its Washington Headquarters office. However, a warm, fraternal relationship between the Oak Ridge Operations Office (ORO) and the Center existed throughout the period covered in this book. This friendship resulted mainly because of an "Extension" relationship, or its equivalent, that existed between ORO and TIC for three decades. Under ORO Managers Sam Sapirie and, later, Robert Hart, the Center received not only space for operations but also constant and expert care in management areas related to maintaining financial records, contracting assistance, personnel recruiting and personnel promotions, and security advice and protection. For its part, the Center designed and printed ORO publications and provided special art and graphics assistance whenever requested. For decades, the large ORO-maintained security billboards, located at the entrances and exits to Oak Ridge, contained periodically reworked designs created by Nathaniel Johnson, TIC artist and Branch Chief. Information about TIC staff (promotions, transfers, new hires, marriages, and births) was always incorporated in the local "OR-BITS" newsletter, edited by ORO's Ruth Carey and published by Oak Ridge Federal Employees

Association. Invitations to participate in ORO Managers' periodic staff meetings were frequently extended to TIC managers. Such sharing and displays of mutual cooperation helped cement the ties of "cousinship" between the two organizations. Any successes attributed to TIC for the period covered by this book must therefore include recognition of the advice, counsel, and other forms of assistance provided by ORO management and staff.

But it was the strong belief in and commitment to service, as exemplified by the management style of TIC's leaders, that propelled the TIC vessel successfully for decades through turbulent waters. For the total period represented by both the AEC and ERDA, five men had the responsibility of managing the Technical Information Center at Oak Ridge. Dr. Alberto F. Thompson established and managed the initial program, followed by Dr. Brewer F. Boardman, Armen G. Abdian, Melvin S. Day, and Robert L. Shannon. Directors of the Washington Headquarters technical information program for this same period (in addition to Thompson and Day, who served at both installations) were Bernard M. Fry, Edward J. Brunenkant, Edwin E. Stokely, and Eric Willis.

The Technical Information Center's reputation for unstinting service stands as a monument to the directors, managers, and their dedicated staffs. It was they who designed and carried out the technical information programs that, they felt, promoted peace, supported a strong national defense program, and helped point the way toward economical and abundant energy for all mankind. Their work, their planning, and the strategies they employed to achieve their goals have formed the archival base from which highlights of their recorded past have been extracted and chronicled in this book.

TECHNICAL INFORMATION PROGRAM MANAGERS (AEC/ERDA) (1947–1978)

Alberto F. Thompson
(1947)

Brewer F. Boardman
(1948–1951)

Armen G. Abdian
(1951–1955)

Melvin S. Day
(1956–1958)

Robert L. Shannon
(1959–1978)

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ANTICIPATING AN INQUISITIVE PUBLIC

CHAPTER 1

In an unusually dramatic announcement, uncharacteristic for a government information release, the world was made aware of the successful detonation of the world's first nuclear device, named "Trinity." In beginning its statement, the War Department reported, "Mankind's successful transition to a new age, the Atomic Age, was ushered in July 16, 1945, before the eyes of a tense group of renowned scientists and military men gathered in the desertlands of New Mexico to witness the first end results of their $2,000,000,000 effort. Here in a remote section of the Alamogordo Air Base 120 miles southeast of Albuquerque the first man-made atomic explosion, the outstanding achievement of nuclear science, was achieved at 5:30 a.m. of that day. Darkening heavens, pouring forth rain and lightning immediately up to the zero hour, heightened the drama. . . ."[1]

Some three weeks later after Trinity, atomic bombs "Little Boy" and "Fat Man" were air-dropped over Japan, destroying Hiroshima and Nagasaki and killing an estimated 110,000 Japanese from the initial blasts. More than double that number would die later from the effects of radiation.[2] Although the War Department's description of the Trinity shot reflected the excitement surrounding scientists' reactions to one of mankind's most awesome inventions, it was nevertheless to this purpose that the two billion U.S. taxpayers' dollars had been invested: the creation of an atomic bomb that would hasten the end of World War II.

With the world becoming suddenly apprised of what was then the greatest story of the century, details of this astounding achievement now had to be supplied to a clamoring public. General Leslie R. Groves, Commanding General of the Manhattan Engineer District, had foreseen the need to have in readiness factual information on this scientific accomplishment that could be imparted in ways that would not compromise military secrets. Earlier, in April 1944, he had selected Henry D. Smyth to prepare such a report that would recount the technical aspects of the wartime project. Dr. Smyth, a Princeton University physicist, had been associated with the Manhattan Project since 1941.[3]

On August 12, three days after the bombing of Nagasaki, the War Department released the report entitled *A General Account of the Development of Methods of Using Atomic Energy for Military Purposes Under the Auspices of the United States Government, 1940-1945* by Henry DeWolf Smyth, "written at the request of Maj. Gen. L. R. Groves, U.S.A." Prepared and published as a semitechnical report, the Smyth account of the atomic bomb quickly became a basic informational resource for the public that had suddenly been thrust into the Age of the Atom.

As the report indicates, more questions were posed to the American people than could be answered by the facts presented. In the words of Dr. Smyth, "We find ourselves with an explosive which is far from completely perfected. Yet the future possibilities of such explosives are appalling, and their effects on future wars and international affairs are of fundamental importance. Here is a new tool for mankind, a tool of unimaginable destructive power. Its development raises many questions that must be answered in the near future. . . . In a free country like ours, such questions should be debated by the people and decisions must be made by the people through their representatives. This is one reason for the release of this report. . . ."

Whereas the Smyth report, along with amply supplied War Department press releases, provided details for the press and radio media, information on the development of this "new tool of mankind" needed to be presented more fully and in depth not only to the scientific and technical segments of society but also to laymen. From information already available, the implications of peaceful uses of atomic power were obvious—especially for industrial applications. As Dr. Smyth reported, "At least there is no immediate prospect of running cars with nuclear power or lighting houses with radioactive lamps although there is a good probability that nuclear power for special purposes could be developed within ten years and that plentiful supplies of radioactive materials can have a profound effect on scientific research and perhaps on the treatment of certain diseases in a similar period."

To provide full accountability to a nation that had, thus far, entrusted to him the secrets of the atomic bomb's development, General Groves authorized a historical Project record of its scientific creation. A memorandum dated November 29, 1945, subject "Scientific Records of Manhattan District Research," was signed by General Groves' deputy, Colonel Kenneth D. Nichols, War Department Corps of Engineers, Manhattan District, Oak

Ridge, Tennessee. Purpose of the memorandum, which was directed to all area engineers, was to bring together into one central file all relevant classified and unclassified information related to wartime atomic bomb research.[4]

The results from this memorandum request, and subsequent efforts by the Manhattan District Corps of Engineers to consolidate research records on the nation's wartime nuclear enterprise, had longer term effects than might have been initially imagined or intended. The office established to execute Colonel Nichols' directive and coordinate the information collection effort became the nucleus for what ultimately would become one of the world's most important centers for the dissemination of scientific and technical information.

As explained in Colonel Nichols' memorandum, the Manhattan District Research Division was making plans for a complete and authoritative scientific record of all research work performed by Manhattan District contractors. This record was to be written by the contractors as part of their contractual obligations, and the overall planning and editing were to be the responsibility of the contracting officers.

The scientific record would consist principally of review articles based on the original research reports. The security classification of the review articles was to be the same as that of the research reports. These articles would also contain more than the ordinary amount of fundamental data, since the original reports would not be readily available. Where existing reports did not present the source material adequately, individual papers would be written to supplement the broad review articles.

The memorandum also stated that it was intended that preparation of the research records by all contractors would be the direct responsibility of each contracting officer concerned with any research contract. It was expected that he would secure the assistance of such scientifically trained officers in his organization, familiar with research work under the contract, as might be necessary to supervise the writing program and editing of the manuscripts. These officers would constitute an editorial staff for their part of the record.

This editorial staff would meet with the contractors to prepare a detailed outline of the writing to be done. They would decide all questions relative to the nature of the material to be included and the form of presentation. In the interest of uniformity, final manuscripts were expected to conform as closely as possible with forms chosen by the Research Division for the Manhattan Project Record. As soon as possible, and not later than December 15, 1945, editors were expected to submit their detailed outline of the writing to the Research Division of the District Office.

Finally, a representative of each of the editorial staffs would be designated by his superior to represent the staff on a District Editorial Advisory Board. This Board would then make District-wide decisions relative to coordination of the writing programs in the different areas. This Advisory Board would be responsible for final decisions as to allocation of credit, and assignment of writing responsibility, where several different areas collaborated on one research problem.[4]

The creation of a "Manhattan Project Record" was therefore Colonel Nichols' purpose as related in the memorandum. Further elaboration on the plans for this proposed project is revealed in a December 4, 1945, "Memorandum to the Files" prepared by Corps of Engineers Major Alberto F. Thompson, Jr. Thompson refers to a November 27, 1945, meeting held in Colonel Nichols' office which reviewed details pertinent to the earlier quoted memorandum and considered matters relating to ultimate publication of the Record. In addition to Colonel Nichols, other attendees at the meeting were Lt. Colonel A. V. Peterson, Major E. J. Bloch, and Major A. F. Thompson.

In this note to the files, Thompson states: "Colonel Nichols agreed that negotiations should begin to arrange for publication of all of the Manhattan Project Record, including the Technical Encyclopedia being prepared at Y [sic]. He stated that these arrangements should provide for publication of the completed work before 1 January 1947. He directed that the ability of the Government Printing Office to publish the material should be thoroughly investigated with a view to utilizing their facilities insofar as they could guarantee publication by 1 January 1947. He further suggested that the District facilities . . . might be utilized for the most highly classified material. He indicated that the facilities of the university presses and commercial publishers should also be investigated and a comparison made between the amount of work involved in publication through these media and through the Government Printing Office."[5]

Reflecting the seriousness of the publication endeavor being undertaken, General Groves, early in 1946, spurred efforts toward the acquisition of relevant information materials associated with the Manhattan District research. Two letters are of particular significance.

In a letter to Dr. Nathan Bradbury, Santa Fe, New Mexico, dated April 1, 1946, General Groves requested assistance in obtaining data from the Los Alamos project.[6] He stated:

> I should like to enlist your cooperation in planning for making available certain basic information from Los Alamos to other installations which need the information to round out their portions of the Manhattan District Technical Series.

I understand that the Los Alamos Technical Series has been planned as a carefully integrated account of all the work which has been performed at Los Alamos. It is not my intention to ask you to modify these plans, insofar as the work at Los Alamos is concerned. However, in the interest of obtaining the best possible over-all description of Manhattan District research work I feel that the Los Alamos writing program should now be coordinated with our over-all publication plans where this can be accomplished without too much additional effort at Los Alamos.

Now that the declassification rules are available, it becomes possible to proceed more confidently to make available the results of Los Alamos work to other Manhattan District installations, whenever the work in question is not covered by those portions of the Declassification Guide dealing with information not to be declassified, such portions being marked with an asterisk; in other words, any material not in the most restricted category may be so exchanged.

Accordingly, I should like to enlist your cooperation in furnishing certain material to the Declassification and Publications Division at Oak Ridge for their use in the publications program. . . .

We are anxious to have as high a degree of uniformity as possible in the treatment of authors with respect to the publication of the results of their nucleonics research throughout the District, and to assist in attaining this objective we believe that representatives of the Declassification and Publications Division should visit you in the near future to discuss problems of District-wide importance in these fields.

General Groves' request to Dr. Bradbury was followed by a similar request the following day to Rear Admiral T. A. Solberg, Bureau of Ships, Navy Department.[7] In this letter, the earlier concept of a Manhattan Project Record has now been refined to a Manhattan Project Technical Series [see also reference to Manhattan District Technical Series in letter preceding]. He states:

The Manhattan District is having prepared a series of manuscripts which it is intended will constitute a comprehensive and authoritative account of the scientific developments which resulted from research work under the contracts administered by the District. . . .

According to present plans, this work will all be published as a single series of volumes, which will probably be entitled the Manhattan Project Technical Series. Those portions of this series which may be declassified, without endangering national security, will be made available to the public. . . .

It is contemplated that the series will be subdivided according to the broad fields of investigation which were the subjects of our special interest. Thus, there will be a series of volumes on the manufacture of uranium compounds, pile physics, electromagnetic methods of separation of isotopes, gaseous diffusion methods of separations of isotopes, etc. Within each such subdivision, credit will be awarded to all of those installations which made important contributions in the field concerned.

> We understand that there is being prepared, under the administration of the Navy Department, a manuscript of the general character described above, dealing with the scientific developments resulting from work on the thermal diffusion separation process. In the interest of obtaining as complete and authoritative record as possible, of all Government contributions in the field of nucleonics, for the Manhattan Project Technical Series, and because the thermal diffusion separation work is so closely related to the other uranium isotope separation programs, we are writing to request consideration by the Navy Department for inclusion of a description of the thermal diffusion process developments in the Manhattan Project Technical Series.
>
> Your consideration of the question of furnishing us with a copy of your manuscript dealing with the thermal diffusion developments for our series will be greatly appreciated.

Thus, through directives, letters, and personal efforts that reflected full support at highest military rankings, the Oak Ridge Declassification and Publications Division, Corps of Engineers Manhattan District, began to accumulate and consolidate a record tentatively described as the Manhattan Project Technical Series (MPTS).

Considerable international interest and activity pertaining to nuclear science and technology characterized the year 1946. The United Nations General Assembly in London created the United Nations Atomic Energy Commission on January 26. The U.S. Army's Manhattan Engineer District conducted Operation Crossroads, detonating two atomic weapons in the Marshall Islands. Bernard Baruch, representing the United States at the U.N. Atomic Energy Commission, proposed a plan to outlaw the manufacture of atomic bombs and to dismantle those already existing. The plan, which also included sharing atomic energy secrets with other nations, failed because the Soviet Union did not accept international inspection of their atomic facilities. By August 1, the Atomic Energy Act was enacted by Congress which provided for the establishment of the Atomic Energy Commission.[8]

To facilitate the collection of manuscripts that would appropriately inform the scientific and technical public about Manhattan District research and developmental activities, Colonel Nichols' directive establishing a Project Editorial Advisory Board was effected. As prescribed, one representative from each laboratory site involved in the atomic energy project was appointed. Several years would be required before the publication task would be completed, however, and the initial name Manhattan Project Technical Series would be changed to the National Nuclear Energy Series (NNES).

All activities relating to the establishment of this Series and its ultimate publication and all problems attendant thereto (e.g., obtaining or assigning appropriate credits, resolving classification matters, section groupings for the various volumes, patent clearances, assignment of copyrights, etc.) became the managerial concern principally of one man: Major Alberto F. Thompson, Jr. When the Atomic Energy Commission became fully organized, it was he who became the director, not only of the NNES publication project but also of a larger operation concerned with informing the scientific and technical public of all reportable past and continuing activities related to atomic energy research and development by the United States.

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ORGANIZING FOR THE START-UP

CHAPTER 2

With the passage of the Atomic Energy Act of 1946, Congress established the Atomic Energy Commission (AEC). Under Executive Order No. 9816, President Harry Truman transferred the Army's Manhattan Engineer District programs and facilities to the new public agency, effective midnight December 31, 1946.

On January 1, 1947, the AEC began its operations* under the newly appointed Chairman David E. Lilienthal. As former Chairman of the Tennessee Valley Authority, Lilienthal was hardly a stranger to the atomic energy enterprise; his home, at Norris, Tennessee, was situated no more than ten miles from the recently developed Oak Ridge site. A year earlier Lilienthal had gained international prominence as cochairman of a panel created by the State Department to attempt to derive a workable plan for controlling, safeguarding, and inspecting atomic energy activities at the international level.

As recorded in the Initial Report of the Commission to the Joint Committee on Atomic Energy, principal government-owned atomic energy installations transferred from the Manhattan Engineer District to the AEC were Clinton Engineer Works, Oak Ridge, Tennessee; Hanford Engineer Works, Pasco, Washington; Los Alamos Scientific Laboratory, Los Alamos, New Mexico; Argonne National Laboratory, Chicago, Illinois; Radiation Laboratory of the University of California at Berkeley; Brookhaven National Laboratory, Patchogue, Long Island, New York; Knolls Atomic Power Laboratory, Schenectady, New York; Dayton Engineer Works, Miamisburg, Ohio; plus additional activities contributing directly to

*Even though Atomic Energy Project operations were assumed by the AEC on January 1, the Manhattan Engineer District was not officially abolished until August 15, 1947.

research operations, such as Battelle Memorial Institute, Columbia University, Iowa State College, Massachusetts Institute of Technology, and National Bureau of Standards.

Among the major programs pertinent to information emanating from institutional research initiated by Manhattan District and transferred to the AEC were the declassification of atomic energy data (to the extent consistent with security) and the compilation of scientific developments resulting from work of the Manhattan Engineer District.[1]

2.1 *DEFINING THE TASK*

The Library Unit of the Manhattan Engineer District Research Division 9
in Oak Ridge was assigned responsibility for implementing a program that would establish a system for controlling the exchange of scientific and technical information, promoting wider authorized dissemination within the District, and releasing certain types of information to the public.

In an unpublished account of the early information program,[2] former AEC Librarian Robert E. Devine stated that the task of the Library Unit was to gather and review the hundreds of reports that had been generated by the Project sites. Each report was evaluated for its scientific content and possible declassification. Security restrictions complicated the task, and because of this problem, the Manhattan Engineer District appointed a committee to develop a declassification guide. In April 1946 this guide was issued, and the declassification process was accelerated. The Declassification Branch of the Research Division worked closely with the Library Unit and certified the declassification of each paper.

In mid-1946, a Bibliography and Literature Survey Section was organized as a part of the Library Unit of the Research Division. The initial task of this group was to compile and organize bibliographic aids to assist in the identification of the information being received.

According to Devine, a year later a classified distribution guide was circulated to all laboratories and contractors. This new guide served to control the automatic distribution of classified reports generated by the various laboratories for internal Project use, including the Library Unit in Oak Ridge. The same system was later extended to include unclassified reports.

When the staff members of these former Corps of Engineers offices were incorporated into the newly formed AEC Oak Ridge Directed Operations (ORDO), they did not find the transition to their new tasks easy. Staff effort now had to be adjusted to support an infant public-service-oriented federal agency, the AEC, rather than to accomplish day-to-day duties involving the hidden work of a military organization. Management was also required to accommodate a sudden, almost explosive, pressure and demand from the public for access to the thousands of declassified and unclassified documents for which no system or infrastructure had yet been designed.

Embodying the broad technical information program interests of the entire AEC's research activities, this germinating technical information program had now been assigned to the Oak Ridge AEC Field Office, which was heavily involved with other newly acquired responsibilities. ORDO management, preoccupied with servicing the remaining military programs, overseeing on-site and off-site contracts, and redirecting the National Laboratory, was also required to consider the needs of the AEC's technical information program. Of immediate concern was the appropriate staffing of this new Field Office Division, procuring printing equipment, and designing a technical information program for controlling, publishing, and appropriately disseminating both wartime and peacetime research on atomic energy.

Because allotted ORDO positions were being severely stretched to accommodate field office growth problems, requests for staffing the new technical information program organization were not always quickly forthcoming. Added to the new Division Chief's concern was the fact that the more fundamental justification for the AEC's technical information function's being located in Oak Ridge (i.e., production of the Manhattan Project Technical Section volumes) could report only small progress for a year-long effort. In an attempt to alleviate some of the start-up difficulties, a restructuring of the information program was effected in early October 1947.

2.2 *NEEDS OF THE TECHNICAL INFORMATION PROGRAM SUMMARIZED*

An informative but unsigned study, "Technical Information Services for the Atomic Energy Project," dated October 2, 1947, reveals the considerable frustrations in defining the technical information program and getting it under way.[3] In addition to the document's importance in providing a backdrop to the early AEC technical information program, it also effectively presents the earliest argument for the AEC's information program being structured as a centralized services facility. The document also provides an opportunity to review the earliest design of the basic technical information program that remained functional for decades.

As then organized, planning and advisory functions relative to technical information services, such as coordinating the writing of the National

Nuclear Energy Series (NNES) (formerly the "Manhattan Project Technical Section" volumes), were the responsibility of the Technical Information Branch of the Office of Public and Technical Information in Washington. Operations of the technical information services, on the other hand, were administered by the Technical Information Division, ORDO. The change had come so rapidly and the personnel in Washington were still so closely connected with Oak Ridge operations that a careful separation of functions between the two entities was difficult.

Until the formation of the Technical Information Division at Oak Ridge in April 1947 there had not existed an integrated information facility within the Atomic Energy Project. Accordingly, there had been no overall approach to the problem of acquisition and dissemination of information.

First to be recommended was the validation of an integrated information service for the entire AEC and its contractors that would be operated by the Commission itself, rather than by one of its contractors.

The study indicated that the primary sources of information in the field of atomic energy should be two: Atomic Energy Project reports (both classified and unclassified) and scientific periodicals. Subsidiary sources of information could include compilations of all information types, including books. Further to this point, it was apparent that the volume of material bearing on any field of science was becoming too great for any research worker to read for himself. It was nevertheless believed that the effectiveness of any research worker depended directly on a cross-fertilization of ideas. One of the most important functions of a central information organization, therefore, would be to promote a means for intellectual enrichment.

For efficient and unfettered access to the collected and disseminated information materials, a suitable indexing system was required to enable a research worker to locate all Project information on a given subject. This need had been recognized earlier at the Metallurgical Laboratory in Chicago during the war, and the Chicago Index was started. This index was concerned chiefly with Plutonium Project data, however. Because the Argonne National Laboratory was required to reduce its services to other Project sites, the Technical Information Division at Oak Ridge was made responsible for reproducing the Chicago Index and for maintaining and expanding the material to include all Project research and development reports, both classified and unclassified. A subject index to declassified documents had already been started.

For effective use, however, the card index needed to be made available to as many workers as possible. To this end the document dissemination policy was reviewed with the objective of eliminating restrictions for security reasons insofar as possible. Research in the latest indexing and sorting techniques was also under way at Oak Ridge. It was believed, according to the report, that research in this field was just as important to the Commission as research in the scientific fields.

Following the need for effective indexing, from the standpoint of importance in providing information, was the use of abstracts. Whereas bibliographical searches, aided by suitable index systems, enabled research workers to obtain access to material in a given field, they did not provide the desired cross-fertilization obtainable when workers maintained contact with a wide variety of material outside their fields of interest. To provide help in this area, the Technical Information Branch had already instituted several abstracting services, including *Abstracts of Project Reports, Abstracts of Declassified Documents, Guide to Published Research on Atomic Energy,* and *Reports Added to the Technical Library.* It was believed that the only satisfactory answer to researchers' needs was to abstract all relevant information, no matter where or how published, and to make such information available through periodic abstract journals.

Supplementing the indexing and abstracting function, the Technical Information Branch would also make available a complete, integrated library service that would provide all Project sites with printed material in its original form. It was obvious that some published material would be of such limited usefulness that a single copy, available on request by the sites, should be purchased. To provide this service, the central information service would need to maintain extremely extensive master reference files, with copies provided to each major Project library.

In stressing the view that a well-planned program for controlling, disseminating, and managing technical information for the newly established AEC was necessary, the study report continued:

> It appears desirable to emphasize again our firm belief that the Technical Information Division at Oak Ridge as a strong, well-equipped organization for correlating and dispensing information throughout the Atomic Energy Project is an indispensable activity of the Project which can save its cost many times over. The budget for this organization in Fiscal year 1949 appears, if anything, to have been too small when considered in the frame of reference of the major responsibilities to be discharged. A rather large and expensive staff of professional workers will be necessary to maintain a satisfactory program, to say nothing of doing the minimum research necessary constantly to improve our information services.
>
> Finally, it is desired to emphasize again the belief of the Technical Information Branch that most of this work needs to be centralized. This is not to say that each contractor will not require a strong information service, but it is believed that these should be primarily concerned with servicing their own organizations and should not attempt to duplicate services of a Project-wide

> sort. It is our belief that this centralized organization can advantageously be operated by the Commission, since many problems of security are best taken care of through such centralized control.
>
> As far as we can ascertain, there is only one research contractor organization which is interested in operating such a centralized information center and this is the Brookhaven National Laboratory. It appears that the Brookhaven National Laboratory has definite plans to do so. One of the purposes of this memorandum is to put on record our belief that a considerable waste of Government funds will result if there is not a clear understanding that information services should not be duplicated on a Project-wide basis. . . such contractor's budgets should be made up and justified in the same detail as that of the Technical Information Branch. Only in this way will it be possible to determine whether or not there is needless duplication.

Because of the depth of understanding and knowledge about the perceived needs of the program and, in particular, the concerns reflected in establishing an effective, working AEC information policy, it is surmised that Dr. Alberto Thompson may have been the author of the quoted document. The program as described incorporated practical elements that today seem fundamental for accommodating the scientific information program needs of a major federal research agency, such as the then burgeoning AEC. Program planning steps had to be tentative and provable in those early years, however, owing to the legal necessity for tight control of the information being disseminated. The statutory flip-side constituted a greater organizational difficulty, however—the ensuring of rapid, effective access to an enormous backlog of information that was demanded by the public. It is to the credit of the early developers of the AEC information program that the major elements incorporated in its design (i.e., packaging and categorizing of information, abstracting, indexing, providing effective document availability, and setting up resources and tools for retrieval) continue to be visible and available today in successor agency technical information program manifestations.

2.3 *EXECUTING NEW POLICY*

In March 1947 Alberto F. Thompson, Chief, Publications Section, Research Division, ORDO, forwarded a publication policy draft to AEC Washington Headquarters, Attention Colonel O. G. Haywood, at Haywood's request.[4] Still reflecting military overtones, the letter was concerned with developing appropriate policy to ensure the proper preparation and submission of reports from contractors that now would be subject to public scrutiny and likely publication. Iterative efforts of this nature ultimately resulted in AEC Manual Chapter 3201, which provided policy for the control and dissemination of atomic energy research results for all activities under AEC cognizance.

In the Second Semiannual Report of the AEC to Congress, the various portions of the Atomic Energy Act that required the Commission to effectively control and disseminate information resulting from wartime and ongoing nuclear research are cited. In discussing the responsibilities of the Commission, the report states: "The maintenance and improvement of the United States position in the field of atomic energy requires a careful balancing of control and dissemination of information. In our desire to prevent unauthorized transmission of scientific information of military importance we must not go to the extreme of permanently locking up all our information. We must inspire talented men to enter the new field and we must give them the information they need in order to proceed. To overconfine today's knowledge is to stifle the development which would provide security tomorrow."[5]

In describing the AEC's information dissemination program, the Commission explained in the Second Report to Congress that the declassification policy established by the Manhattan Engineer District had been reaffirmed. Declassification action and other reviews had allowed the Commission's Technical Information Branch to clear for public release approximately 100 technical articles each month. During the year, approximately 1200 scientific papers had been declassified, and a large number were published in scientific and technical journals; others were made available through the Office of Technical Services of the Department of Commerce.

In the Third Report to Congress (covering the period July–December 1947), the Commission devoted a considerable number of pages to public and technical information.[6] Because of the nation's inquisitiveness and interest in the government's hitherto top-secret program on atomic energy research, the necessity for prompt reporting on progress to inform the public was imperative. Advertising slogans, signboards, and ads were beginning to appear with newly labeled "atomic" products. Radio shows, magazines, newspaper articles, "informed" reports, lectures, and speeches were constantly reinforcing the public's interest in atomic energy matters. Governmental atomic energy installations became prominently conspicuous in American minds as places surrounded by mystery and secret activity.

For credibility for the nation's atomic research program, the development of a means and style for informing the public properly was necessary. Leading this effort was the Commission's Chairman. Hewlett and Duncan[7] quote David E. Lilienthal as follows: "Probably among the most important decisions in our history as a nation will be those made concerning the course and direction of atomic energy development, and the uses to which this new force is put. What I am proposing, therefore, is nothing less than a broad and sustained program of education at the grass roots of every community in the land."

Thus it was not inappropriate to open the description of the Public and Technical Information program of the AEC in the Third Report to Congress with the following statement: "Directly supporting not only the research and training activities of the Commission's facilities, but also the work of educational and industrial institutions throughout the country, is the provision of technical information on work done in the atomic energy program."

Further commenting on the technical information program, the Commission reported that late in 1947 a unified Public and Technical Information Service had been established to ensure adequate control and dissemination of the information that it considered to be "the lifeblood of scientific and engineering progress—and of public understanding of that progress and its implications."

The newly organized Public and Technical Information Service, as described, combined five interdependent functions relating to controlling and disseminating information resulting from atomic energy research:

- Originating, reproducing, and controlling the distribution of classified Project reports for personnel requiring such information.
- Declassifying documents by qualified scientific reviewers; material then became available for public use.
- Editing, preparing, and reproducing technical information materials, including indexes, abstracts, Project reports, and declassified papers.
- Providing security guidance services to publishers, editors, reporters, and broadcasters.
- Providing service to the public by assisting representatives of the press, radio, citizen and trade organizations, educational agencies, and other information services in obtaining the full range of declassified and unclassified data currently available from the national atomic energy program.

Servicing the AEC's technical information program was the responsibility of the program carried out at ORDO. All public information was directed by Washington Headquarters, supported by public information professionals located at each of the five Offices of Directed Operations. Frequently, one type of information activity required the contribution of the other; and policy direction relating to the wide fluctuations of interests and needs by the public and government, under one director, was a felicitous organizational decision.

In describing progress made during 1947 in the dissemination of technical information, the Commission was pleased to report that the system for providing information both to the Commission and its contractors' organizations as well as to the public had enlarged considerably during the year. A number of significant accomplishments could be cited to highlight the information program under development:

- *A Guide to Published Research on Atomic Energy* and allied fields was prepared by the Technical Information Service by assembling abstracts in this field. During the year 2,223 such abstracts were assembled and circulated throughout the Commission's contractor groups.
- A secret *Abstracts of Research and Development Reports* was issued monthly during the year to addresses on a need-to-know basis.
- An extensive card index system was developed by the Technical Information Branch; almost 1,000,000 index cards were prepared and distributed in the year.
- Documents were reproduced and distributed to Project laboratories, government agencies, and 150 depositories of the Library of Congress. They were also made available to the public through Office of Technical Services. Nearly 162,000 copies of documents were so disseminated.

The Commission report[6] also pointed out that much progress was made toward completion of the NNES, a planned 110-volume compilation of scientific treatises based primarily on research in the field of atomic energy conducted under government auspices.

Because the public's demand was so great, the Commission expressed its hope that "the contractor organizations and the associated universities and colleges will redouble their efforts to provide speakers, visual materials, etc., to help satisfy this intense and extensive public demand for basic information on atomic energy and the progress of the national program for its development."

A particularly significant effort to alleviate the urgency and demand for security guidance and positive information service was the appointment of a special committee on atomic energy by the American Textbook Publishers' Institute to speed the development of textbooks dealing with this field.

2.4 *ESTABLISHING A HOME AND EQUIPPING THE SYSTEM*

The Commission's accomplishments as cited in the Third Report to Congress were the result, of course, of the newly established program that required appropriate staffing, materials, equipment, and space to operate. Space was provided by ORDO in two principal areas. The AEC Administration Building, known by Oak Ridge dwellers as the "Castle on the Hill" was, for many years, the principal site of operations. Office space, along with secure areas for storage of classified documents (vault areas), the technical library (inclusive of a catalog-card index to thousands of recorded research reports), abstracting and indexing facilities, and a composition area that included space for art preparation, page make-up, and machine composition were all supplied by the Manager, ORDO.

The AEC Administration Building, among the first structures to be built in Oak Ridge during the war years, had been hurriedly put together but was nevertheless imposing in its isolated grassy-lot setting of considerable acreage. It had a wood clapboard exterior, and rough-sawed oak beams were visible in all office areas. Its seven two-storied bays, interconnected by long hallways, faced the Turnpike on space that in later years would be used by a modern Federal Building. It was heated in winter by steam pipes that were elevated on outside pilings that ran from a large coal-fired steam plant located near the Turnpike approximately two blocks away. To cool the uninsulated building in the summer, electric fans were perched over windows to enhance air circulation.

Approximately one-third of the building was allocated for office and working space dedicated to the information and declassification programs. (See Figs. 2.1 to 2.3.)

At the rear of the Administration Building was located a slightly smaller but more modern building in which printing, document distribution, and warehousing were accommodated. Printing equipment, paper supplies, boxes, inks, Photostat machines, and chemicals were all housed in this plant area.

In reporting the Division's Record of Accomplishments[8] on November 26, 1947, to J. C. Franklin, Manager, ORDO, W. W. Lord, Assistant Chief of the Technical Information Division, stated:

> In October 1947 the technical information facilities of the Atomic Energy Commission were reorganized. All groups engaged in such collecting, editing, processing, reproducing, and distributing of technical information were combined together for the first time under the single direction of the Chief of the Technical Information Division. Improvements in dissemination of technical information have already resulted from this unification of authority, and many more are planned. The recruitment and training of specialized personnel, including editors, draftsmen, special machine operators, reproduction plant operators, and others, has proceeded rapidly during the last half of 1947. When recruitment is complete, the ORDO will have available a complete organization for the preparation and distribution in permanent, attractive form of

Fig. 2.1 **Oak Ridge Operations Office headquarters building. For ten years the ORO Administration Building housed the AEC's technical information program in Oak Ridge.**

Fig. 2.2 Technical Literature Section of the Reference Branch (1955). At left (standing) is Section Chief Dr. Simone Schwind; facing her is Assistant Chief Hugh Voress.

Fig. 2.3 Composition Section (1955). Racks on desks hold demountable typebars, which were capable of providing 180 special characters (Greek, mathematical, and operational symbols) for each compositor's use. Typebars were manually inserted into the IBM composing machines as required to generate scientific text and set equations.

the results of research on the Atomic Energy Project. Classified work will all have to be reproduced in Commission facilities, while as much as possible of the declassified work will be printed by the Government Printing Office or private publishers, depending upon circumstances.

Report distribution has been improved during 1947 as the result of assigning classified reports to categories and by having them distributed by the issuing installation in accordance with Standard Distribution Lists. Such standard distribution helps to insure that technical information reaches all those who need it and are qualified to receive it. It is the first step in the evolution of what is eventually planned to be a Project journal which will carry all classified and a certain amount of declassified Project results in the field of atomic energy. The next step will be to have all reports sent to Oak Ridge for editing, processing, reproduction, and distribution. Certain phases of this plan are

already under way with reports being received from Iowa State College, MIT, Los Alamos, and the Electrotechnical Laboratory, Norris, Tennessee . . . .

2.5 *PLANNING THE NATIONAL NUCLEAR ENERGY SERIES (NNES)*

Responsibility for planning the volumes of the Manhattan Project Technical Section (MPTS) (later renamed the National Nuclear Energy Series) is discussed in a March 4, 1947, letter from Alberto F. Thompson to Colonel O. G. Haywood.[9] As earlier recounted, writing of the individual manuscripts was the direct responsibility of the contractors. Planning the series, however, had been the responsibility of the Research Division at Oak Ridge "based on knowledge of what writing was already under way in November 1945 plus knowledge of what research had been done throughout the Manhattan Project." Colonel Nichols' Manhattan Project Editorial Advisory Board (MPEAB) had the responsibility of obtaining information on the contractors' writing programs and (according to Thompson) "settling by mutual agreement questions of how work should be prepared which had been done at a number of different installations."

The Preface to the NNES volumes[10] in describing the activities and responsibilities of the MPEAB pointed out that after the close of the war the Manhattan Project was able to give its attention to the preparation of a complete record of the research work accomplished under Project contracts. All major installations were asked to appoint one or more representatives to make up a committee. This group, initially named the Manhattan Project Editorial Advisory Board, was later called the Project Editorial Advisory Board (PEAB) upon sponsorship of the Series by the Atomic Energy Commission. The first PEAB meeting was held on Feb. 9, 1948, when it recommended the publisher for the Series.

Names of the Board members and the installations they represented were:

Alberto F. Thompson, AEC Public and Technical Information Service, Washington, D.C.

Brewer F. Boardman, AEC Technical Information Branch Extension, Oak Ridge

Charles Slesser, J. H. Hayner, and W. M. Hearon, AEC Office of New York Operations (representing Madison Square Area of the Manhattan District)

Richard W. Dodson, Brookhaven National Laboratory

R. B. Korsmeyer, W. L. Harwell, D. E. Hull, and Ezra Staple, Carbide & Carbon Chemicals Corporation (K-25), Oak Ridge

Russell Baldock, Carbide & Carbon Chemicals Corporation (Y-12) [until May 4, 1947, work was under Tennessee Eastman Corporation], Oak Ridge

J. R. Coe, Clinton Laboratories [former name for Oak Ridge National Laboratory]

T. W. Hauff, General Electric Company, Hanford, Washington

John P. Howe, General Electric Company, Knolls Atomic Power Laboratory

John F. Hogerton, Jerome Simson, and M. Benedict, Kellex Corporation

R. R. Davis and Ralph Carlisle Smith, Los Alamos

C. J. Rodden, National Bureau of Standards

R. S. Mulliken and Hoylande D. Young, Argonne National Laboratory

Frank H. Spedding, Iowa State College

R. E. Zirkle, Plutonium Project Medical Group

George M. Murphy, SAM Laboratories [Substitute Alloy Materials—Code name for the laboratories operated by Columbia University in New York under the direction of Dr. H. C. Urey]

B. W. Whitehurst, Stone & Webster Engineering Corporation

Raymond K. Wakerling and A. Guthrie, University of California

D. R. Charles and M. J. Wantman, University of Rochester

With the execution of the contract for the publication of the NNES, the original reason for the PEAB's existence disappeared. However, the very valuable service provided by the Board did not go unnoticed, and it was decided to establish a successor to the PEAB. This Panel, to be called the AEC Technical Information Panel, would furnish advice on all types of technical information problems.

(See also Secs. 3.4 to 3.6 and 4.14.)

2.6 *"COLD-TYPE" COMPOSITION SELECTED AS THE PUBLISHING OPTION*

Although the recently introduced declassification manuals were replete with rules and instructions for handling and grading classified information, differing opinions on the status of a downgraded manuscript could occasionally cause a manuscript to be revised when reviewed by a second pair of eyes. It was therefore deemed necessary that all editing, composing, and interim printing of information intended for Series publication be made secure under local control until the manuscript was finally released to the printer. When all editorial actions were complete, and patent, copyright, and final reviews had been given, then printing could be accomplished.

In planning for the publication of the NNES volumes, Dr. Thompson was required to consider the often tentative nature of manuscripts undergoing their various reviews. On the other hand, he was compelled to move forward in a systematic way toward accomplishing publication. The decision to edit, compose, and manage the various reviews in house left few options as to the kind of system to be adopted for final publication. By editing the manuscripts in house and composing the text on a newly developed variety of IBM typewriters, manuscript processing was under total local control. Galley pages would also be made up in house, incorporating artwork and tables as necessary, in preparation of final text pages that would be printed by photo-offset lithography.

For the NNES and for certain other commercial publications, the printer ultimately selected was Edwards Brothers, Inc., Ann Arbor, Michigan, which, at the time of NNES publication, was perhaps the largest photolithographic printer in the United States.

In pondering his decision and in recording some rules for setting his ideas in motion, Thompson prepared a memorandum to the files.[11] In it he states:

> This memorandum is based on the results of conferences and conversations held on April 21 and 22, 1947 between a committee composed of Mr. J. W. Edwards, Mr. Brewer F. Boardman, and the undersigned, and representatives of the International Business Machines Corporation, the David Taylor Model Basin of the U.S. Navy, the Visitype Corporation, the Reproduction Branch of the Carnegie Institute, and the Library of Congress.
>
> On the basis of these conferences and conversations the following recommendations with respect to the methods used in the preparation of the proof for the Technical Series were arrived at:
>
> a. The International Business Machines Corporation's proportional spacing electric typewriter is the correct machine to be used. The bookface type is probably the best available at the present time. The Edison justifier is probably the best machine to use for justification unless it can be demonstrated that no loss of time will result from the use of manual justification. No one who was consulted felt that the verityper [sic] would be satisfactory to do the work. Mr. Watson of IBM has become very interested in this development and will see to it that IBM representatives cooperate to the utmost in the development of these machines for AEC use.

b. Hand composition will have to be used considerably. It is useless to expect any composing machine to meet all of the requirements of technical composition.

c. The copy should be typed so as to reduce to sixteen characters per inch. Ratchets should be designed so as to give six lines per inch on finished copy. These dimensions most closely approximate those used for letter-press work of this character. The IBM representatives stated that no particular difficulty would be encountered in designing appropriate ratchets and putting them into production. They stated that the design problems should be worked out with Mr. Kramer of the Chicago office, and an order placed as soon as possible.

d. Special type should be designed for the IBM machines for subscripts, and possibly superscripts, if these cannot be used interchangeably. A sufficient number of machines should be so equipped to enable all chemical typewriting to be done upon special machines insofar as possible to avoid some hand work and transferring of copy from machine to machine.

e. Visitype should be used for all mathematical expressions and Greek letters. Greek letters which match the book-face type are already available for Visitype and the operation for inserting them in copy is very rapid and simple. The mathematical symbols available from Visitype may not be satisfactory for matching book type although everyone interviewed agreed that the sample copy prepared by Mr. Edwards and attached to this memorandum was satisfactory. In fact, most of those who expressed an opinion stated that it was superior to the best letter-press work. However, it will be possible to design Visitype characters which will more closely match the book-face type, have plates prepared, and make the special sheets available within two weeks of order and the cost can be considered negligible.

f. Visitype should be used for headings and sub-headings which add variety and a pleasing appearance to the pages. Mr. Boardman has agreed to take the responsibility of looking for appropriate type in Monotype catalogues. This can then be photographed and transmitted to the Visitype company for the preparation of plates and sheets in the necessary number of sizes.

g. Visitype should be used for italics. The appropriate material will be obtained as described under "f."

h. The possibility of using an IBM machine equipped with modern type, which is somewhat smaller than the book-face type, for typing footnotes should be investigated. If this appears undesirable, the use of photographic reduction and stripping-in should be standard. As already pointed out above, considerable stripping-in should be considered inevitable in preparing this proof and a photographic laboratory will be absolutely essential for the PEG's operations.

The method chosen by Dr. Thompson became known as "cold type" publishing, as contrasted with the more conventional publishers' choice of composition involving hot-metal. Most commercially published texts were printed from Linotype or Monotype line castings. These were made by a process involving metal matrices (representing the various characters) being assembled mechanically into words to a predetermined line length, then held in place by the machine to form a mold. Molten metal was then poured over the matrices to form a line casting. Sequentially arranged lines of text in metal created columns of type or pages for printing.

The cold-type, photolithographic publishing process had not been considered a suitable option for commercial publishing. Besides tedious manual work involved in cutting, pasting, and forming of cold-type text pages, when prepared for offset lithography, only short print runs were normally requested because lithographic plates were not usually deep-etched. However, since scientific and technical reports and books required print runs usually fewer in number than those required for the popular and larger commercial market, offset lithography was more often the more economical and preferred publishing choice for the Technical Information Division. The techniques introduced by Dr. Thompson, once implemented and continuously improved, resulted in finished text pages often difficult to distinguish from text pages set by more conventional methods.

The PSM (as the IBM Proportional Spacing Machine was commonly called) was chosen for most of the Branch's typewriter composition. Electrically powered, it was manufactured with typebars that provided the amount of space an alphabet character or numeral required according to its natural width; thus composition that emulated ordinary book-text type styles was created. Whereas an "i" or "l" required two units of space, an "M" required five units. Other alphabetic characters ranged between these limits. The composed pages could be set either "justified" or "ragged right." Justified copy could be obtained by retyping a galley of text and adding or subtracting units of space between words in each line of copy, resulting in a straight right-hand margin alignment.

Superior and inferior numbers, essential to scientific text, were unavailable from the ordinary IBM PSM typewriter keyboard. These were accomplished by paste-up initially, but soon they became an available option on IBM PSMs, specially ordered with keyboards designed to produce copy for scientific and technical information needs.

Special Greek letters and mathematical signs of operation were similarly required. Visitype (the manual paste-up method initially used in the program as directed by Dr. Thompson) was found to be awkward, time-consuming, and generally inefficient for copy preparation. More often than not, paste-ups would not match the available typewriter type characters in size and design. As had been promised to Dr. Thompson by the IBM company president, improved type faces in different sizes soon became available on IBM composing machines. Local operators, as they became more expert, found it easier to type special characters directly onto copy from machines containing the type characters than to leave the spaces void for paste-ins.

Carl B. Holmes, Publishing Branch Art Director, designed an italic typeface based on the IBM Bookman typeface. From this design, IBM engineers constructed typewriter keybars to allow a matching of the italic keys to other IBM keyboard arrangements. IBM engineers again accommodated the local composing group by providing machines with smaller (10 point and 8 point) typefaces that would augment the basic 12-point machines in use. Still later, "demountable" type bars, designed to provide essentially all of the special characters needed for technical composition, would be available from IBM for use on machines specially procured to conform with local specifications (see Sec. 5.5).

The impact of Dr. Alberto Thompson's list of specifications for copy preparation was strongly felt in the publishing program for decades following their implementation. They were initially recommended for the creation of the NNES. Once implemented, however, most of the rules and practices went essentially unchanged in the creation of research and development reports and other kinds of manuscript texts needed for the AEC information program.

With increased sales of the IBM PSM machines, and with Varitypers and other similar equipment being offered to small publishers as an economical composition option, "cold-type" publishing soon became popular for the small entrepreneurial publisher and print shops. By the 1960s it had become favored by small weekly newspapers, and within a decade—with the advent of photocompositors tied to computers—cold-type publishing had almost completely replaced the traditional hot-metal method of composing text.

Until computers and electronic photocomposition devices were developed and became available decades later, much of the initial equipment and many of the publishing policies and rules initiated by Dr. Thompson were still evident in the publication program of the AEC at the time of its demise.

(See also Secs. 5.3, 13.9, and 15.11.)

2.7 *PRINTING PLANT CAPABILITIES REVIEWED*

Management was uncertain, initially, that the printing equipment inherited from the Manhattan Engineer District was adequate to accomplish the publishing task required for the Manhattan Project Technical Series. Expert knowledge was needed to answer the question as to how trustworthy and capable the local printing facility might be should a decision be made to publish the Series locally.

In October 1947 a study by Lithographic Technical Foundation, Inc., was ordered by Dr. Brewer F. Boardman, Chief, Technical Information Division, to review the existing plant's space, equipment, and working arrangements and to recommend alternatives as measured against projected workloads.[12]

The completed study, sparse in its recommendations, did suggest a possible move to the "West Village Laundry" building for better layout and eventual equipment expansion. A review of equipment versus projected workload confirmed the need for a larger offset press. The recommended move did not materialize, however, and plant improvements were made only as approvals could be obtained from the Joint Committee on Printing, which, soon, would assume oversight of the local printing facility.

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WIDENING THE CIRCLE OF RESPONSIBILITY AND ESTABLISHING LINKAGES

CHAPTER 3

Frederick E. Croxton, who, in later years would complete his federal service career as Director, Automated Systems Office, Library of Congress, began his library career in 1949 as supervisor of the bibliography group, Library Branch, Technical Information Service, Oak Ridge. In describing problems that information program managers faced during the earliest days of the U.S. Atomic Energy Commission (AEC), Croxton, in an unpublished study,[1] pointed out that, to understand the problems fully, one must first realize that the growth of information on atomic energy was phenomenal. Although much sought after, only a portion of the technical information being produced in the early 1950s was obtainable from published literature sources. Data appeared, instead, in letters, memoranda, progress reports, and topical reports—the most widely distributed seldom being prepared in more than 30 copies. Most of these copies were retained within the originating research organization for the use of the author and his co-workers.

In describing the genesis of the atomic energy information-dissemination process, Croxton continues:

> The first information distribution agencies were the authors themselves. They had, however, a very limited knowledge of the overall scope of the atomic energy program, being concerned mainly with their own research problems and limited by compartmentation policies. The next, and surprisingly successful, dissemination office was that of General Groves. Here, reports were scanned and redistributed. Excerpts from reports of broad scope were furnished the sites which required the data, and reproductions were accomplished in order to obtain multiple copies of other reports useful to many groups. It was obvious that this sort of dissemination technique could only fall of its own weight after a short time. General Groves' office could not, and did not intend to maintain the service on a complete or permanent basis.

The Manhattan District, therefore, established within its Research Division at Oak Ridge an office whose sole function was the dissemination of technical research and development information. This office was known as the Library Branch.

With the passage of the Atomic Energy Act of 1946, the sudden growth of research information being made available to the public had to be accommodated and managed. The Library Branch, which initially required only a few positions to handle the workload, quickly grew to an organization of almost 200 persons. When transformed into its new AEC identity, it became known as the Technical Information Division.*

The year 1948 should be considered historically significant in reviewing the AEC's technical information program because that was the year that an infrastructure was delineated sufficiently to allow the necessary contact points to be established for an effective and responsive information program activity. Refining the organizational components responsible for initiating and carrying out the AEC's technical information program, both within and outside the AEC, was essentially completed in that year. Identifying the kinds of information and establishing the network to facilitate the flow of technical information within the research and development community was accomplished largely through the guidance and assistance of two important constituent groups: the Technical Information Panel and AEC librarians.

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*A certain amount of bewilderment as to whether to cite "Branch" or "Division" for the Oak Ridge technical information activity is evident in official AEC documents appearing during the 1947–1949 period. The major reason for the confusion was the fact that, initially, the Oak Ridge information group was directed by the Manager of ORDO, and under the field-office structure, it was given division status. The Washington Headquarters technical information office, however, was organized as the Technical Information Branch under the Division of Public and Technical Information Service. Because of its close ties to the Washington office, the Oak Ridge activity was sometimes addressed as the Oak Ridge Technical Information Branch as well as the Technical Information Service. This problem became even more complicated when, in March 1949, the Oak Ridge activity became an extension office of the Washington Branch, which resulted in an official name of Technical Information Branch, Oak Ridge Extension. However, because of its original divisional status and the need to continue to operate in parallel with its other Oak Ridge peer groups, the "Branch" designation evaporated. The official September 1949 organization chart cites "The Technical Information Division" as "the operating extension of the Technical Information Branch (under the general direction and policies of the Atomic Energy Commission Division of Public and Technical Information Service)." Therefore, in listing the name changes in the Introduction occurring for the Oak Ridge activity, "TIB(ORE)" was not included. When the Division of Technical Information Service became the designated title (with the Oak Ridge activity becoming an extension), the confusion lessened.

3.1 *IMPROVED PUBLIC AVAILABILITY OF AEC DOCUMENTS DEMANDED*

On March 12, 1948, Carroll L. Wilson, AEC General Manager, forwarded a memorandum[2] to J. C. Franklin, Manager, Oak Ridge Directed Operations (ORDO), that pointed out the need for a means to make scientific and technical publications available to the public in an efficient and expedient manner.

Because of an increasing demand from the public for declassified AEC reports, a study had been conducted by the Washington office staff to investigate the possibilities of using the facilities of other government agencies to handle AEC publications. A plan had been presented to the Superintendent of Documents, and, although regulations prevented him from selling AEC publications from the Government Printing Office (GPO) in Washington, he agreed to delegate the AEC office in Oak Ridge to act as his agent.

The memorandum accordingly directed the ORDO Manager to take necessary action to provide this service at Oak Ridge and an early start-up was recommended. Attached to the memorandum was a copy of the Superintendent of Documents' authorization, complete instructions for handling receipts derived from sales, and a schedule for pricing publications.

The study referenced in the General Manager's memorandum was concerned with the fact that, since the declassification program was initiated on March 30, 1946, copies of declassified documents had been made available to the general public only through the Office of Technical Services (OTS) of the U.S. Department of Commerce. OTS provided public availability only when it was known that the documents were not to be published elsewhere, to avoid criticism by scientific journals of prepublication. Documents intended for the National Nuclear Energy Series (NNES) were not sent to OTS because Project scientists wanted to disallow release of material slated for books. As a result, many documents had not been made available outside the Atomic Energy Project sites.

Within the Project, all requests for specific documents had been honored promptly, often by furnishing Photostat copies. The crux of the problem pertained to requests that came from outside the Atomic Energy Project. To serve this clientele, efforts had to be made to make the declassified documents more readily available; however, there was no authorization for the AEC to sell documents directly and use the proceeds in a revolving fund.

The question of having documents reproduced by the GPO, and having the Superintendent of Documents print a small overrun, for listing and for public sale had been considered. Such an arrangement would increase printing costs to the AEC and would necessitate the establishment of a liaison group in Washington to work with the GPO.

The study pointed out that either the OTS or the Technical Information Division at Oak Ridge could be used as a point for distribution, but the Superintendent of Documents was forbidden by regulation to handle material not reproduced by GPO. The Superintendent of Documents, however, agreed to designate the AEC, Oak Ridge, as a qualified agent and sales outlet, as stated in a letter of March 3, 1948, to Mr. Morse Salisbury. Since OTS was considered a temporary office that had been set up primarily to dispense foreign data, it appeared desirable to use the Technical Information Division, which already had facilities for providing the documents, individually or in bulk, to a multitude of official users. According to this plan, the Technical Information Division would print enough documents for its current distribution and an extra 100 copies for sale to the public. These would be sold at a price established by the Superintendent of Documents. Under the proposed arrangement the proceeds would be turned over to the Superintendent of Documents.

The Manager of ORDO had therefore been authorized to expand the official distribution of declassified documents to include a number of institutions cooperating with AEC contractors (or as recommended by AEC Division Directors) and to provide 100 copies for sale to the public at prices sufficient to cover the actual costs involved in such public distribution.

On March 19, 1948, acting in accordance with the memorandum request, R. W. Cook, Deputy Manager, ORDO, sent a note[3] to Brewer Boardman stating: "I suggest you [proceed] in setting up the administration of sales, receipts, accounting, and relations with GPO on funds. Please advise how this will affect your space, personnel, budget, and other requirements."

This action inaugurated a cooperative sales program with the Superintendent of Documents that lasted for several years. The Library of Congress and Depository Libraries, however, received (and continued to receive) gratis copies of unclassified research and development (R&D) information.

3.2 *INFORMATION POLICY VALIDATED*

A draft bulletin on technical information services under consideration as a "GM" (General Management) directive was airmailed on March 29, 1948, to Brewer Boardman with an accompanying memorandum[4] signed by Alberto F. Thompson. The memo requested prompt delivery of the draft to J. C. Franklin, Manager, ORDO, for his review and approval. Upon receiving Franklin's initialed "O.K.," the first official recognition of the technical information program of the AEC was published[5] as a part of the AEC's operational policy, entitled Bulletin GM-81, "Collection and Distribution of AEC Research and Development Reports and Provision of AEC Technical Information Services."

AEC Bulletin GM-81 required that a file of all R&D reports be maintained, along with appropriate technical information services, through a central facility at Oak Ridge. It further stipulated that, in order that the central facility might provide technical information services in a form that would be most useful, its operations were to be guided by the recommendations of an advisory group made up of representatives of all AEC installations concerned with technical information problems.

In allocating the various levels of responsibility for complying with this directive, the Bulletin stated that:

- The Office of Public and Technical Information Service, Washington, had staff responsibility for all information services. Through this office, policies and planning of technical information services would be coordinated with the Technical Information Division, ORDO.
- The Technical Information Division, ORDO, would be responsible for collecting and maintaining the central file of R&D reports, for furnishing or arranging for appropriate technical information services (including literature searches), for issuing title lists and abstracts, for providing indexing and bibliographical services, for distributing reports, and for carrying out other associated activities. On request of TID (ORDO), other AEC installations should submit copies of any R&D reports as defined in the Bulletin.
- The Division of Research, Washington, was responsible for preparing, issuing, and maintaining up-to-date Standard Distribution Lists for use by contractors and others issuing R&D documents. The Research Division would also be responsible for determining the distribution of all classified R&D reports not covered by the Standard Distribution Lists and how supplementary distribution of classified reports should be made. Through the Materials and Information Branch (Oak Ridge Extension), the Division of Research would authorize the distribution of reports prepared by the Technical Information Division.
- Offices of Directed Operations, through the directive, were to advise contractors under their jurisdiction of the provisions of the Bulletin and ensure that the Bulletin's procedures and policies were carried out.

Although technical information program emphases have shifted through the years to adjust to the changing policies of administrations and agency policies, the fundamentals outlined in this first AEC GM Bulletin on technical information have remained as core program concerns for the Oak Ridge facility.

3.3 *PROGRAM ASSIGNED TO TECHNICAL INFORMATION BRANCH, WASHINGTON*

As recounted earlier, when the AEC was established, all administrative matters (i.e., correspondence, memoranda, and directives related to the AEC's technical information program) were addressed to the Manager, ORDO. As one of the several divisions under the direction of the ORDO Manager, all official administrative and reporting actions were accomplished within that framework.

There were, however, several AEC activities that received assistance from ORDO management under arrangements known as "extension service." The Declassification Branch, Instrument Branch, and S.F. Accountability Branch were all Extensions that received direction through their responsible Washington offices. Physical space arrangements, provisions for security, personnel needs, administrative matters, and financial accountability assistance were provided by ORDO under the Extension arrangement.

On November 12, 1948, Brewer Boardman was advised in a memorandum[6] from Alberto Thompson that responsibility for the administration of the Technical Information Division, ORDO, was now assigned to the Division of Public and Technical Services in accordance with a memorandum from Carroll L. Wilson, AEC Manager, to Morse Salisbury, and this action had been made effective October 14. The new title for the Oak Ridge facility that Boardman was to use in the future was Technical Information Branch, Oak Ridge Extension. No changes in policies or responsibilities were contemplated, the memorandum stated.

The change resulted from a recommendation made in a memorandum from Morse Salisbury (originator's initials AFT) to Carleton Shugg, Deputy General Manager, dated October 13, 1948, subject: "Administration of the Technical Information Division."[7] The memorandum set forth two requested changes: (1) That the Technical Information Division (to be renamed the Technical Publications and Library Service) be operated as an extension of the Washington office and (2) that the renamed extension be physically transferred to Chicago.

A number of reasons for the recommended change were cited by Salisbury. The primary reason, however, was to secure better day-to-day management oversight of the technical information program. Quoting the Memorandum: "The Technical Publications and Library Service is intended to furnish technical information services on a Project-wide basis. It is endeavoring to match the services furnished by the best government and industrial technical information set-ups. No Operations Office has on its staff individuals equipped for, or primarily interested in, this work. As pointed out by Mr. Franklin in his memorandum to your office of September 8, 1948, he has found that the Technical Information Division at present looks to Washington for direction. Mr. Franklin has found himself receiving contradictory instructions from Washington to build up technical information services and at the same time reduce his over-all personnel strength."

Insistence by ORDO management on compliance with local directives on hiring was also cited as a problem in obtaining competent professional and sub-professional talent to manage activities in the Library Branch. For example, Oak Ridge regarded low-paid administrative clerks' positions as equivalent to sub-professional library grades. It was felt that a job reclassification at TID would result in increased efficiency, but the needed reclassification was much delayed by personnel regulations at ORDO.

The memorandum continued with an extensive exploration of ways reduction of backlogs and positions could be accomplished through the proposed reorganization and, ultimately, by a total organizational move to Chicago.

In regard to the latter, the memorandum stated: "With reference to the physical transfer to Chicago, it has been ascertained that adequate space will be available for the Technical Publications and Library Service in the Museum of Science and Industry after this [sic] vacated by administrative personnel of the Chicago Operations Office and the Argonne National Laboratory about March 1, 1949. However the Public and Technical Information Services wishes to urge that the paramount consideration in planning the physical transfer be maintenance of the highest possible operating efficiency for the Service. It is certain that servicing of classified reports, issuance of dated publications, and of index cards will suffer serious disruption during any move. Personnel will be lost and a large recruiting and training program will be superimposed upon other activities. For these reasons we believe the physical transfer should be deferred until the Technical Publications and Library Service can be located at the Argonne permanent site. . . ."

From the overall tone of the memorandum, certain messages may have been intended or communicated that were not openly and overtly stated. In any event, approval was given the following day to allow the technical information program to be directed from Washington and for a change of name to the Technical Information Branch, Oak Ridge Extension. (See also Sec. 3.6.) Although for a number of years rumors and hints abounded about a possible physical relocation elsewhere, no actual effort on the part of management to plan a move to Chicago was ever made. The popular excuse given was that the tremendous expense in relocation (i.e., personnel and equipment) would be too great and the service interruption would be untenable.

3.4 *NEED CITED FOR SUCCESSOR TO PROJECT EDITORIAL ADVISORY BOARD*

Another important document bearing "AFT" as the originator's initials was transmitted to the Manager, ORDO, on April 2, 1948, signed by Carroll L. Wilson, General Manager.[8] Subject of the memorandum was "Panel on Technical Information Service."

The memorandum explained that a Project Editorial Advisory Board (PEAB) had been established in December 1945 for the purpose of coordinating the writing of the Manhattan Project Technical Section documents (now the National Nuclear Energy Series). Initially the board was concerned principally with the elimination of duplication in the NNES coverage and in making certain that all Project work was completely covered.

It was also a fact, according to the memorandum, that most of the Board members were responsible for the technical information activities at their respective installations, and the Board became a logical group to make recommendations on all aspects of Project-wide technical information services. Consequently, close relations developed between the PEAB members and the Technical Information Service, and useful contact and dialog among the members assisted in the program development in other areas of mutual concern.

The memorandum pointed out that both the Board members and AEC Technical Information Service management agreed that consultation such as had been provided was invaluable in the development of a satisfactory technical information service and should be continued.

Accordingly, it was decided to establish a successor to the PEAB that would, in the future, be called the Panel on Technical Information. This Panel would furnish advice to the Public and Technical Information

Service on all types of technical information problems. Heads of installations were to be informed of the need to submit individuals' names for consideration as Panelists. On approval, the nominees would be appointed to the Panel by the General Manager.

With the establishment of the Technical Information Panel, the technical information program received useful advice, counsel, and a critical focus for almost the entire lifetime of the AEC.

3.5 *INITIATION OF THE TECHNICAL INFORMATION PANEL*

The Technical Information Panel was both a sounding board for AEC information policy development and a valuable and dependable resource of ideas for program planning, implementation, and modification.

The purpose and duties of the Panel were described in a pamphlet *The Technical Information Services of the U. S. Atomic Energy Commission,*[9] made available to all AEC contractors, field offices, and project libraries. As described in the document, each Panel member had a duty to ascertain the information needs of the sites each represented and to advise the Chief of the Technical Information Service accordingly, to recommend policies regarding information services throughout the AEC, and to recommend improved ways and means of disseminating atomic energy research information efficiently. In addition, Panel members were to act as liaison officers between the AEC's Technical Information Service and their local technical information organizations.

Suggestions for improving the AEC's technical information program were welcomed from the scientists, engineers, technologists, report custodians, and all others involved with the AEC's research activities. For those Project sites with no Panel representative, comments about the technical information program were to be forwarded to the Panel Chairman by way of the local contracting officer.

The first meeting of the Panel, after its establishment by the AEC General Manager on April 2, 1948, was held on June 14 in Chicago at Argonne National Laboratory facilities. Two additional meetings were organized for 1948. The second was held in the Office of New York Directed Operations on August 2 and the third in Chicago at the Museum of Science and Industry on October 17.

Present at the first Panel meeting, held in the offices of the Argonne National Laboratory, were the following members and attendees:

Hoylande D. Young and A. J. Dempster, Argonne National Laboratory
Alberto F. Thompson, AEC Technical Information Branch, Washington
John H. Martens, AEC Technical Information Branch, Washington
W. W. Lord, AEC Technical Information Division, Oak Ridge
Charles L. Slesser, AEC New York Directed Operations
L. R. Thiesmeyer, Brookhaven National Laboratory
R. B. Korsmeyer, Carbide and Carbon Chemicals Corp. (K-25), Oak Ridge
Russell Baldock, Carbide and Carbon Chemicals Corp. (Y-12), Oak Ridge
A. T. Voigt (for E. I. Fulmer), Iowa State College
John F. Hogerton, Kellex Corporation
R. R. Davis, Los Alamos Scientific Laboratory
R. W. Stoughton, Oak Ridge National Laboratory
Raymond K. Wakerling, University of California
Henry A. Blair, University of Rochester

During the lifetime of the Panel, the technical information program director from the AEC Washington office was the Panel Chairman. It was he who prepared the agenda, selected the meeting venue, and acted on Panel recommendations. Secretary for many years was John H. Martens, assistant to Dr. Thompson. In later years the TIC Manager was Panel Secretary. It was he who assumed responsibility for handling meeting details, such as extending invitations, distributing papers, and handling meeting logistics. Initially, the Panel assembled as often as three times a year. Later, these meetings were scheduled semiannually, and in the years prior to the dissolution of the AEC, only annual meetings were programmed.

In general, the Panel was well balanced, both in terms of AEC program representation and of their individual backgrounds and educational attainments. Most members were well educated in the various scientific disciplines and had had technical experience or research assignments in the various Manhattan Engineer District programs. Certain members, named to the Panel because of their Manhattan Project Editorial Advisory Board assignments (see Sec. 2.5) also were widely recognized as NNES authors. (See Fig. 3.1.)

Appendix 2 lists AEC Technical Information Panel Members and their records of service for the entire AEC institutional period.

(See also Secs. 5.1 and 13.11.)

3.6 *THE WORK OF THE PANEL BEGINS*

In general, the order of business for the Panel followed the Agenda that had been mailed in advance to each member. During the early, uncertain days of NNES's development, much of the Panel's business was devoted

Fig. 3.1 A meeting of the AEC Technical Information Panel at the Division of Technical Information Extension, Oak Ridge, January 1966.

to problems associated with securing manuscripts to match the planned Series outline and publication of the corresponding volumes.

As recorded in the Minutes of the first meeting,[10] Dr. Thompson described a cooperative program being developed by the AEC with other organizations for abstracting the technical literature. A proposal from the John Crerar Library in Chicago had been received to do abstracting in the area of nuclear science literature. The Panel supported the idea of engaging John Crerar Library for additional abstracting and indexing.

To provide a means of selling documents, Dr. Thiesmeyer drafted a proposal on the distribution of unclassified and declassified documents which stated: "Each installation is urged to advise . . . affiliates regarding this [distribution] policy and adopt a price list applicable to the materials it prints which will be used in distributing copies to non-affiliated requesters."

The possibilities of a research program on machine referencing systems were described. Several members were much interested in the possibilities of machine indexing, and Dr. Thiesmeyer pointed out that Brookhaven National Laboratory had IBM electronic accounting machine equipment on order for such experimentation.

Much of the work of the second meeting[11] focused on document distribution and whether microcarding of documents might be a more efficacious method to duplicate and distribute documents than the then customary method of microfilming. A Project-wide Publications Request Form was also formalized. Dr. Thompson reviewed the results of a survey on the possible use of microcards. Up to about 50 pages of typescript could be placed on film (at an estimated sixteen cents per card). The decision was also made at this meeting to form within the Technical Information Panel a working panel for library problems rather than to establish a formal subpanel constituted of librarians. On other topics, the Panel approved the form and contents for the new publication, *Nuclear Science Abstracts (NSA)* (see Sec. 3.8 following), and it was agreed that a library bulletin should be inaugurated and issued quarterly from Oak Ridge.

From the Third Panel Minutes,[12] it was recommended that:

- Titles of journals abstracted should be abbreviated in accordance with the standards established by *Chemical Abstracts.*

- Reports possessing satisfactory numbers would not be changed; reports possessing unsatisfactory numbers would be assigned numbers in the NP series but cross-referenced to the original number; and reports bearing no identifying numbers would be assigned GNP numbers.

Also at the Third Panel Meeting, the Chairman announced that the name of the Technical Information Division at Oak Ridge had been changed to the Technical Publications and Library Service. The reason given was that the Technical Information Division's work had now been attached to the Division of Public and Technical Information Service in Washington and that its budget would have to be defended there. Since the name Technical Publications and Library Service was more descriptive of the actual functions of the group at Oak Ridge, rather than "Information Service" (which was normally associated with non-technical information work), the name was changed. After considerable discussion on the proposed name change, the Panel voted against the proposal "on the ground that unnecessary confusion would result on account of the extremely extensive distribution of material by the Technical Information Division, and voluminous correspondence between the Technical Information Division and the various Project scientific information centers." Instead of the recommended name, the title that was actually approved was Technical Information Branch, Oak Ridge Extension.

3.7 *AEC LIBRARIANS' CONFERENCES: 1948*

AEC Project librarians were very active in 1948 in reacting to the influences of the newly developed AEC technical information program and to the expanding roles that libraries were experiencing in Project-related needs for information tied to new or planned research.

Two AEC librarians' conferences were held in 1948: the first at Brookhaven National Laboratory, April 26–28, and the second at Argonne National Laboratory, October 15–16. Among the agenda topics for the first conference were (1) the matter of petitioning the Technical Information Panel to set up a permanent library organization to meet at regular intervals, which would allow representation from each AEC installation or project; and (2) the matter of approaching the Technical Information Panel about the librarian's group becoming recognized as a Sub-Panel. When submitted to the Panel at its second meeting, the petition was denied. From the Panel minutes: "The Panel agreed that many technical information problems arise on the Project which could best be studied by conferences among the Project librarians. It was further agreed that, in the interest of economy, such meetings should be held in conjunction with the meetings of the Technical Information Panel since some individuals can serve in both capacities. For this reason, it was recommended that no formal Sub-Panel be formed."

Members of the first librarians' conference and the installations represented by them were

John P. Binnington, Brookhaven National Laboratory
Dr. Brewer F. Boardman, Chief, Technical Information Division, AEC Oak Ridge
Mrs. Clarence D. Brenner, University of California, Radiation Laboratory, Berkeley
Dr. Gilbert L. Campbell, Los Alamos Scientific Laboratory
Miss Wilma Chioti, Iowa State College, Ames
Bernard M. Fry, Chief Librarian, Technical Library, AEC Washington
Frederick Franklin, Fairchild Engine and Airplane Corp., NEPA Division, Oak Ridge
H. H. Goldsmith, Brookhaven National Laboratory, Upton, New York
Mrs. Ruth C. Liebross, AEC, Ansonia Station, New York
John H. Martens, AEC Technical Information Division, Washington, D. C.
Foster E. Mohrhardt, School of Library Science, Columbia University
Jack C. Morris, Oak Ridge National Laboratory
Gordon E. Randall, Plant Librarian, Carbide and Carbon Chemicals Corporation, Oak Ridge
P. F. Rueff, Librarian, Y-12, Carbide and Carbon Chemicals Corporation, Oak Ridge

F. W. Simpson, Library Branch, AEC Technical Information Division, Oak Ridge

E. F. Smith, Argonne National Laboratory, Chicago

Mrs. Alice H. Spiegel, Kellex Corporation, New York

Dr. R. A. Staniforth, Monsanto Chemical Company, Dayton, Ohio

C. G. Stevenson, General Electric Company, Richland, Washington

Dr. Alberto F. Thompson, Chief, Technical Information Branch, AEC Washington

Mrs. Jane Uffelman, Librarian, Y-12, Carbide and Carbon Chemicals Corporation, Oak Ridge

Dr. I. A. Warheit, AEC Technical Information Branch, Oak Ridge

Miss Jane E. Wike, Atomic Energy Project, University of Rochester, Rochester, New York

Miss Katherine C. Willsey, Knolls Atomic Power Laboratory, Schenectady, New York

Principal agenda topics for the first librarians' meeting[13] focused on supporting and jointly cooperating in projects on subject heading lists, union lists of serials, exchange of duplicate reports, an index of important bibliographies, and a union index of technical translations. In addition to setting up arrangements for interlibrary loans, the matter of establishing a library bulletin was also considered.

At the second meeting,[14] the first issue of the library bulletin was introduced and reviewed. Also discussed was a manual of procedures for technical reports. The essential elements of a title page were presented for the typical research report. It was recognized that authoritative rules for cataloging reports were nonexistent. The American Library Association's rules for cataloging emphasized accurate and consistent displays of cataloging elements for books and monographic items, and rules for handling report literature were not obtainable from this authority. Report literature had never been considered prestigious from most librarians' point of view, and special rules for handling or cataloging reports seemed unwarranted.

It was therefore generally agreed that, for cataloging and accountability purposes, all reports should be standardized to include on a title page the title by which the report would be identified, authors' names, the issuing installation (and subcontractor, if any), date of preparation, contract number, report number, category classification, documentation (collation, etc.), and classification. From these essential elements grew the cataloging "tags" still in use today for cataloging research and development reports. Considerable work and discussion at the meeting also centered on report numbers and ways numbers could be standardized.

From the work of the Librarians' Conferences, ideas and recommendations were filtered into the Technical Information Panel, and, where required, policy was established and implemented Project-wide.

(See also Sec. 4.15.)

3.8 *ANNOUNCING AEC'S RESEARCH:* NUCLEAR SCIENCE ABSTRACTS (NSA)

According to an excellent paper prepared for the Thirty-Fifth Meeting of the Technical Information Panel,[15] the earliest secondary announcement publication came into existence as early as 1946. In July of that year the Manhattan Engineer District, Oak Ridge, prepared a semimonthly *List of Documents Declassified* that was continued under the imprint of the AEC with Volume 1, Number 1, dated July 1947 as *Abstracts of Declassified Documents (ADD). ADD* was issued through June 1948 (Vol. 2).

Also started by the Corps of Engineers, Manhattan District, was *Atomic Energy in Foreign Countries,* which began in July 1946 as a companion publication to the *List of Documents Declassified.* This publication was begun because of the belief that research work being performed in foreign countries was important and should be announced to U.S. researchers. This publication continued through nine monthly issues, the last one dated May 1947. The first issue contained references to reports and published literature on atomic energy developments in eighteen foreign countries.

In November 1946 the *Guide to Published Research on Atomic Energy* was started. This publication was issued from November 1946 to June 30, 1948, on a semimonthly schedule. Abstracts were arranged under 37 subject categories, derived from 21 abstracting and indexing services, including abstracts prepared by the AEC technical information group. The sources of many of the original articles were foreign journals, including some published in France, England, Russia, and Germany.

At the first Panel meeting, the concept of an abstracting service that would not be limited to the report literature was discussed. The amount of research completed and yet to be reported made it mandatory that a formal announcement mechanism be devised. Discussions with existing abstracting services toward obtaining prompt announcement of unpublished governmental research results on atomic energy had proved unsuccessful. *ADD* was the result of AEC's decision to meet its announcement responsibility through its own resources. This journal contained abstracts of AEC declassified documents identified in the Manhattan District

Declassified (MDDC) and Atomic Energy Commission Declassified (AECD) series.

The Panel now made the decision to include AEC's research in a new announcement publication (regardless of the publication medium—journal article, patent, or report) in the interest of providing prompt and suitable public access to the completed research. The general view held by the Panel was that all pertinent literature of interest to the atomic energy enterprise should be incorporated in a regularly appearing announcement journal, the name of which was to become *Nuclear Science Abstracts (NSA)*.[16] Also discussed were plans for the Technical Information Division to cooperate with other government agencies involved in abstracting scientific and technical literature. The goal was to eliminate as much duplication of work as possible through the reuse of abstracts.

The first volume of *NSA* was organized under fifty-eight headings. The first abstract, by Cunningham, Ghiorso, and Hindman (Argonne National Laboratory), appeared under "Absorption and Scattering of Radiation." Many headings selected for *NSA*, Volume 1, although relevant to the period covered, might appear odd now. Although some early headings, such as Rare Earths, Nuclear Physics, Mineralogy, and Transuranic Elements, would find relevance today, the appearance of Atomic Bombs, Control of Atomic Energy, Graphite, Radiotherapy, Aviation, and General Botany would not be topics of first choice for today's nuclear science researchers.

Even so, the division into groupings was a step forward from *NSA's* predecessor, *ADD,* which had no divisional arrangements. Only a sequential numbering of MDDC documents (and later AECD reports) was provided by *ADD.* An explanatory note in *ADD* by I. A. Warheit, Compiler, stated that the abstracts were prepared and arranged to allow their being filed in a binder or cut and folded into a standard 5- by 8-in. file arrangement.

At its second meeting, the Panel, upon review of the first published issue of *NSA,* generally approved its form and contents with additional suggestions. Standardized abbreviations modeled after *Chemical Abstracts* were recommended. Other suggestions related to the inclusion of engineering and patent information, the addition of cumulative indexes, the incorporation of conclusions and results in abstracts, and the elimination of repetitious material in titles to save printing space. Author abstracts were to be used whenever possible.[16]

NSA was a continuing matter of concern to the Panel during its lifetime. Because *NSA* provided the principal access to the world's research in nuclear science, matters relating to its category arrangement, cataloging, indexing, content, and frequency of publication were of topmost interest during the lifetimes of both *NSA* and the Panel. *NSA's* designers and planners developed policies that continued to govern *NSA* throughout its publication history.[17] Principal among these were:

- A concern for the identification, collection, announcement, and dissemination of nuclear energy and related literature.
- A concern for appropriate dissemination of nuclear science information regardless of the form or medium in which it is contained (i.e., technical reports, journal articles, books, etc.).
- A concern for appropriate dissemination of AEC-originated scientific discoveries and investigations to scientists outside the AEC complex.
- A concern to collect, announce, and make available information from both U.S. and foreign sources, in English as well as in other languages.
- A concern for the collection and announcement of nuclear information originating in non-AEC organizations to assist scientists working in AEC offices and laboratories.

(See Secs. 4.10, 4.13, 6.4, 6.7, 9.12, 9.13, 10.11, 11.5, 11.13, 12.8, 13.3 to 13.6, 16.9, 16.13, 17.5, and 18.4 for additional information on *NSA* and the indexing program.)

3.9 *FIRST NATIONAL NUCLEAR ENERGY SERIES VOLUME PUBLISHED*

The primary purpose for publishing the NNES was, of course, to synthesize into one historical scientific account the Nation's wartime research on atomic energy. Beyond this important purpose, however, this publication effort had considerable influence on the development of policy and Project-wide procedures and rules for managing technical information resulting from AEC research. Matters related to declassifying, controlling, and disseminating research results; compiling and sharing of data among Project sites; need for appropriate identification standards for project research; how to prepare manuscripts for internal or external publication; and whether and when to allow public access to research information were all issues that required formalized treatment within the AEC's early technical information program. The NNES publication effort, through its continuous encountering of these issues, forced prompt and responsible resolution of the major problems and thereby accelerated the development of an overall AEC technical information policy.

In 1948 the first NNES volume was published—more than a year later than Colonel Nichols' earlier hopes. Nonetheless, it could be considered an achievement ranking as a small miracle considering the myriad problems related to information policy interpretations, the number of departmental reviews and restrictions to which each separate manuscript was subjected, and the rigidly imposed editorial and publication specifications established under provisions of the publishing contract.

Some of the frustrations can be noted in the Preface statement to the first published volume, *Histopathology of Irradiation from External and Internal Sources,* edited by William Bloom, M.D., University of Chicago. Prepared by the PEAB, the Preface explained that many difficulties had been encountered during efforts to prepare a unified account of Atomic Energy Project work. For example, the PEAB was the first committee ever organized with representatives from every major installation of the Atomic Energy Project. Compartmentation for security had been so rigorous during the war that a certain amount of duplication of effort had been allowed to occur rather than to permit unrestricted circulation of research information among certain installations. Because of this situation, the writing programs assigned to the different installations inevitably overlapped in many scientific fields. The Board had, nevertheless, exerted itself to reduce duplication insofar as possible and to eliminate discrepancies in factual data included in the NNES volumes.[18]

Names of 30 Advisory Board members, representing 19 AEC installations, endorsed the Preface. In the Foreword to the volume edited by Dr. Bloom, AEC Chairman David E. Lilienthal commented as follows: "The United States program of development of atomic energy has been described by Major General L. R. Groves, who, as Commanding General of the War Department's Manhattan Project, directed the program from mid-1942 until December 31, 1946, as 'a generation of scientific development compressed into three years.' The tremendous scope of the Manhattan Project Technical Section of the National Nuclear Energy Series, which has been in preparation since 1944, is a tribute to the unprecedented accomplishments of science, industry, government, labor, and the Army and Navy working together as a team. These volumes can be a firm foundation for the United States atomic energy program which, in the words of the Atomic Energy Act of 1946, is '. . . directed toward improving the public welfare, increasing the standard of living, strengthening free competition in private enterprise, and promoting world peace.' "

Arrangements for publication of the series volumes were made by Columbia University under a contract with the AEC. Columbia University in turn selected McGraw-Hill Book Company, Inc., as publisher. A staff of 18 McGraw-Hill editors and clerks, mainly from the company's offices in New

York, had been relocated in Oak Ridge at ORDO offices for the duration of publication of the unclassified portion of the Series, which ultimately totaled 51 volumes. Ross Kepler, Executive Editor, headed the McGraw-Hill staff during the initial phases of the project.

In discussing the NNES Bloom Volume publication, V. V. Hendrix, Chief of the Publication Section of the Technical Information Branch, pointed out that, in addition to the scientific and technical aspects of the NNES, its publication was an innovation in the field of printing. Insofar as he had been able to determine, it was the first time a full-length book had been created by use of IBM composing typewriters. This method, adopted by the Technical Information Branch as being the most logical choice after a careful evaluation of the available typesetting facilities, required that special characters, such as mathematical equations, be hand set by a group of specially trained technicians. Other technicians were employed in page layout and make-up as well as drafting, employing photographic techniques, etc. Final master pages were made up, copied photographically, and printed by the offset process. The Bloom Volume was printed by Edwards Brothers, Ann Arbor, Michigan. Hendrix noted that considerable interest was elicited by this process of preparation and printing. It was being examined from the standpoint of flexibility and economy by a sizeable segment of the printing trade. *Publishers Weekly* labeled the NNES, "one of the most significant projects in American scientific publication."[19]

3.10 *THE COMMISSION'S REPORT TO CONGRESS: 1948*

According to the Fourth Semiannual Report to Congress, Operation Sandstone (the code name for a series of nuclear explosions carried out in April and May 1948) confirmed the fact that the position of the United States in the field of atomic weapons had been substantially improved. These tests also added to the public's interest in obtaining information on atomic energy matters.[20]

The Fifth Semiannual Report had considerable space dedicated to the technical information program.[21] Under Section V, the report noted that "One of the five major programs which the Atomic Energy Act of 1946 directs the Commission to carry on is 'a program for the control of scientific and technical information which will permit the dissemination of such information to encourage scientific progress' " The Commission report further pointed out that scientists, technicians, and business executives increasingly needed information for atomic energy R&D and for general advance in research and industrial technology. "Facts are the only sound basis for citizens' decisions on national policies to guide the control and development of these primal forces," the report stated.

Among the principal Technical Information Service accomplishments cited in the 1948 Commission Report were the following:

- As a continuation of the policy of cooperation with respect to information shared by the United Kingdom, Canada, and the United States as a result of their combined wartime efforts, the second International Conference of Declassification was held September 6–9, 1948, at Harwell, England.
- By the end of 1948, the large backlog of informational papers built up during the war had been sorted, indexed, published, and distributed within the atomic energy enterprise.
- During 1948 more than 3,000 individual classified reports were distributed; in addition, 50,000 individual copies of classified reports went on specific order to various laboratories.
- The Commission established in 1948 a classified *Journal of Metallurgy and Ceramics of the Atomic Energy Project.*
- To provide the atomic energy program with quick access to a wide range of declassified and unclassified papers, a semimonthly publication, *NSA,* was started. The first 12 issues contained 1800 abstracts.
- The Commission reproduced a number of pertinent declassified reports in the field of nuclear science originating outside the project. Among these were 96 reports from the United Kingdom and Canadian atomic energy research establishments.
- Many declassified documents were made available for sale by the Commission under an agreement with the Superintendent of Documents. For the year 1948, the Commission sold 42,000 documents.
- All Commission reports, classified, declassified, and unclassified, were indexed during the year to facilitate the location by project scientists and librarians of information on special subjects contained in them. Index cards, averaging six per report, were prepared for each report issued. During the year 5,700 reports were indexed and 1,712,000 index cards were distributed to project laboratories.
- To acquaint the world of science and technology with the resources of technical information in nuclear science fields available from AEC, an exhibit was prepared and shown at key scientific meetings during 1948.
- At the request of the American Textbook Publishers Institute, the Commission in 1948 undertook the preparation of a *Sourcebook on*

Atomic Energy [by Samuel Glasstone], which was intended to be an authoritative treatment of the basic sciences and technology related to the field of atomic energy. The book would enable authors of textbooks and educators in all scientific fields to incorporate in their texts and course work changes made necessary by advances in nuclear science.

• Exhibit materials were requested for an Oak Ridge educational center to be operated by the University of Tennessee Extension Service to provide educational materials for visitors expected at Oak Ridge when the town was opened. The center was also to be used as a facility for a public educational program to be carried on across the South in cooperation with the Oak Ridge Institute of Nuclear Studies.

• The Commission recognized the publication and sale of the first volume of the National Nuclear Energy Series, *The Histopathology of Irradiation from External and Internal Sources,* published by McGraw-Hill Book Co., Inc.

• The Commission instructed the General Manager to prepare special reports (for the public) at periodic intervals throughout the year dealing with topics of special interest for which there was a need for more detailed information.

3.11 *EARLY PERSONNEL ASSIGNMENTS*

As earlier related, shortly after the formation of the Division of Public and Technical Information, Dr. Alberto F. Thompson, Jr., was transferred from Oak Ridge to Washington, D. C., where he assumed new AEC office responsibilities as Chief, Technical Information Branch.

Morse Salisbury was appointed to the Directorship of the newly formed Division. Reporting to him were the Chiefs of three branches: the Declassification Branch, the Publications Information Branch, and the Technical Information Branch. Dr. Thompson, as Chief, Technical Information Branch, hired Dr. Brewer F. Boardman primarily to assume responsibilities related to the editing and ultimate publication of the NNES at Oak Ridge, in addition to other operational responsibilities. W. W. Lord was appointed Assistant Chief to Dr. Boardman.

In addition to Thompson, other persons who became prominent in the AEC's early technical information program who had held employment with the Manhattan District were Bernard M. Fry, Melvin S. Day, Donald D. Davis, Robert L. Shannon, and Val V. Hendrix.

From its initial establishment in 1947 as ORDO Technical Information Division, thence to the Technical Information Branch, Oak Ridge

Extension, in 1948, there evolved by 1949 an organizational structure[22] sufficiently sturdy to carry the information program forward into succeeding decades. A TID Organization Manual complete with organization charts and mission statements for each program component was published in September 1949 and distributed to all hands. The formal operational title as reported in the Manual was Technical Information Division, Oak Ridge Extension.

Three line branches (Publishing, Library, and Document Control) reported to the Chief, Technical Information Division, Oak Ridge, in addition to a Control Office that incorporated staff responsibilities related to production control, program monitoring, and administration. Each of these branches, in turn, was subdivided into three or four sections. A Technical Adviser had been added to assist and inform the Chief, Technical Information Division, on quality of services being provided. Because of pressures to expedite the publishing of the NNES, an organizational structure heavily oriented toward editing and publishing functions had been fabricated.

Appendix 4 provides the structure, as well as the names of the staff assigned to individual components, for the 1949 Oak Ridge AEC technical information organization.

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14. AEC Librarians' Conference, Minutes of Meeting Held at Argonne National Laboratory, Argonne, Illinois, October 15–16, 1948.
15. *Minutes of the Technical Information Panel,* Thirty-Fifth Meeting, December 12–13, 1963, Germantown, Maryland, United States Atomic Energy Commission, Washington, D.C.
16. *Minutes of the Meeting of the Technical Information Panel,* First Panel Meeting, June 14, 1948.
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OUTFITTING FOR THE FIFTIES

CHAPTER 4

President Harry Truman's first and only full term began in January 1949. In 1949, the Soviet Union detonated its first atomic bomb and the Communist forces of China established their Peoples Republic. The year 1949 was also the last full year that David Lilienthal would serve as Atomic Energy Commission (AEC) Chairman.

When entering the decade of the fifties, the AEC's technical information program managers were faced with issues and problems undreamed of at the time of the Commission's initiation. In their efforts to resolve problems related to organizing, recording, and disseminating information, managers would often find that vexing matters of equal or greater magnitude resulted from situations or events totally external to their local oversight responsibilities. The AEC's task of "dissemination of information to encourage scientific progress. . ." was a priority problem requiring special managerial skills.

In addition to the rapid expansion of the national laboratories and the concomitant broadening of federal research programs, the country's interest in nuclear energy had created an intense investigative fervor among universities and major industrial organizations, many of which were active as prime contractors or subcontractors to AEC laboratory sites and installations. For the initiation of these research tasks, access to pertinent information would often be required by these institutions. Conversely, when research tasks were completed, new information would result and would become available and reportable, either as an internally disseminated Project report or as an article judged suitable for a technical journal. External publication outlets, however, suddenly became difficult to locate by authors desiring to record their research results for peer review in publications representing their scientific and technical fields.

4.1 CONFLICTS IN REPORTING UNCLASSIFIED RESEARCH

From the beginning, it was the Commission's policy to encourage authors of completed research to publish their results in the "open" literature. This type of publication provided appropriate exposure to allow professionals to critique reported results. For Project sites and contractors, journal publication would also ensure that the information would be disseminated at a much lower cost than if it were issued as a document prepared and reproduced for internal AEC report distribution.

At the seventh meeting of the Technical Information Panel (February 1950), it was reported that, because of the great flood of requests for publication of new research results, a backlog of unpublished information had developed among the scientific journals that would take 6 to 24 months to clear even if no additional papers were received. Lack of publication funds by the professional societies was given as the primary reason for the built-up delays.[1] Journal editors were also claiming that research papers, which had been given full-scale Project distribution or sold as AEC documents, created a prepublication status and were therefore prejudiced for scientific journal publication. Researchers, bedeviled by the "publish or perish" imprecation, were therefore loathe to submit their completed reports for project report preparation and distribution. On the other hand, a researcher submitting a manuscript to a journal was assured of a publication delay unacceptable both to the author and the Project manager.

To obviate criticism that receipt-to-announcement time of completed and publishable AEC research had become untenable, the Technical Information Panel was determined to find a dissemination outlet other than journal publication. Already, in addition to internal AEC distribution, about 40 percent of reportable research was being made publicly available as printed research reports.[2] The problem of how to assure prompt and effective dissemination of AEC research results received priority consideration by information program managers and Panel members during much of the 1949–1950 period.

4.2 CONFERENCE ON COOPERATIVE EFFORTS IN THE PUBLICATION OF ORIGINAL SCIENTIFIC RESEARCH

A conference, called by the National Research Council on February 11, 1950, brought together, in Washington, D.C., some 40 editors of established scientific and technical journals to attempt to locate ways to reduce or eliminate backlogs of submitted journal articles and to settle on a definitive statement as to what constituted prior or prepublication.

Much discussion surrounded the viewpoint held by many that the cost of any research project should include the cost of publishing the research results. In some foreign countries the cost of publishing was so high that journals were distributed only to institutions and libraries. In one American technical society, only 200 of 1500 members subscribed to the journal; hence a delivery system this restrictive could only be deemed inferior for those desiring a more comprehensive dissemination of research results.

The consensus of the Conference was that the extensive support of research by the Federal Government was placing a "crushing blow" on the scientific and technical journals; there was no obvious reason why the government should be treated differently from any other organization sponsoring research; and if the government supported a tremendous volume of research, then it should be expected to help bear the cost of publishing it.[2]

Because it was generally agreed that the federal agencies were primarily responsible for the journals' publication burdens and because of the strong recommendation from the Conference that the agencies had an obligation to provide financial assistance, the AEC initiated a program of financial assistance to professional- and technical-society journals in the form of page-charge assessments.

The Eleventh Semiannual Report to Congress (July–December 1951)[3] stated: "The contribution that the Commission's research activities make to scientific progress can be measured in part by the unclassified technical information rising within the project that is released and published. The AEC encourages project scientists to make their own arrangements for publication in established, privately supported scientific periodicals. The volume of material contributed for publication in this manner has helped to create a grave financial problem which threatens a breakdown of these channels of scientific communications. In recent months, the AEC has moved to help solve this problem by paying page costs for publication of material contributed by the journals."

4.3 *AEC DEPOSITORY LIBRARIES PLANNED AS PUBLIC INFORMATION OUTLETS*

On the point of prepublication, Conference attendees also conceded that reproduction and distribution of a limited number of research reports by a government agency to its contractors should not be considered publication and should not prejudice later publication of the same material in an established scientific journal. No disagreement among the editors was heard when this statement was presented.[2]

Considerable discussion at the seventh meeting of the Technical Information Panel (February 1950)[1] related to possible ways that unclassified research information should be distributed to Project personnel in light of the Conference statement. Panel members discussed the preparation of a reduced distribution list, including AEC contractors and others officially connected with the atomic energy program but eliminating the all Government Printing Office (GPO) depository address list. The Panel felt it could not reproduce and distribute unclassified reports generally without prejudicing publication rights. Since journal editors at the Conference agreed that a small number of depository libraries receiving copies of unclassified reports for inspection and local availability would not prejudice publication, however, it was felt that a plan could be developed to facilitate such potential distribution.

Accordingly, it was determined that approximately 15 all-AEC depositories should be established in strategic locations throughout the United States. It was agreed that, if a contractor desired to be named an all-AEC depository, this should be arranged. Because contractors were not always available in strategically desirable locations to become AEC depositories, however, final decision should be made by an independent organization capable of making such a decision. It was therefore decided to request the services of the American Library Association (ALA) Board on Resources of American Libraries to make final library recommendations.

From the basic listing of U.S. libraries provided by the ALA, the AEC Domestic Depository Libraries were established during the ensuing decade. Later, this selection of libraries would become the foundation for the U.S. "Atoms-for-Peace" Library program, instituted to provide information on peaceful uses of the atom for domestic use.

4.4 *TECHNICAL INFORMATION COMMITTEE FORMED*

To assist in the administration of appropriate access to and control of the AEC's research and development information, the General Manager earlier in 1949 had established the AEC Technical Information Committee. At the fourth meeting of the Technical Information Panel (February 11, 1949),[4] Dr. Alberto Thompson explained that this committee was composed of representatives from the Divisions of Research, Biology and

Medicine, Production, Engineering, Reactor Development, and Military Application.

Its purpose was to establish policies for distribution of technical information throughout the Atomic Energy Project, such policies to be based upon recommendations of the Technical Information Panel and a new Advisory Committee made up of representatives from learned societies and interested organizations outside the Atomic Energy Project. The policy so established was to be administered by the Technical Information Branch.

4.5 *INDUSTRIAL ADVISORY COMMITTEE ESTABLISHED*

In the Commission's Fifth Semiannual Report to Congress (January 1949), it was reported that scientists, technicians, and business executives not directly associated with the Commission or its contractors increasingly required information not only for their part in research and development but also for general advance in research and industrial technology.[5] Assisting U.S. industry had been a goal of the AEC from its establishment; how to focus research results in a way that American industry could quickly locate relevant information and integrate it into the industrial complex had not yet been resolved.

On September 1, 1949, a meeting comprised of a group of representatives from scientific and professional societies and the trade press was held in Washington to solicit their views on a proposed AEC program designed to release technological information specifically for industry. An initial test, limited to the field of metallurgy, had been planned whereby a working party (selected from outside the AEC) would be cleared to scrutinize Project reports and advise the Commission on what information in these program areas would be particularly important to American industry. The advisory group approved the proposed project and nominated a group of five to review the Commission's reports in the metallurgical field.

As reported in the Seventh Report to Congress (January 1950),[6] a working committee of representatives of engineering societies and the business press was appointed and cleared to examine classified technological information and determine whether metallurgical data and techniques might be of potential use to industry. Where it could be determined that the value to industry of certain types of information might outweigh the value of keeping it classified, the information would be considered for declassification. The name given this group was the Ad Hoc Committee on Technological Information for Industry, and the initially recommended 5-person working party was expanded to 13 persons.

This group met as an ad hoc committee until 1952, when it was expanded again to 19 members and reconstituted as a permanent committee entitled "Advisory Committee on Technological Information."[7] This committee would later wield considerable influence and cause certain classes of information to be moved from a classified to an unclassified status for general-public use. The Committee also recommended that, for those industries desiring access, classified information deemed of value to industry should also be provided through appropriate classified clearances restricted to U.S. industrial organizations. Ultimately a program directed from the Technical Information Branch, Washington, would be established on behalf of American industry to coordinate AEC efforts in facilitating efficient access to AEC research and development information.

Members of the first Advisory Committee on Technological Information, as published in the Twelfth Semiannual Report (October 1952),[7] were the following:

Sidney D. Kirkpatrick, chairman; vice president and director of editorial development, McGraw-Hill Book Co., Inc.
John Beall, manager of publications, The American Institute of Mining and Metallurgical Engineers
H. E. Blank, editor, *Modern Industry,* Magazines of Industry, Inc.
Gene Hardy, National Association of Manufacturers
Keith Henney, editor, *Nucleonics and Electronics,* McGraw-Hill Publishing Co., Inc.
Dr. Elmer Hutchisson, editor, *Journal of Applied Physics,* American Institute of Physics
Walter E. Jessup, editor, *Civil Engineering,* The American Society of Civil Engineers
Andrew W. Kramer, editor, *Power Engineering,* The Technical Publishing Co.
Everett S. Lee, American Institute of Electrical Engineers
Dr. Walter J. Murphy, editor, *Chemical and Engineering News,* American Chemical Society
D. O. Myatt, managing editor, *Industrial and Engineering Chemistry,* American Chemical Society
Karl T. Schwartzwalder, The American Ceramic Society, Inc.
George F. Sullivan, managing editor, *The Iron Age,* Chilton Publications, Inc.
E. E. Thum, editor, *Metal Progress,* American Society for Metals
Walter Toerge, engineering editor, *Steel,* Penton Publishing Co.
S. A. Tucker, publications manager, American Society of Mechanical Engineers
F. J. Van Antwerpen, editor, *Chemical Engineering Progress,* American Institute of Chemical Engineers
Dr. Alberto F. Thompson, secretary; chief, Technical Information Service, AEC Washington
N. H. Jacobson, assistant secretary; Technological Information Officer, AEC Washington

Appendix 3 is a complete list of persons who served on the AEC Advisory Committee on Industrial and Technical Information (later renamed the Advisory Committee on Technical Information) along with their years of service.

4.6 *OVERSIGHT OF AEC PRINTING PLANTS BECOMES TIS ASSIGNMENT*

At the fifth meeting of the Technical Information Panel (June 9–10, 1949),[8] a topic introduced to the Panel pertained to a decision that had been rendered by the Congressional Joint Committee on Printing (JCP). As explained in the Agenda Notes, because AEC contractor printing plants were wholly paid for with government funds and located on government-owned property, the JCP decided that these plants were completely subject to the Committee's regulations. Included along with the JCP-rendered decision was a list of government-owned AEC plants.

A draft GM Bulletin, intended for transmittal to Managers of Operations, was attached to the Sixth Panel Meeting Agenda Notes for information. The Bulletin stipulated that the provisions of the Bulletin applied to all AEC-owned plants operated directly or by contractors that had been authorized by the JCP. The Bulletin also included procedures for the purchase, operation, transfer, and disposal of printing equipment and certain reporting functions required of field printing plants and defined classifications for those plants approved by the Committee.[9]

Under the authority of the authorizing JCP docket, a Class A plant was authorized for the AEC at Oak Ridge. Class A designations were also authorized for contractors located at the University of Chicago, General Electric at Richland, Sandia at Albuquerque, University of California at Los Alamos, and Associated Universities at Upton, N.Y. Carbide and Carbon Chemicals Corporation at Oak Ridge was authorized to operate a Class B plant.

The General Manager directed the Public and Technical Information Service, Washington, to act for the Commission on printing matters on behalf of the JCP. For the accomplishment of this assignment, an office was established to work with all AEC printing organizations to ensure that printing regulations were appropriately applied and enforced and to assist in obtaining approvals for plant modifications, equipment approvals, and exceptions to regulations when printing demands required such requests.

4.7 *INFORMATION EXCHANGE PROGRAM INAUGURATED*

On the agenda for the Fifth Technical Information Panel meeting (June 9–10, 1949) was a proposal for establishing a vigorous program for the exchange of AEC documents with other agencies, including universities and industrial laboratories in the United States and abroad.[10] Attached to the agenda was an informal memorandum signed by Mortimer Taube, Assistant Chief, AEC Technical Information Service, which stated the issue and provided the rationale for the program's establishment. Pointing out that, by adopting the exchange principle, the Commission would be following general practices employed by other government agencies and sanctioned by Congress, the inauguration of this program would allow program improvements in four important ways:

- The haphazard individual distribution of Commission publications would be eliminated. All free distribution would be accomplished for official purposes or on an exchange basis. (Congress, which looked with favor on exchange programs generally, frowned on any widespread free distribution of the Agency's own publications.)
- The Technical Information Branch would be able to secure promptly and without cost many scientific and technical publications of universities, learned societies, research institutions, and industrial establishments.
- Commission publications to scientific and technical libraries and institutions could be widely disseminated, which would promote cordial and cooperative relations between the Commission and these institutions.
- Finally, the material secured through exchange could be announced in regularly issued announcement publications or accession lists and made available to Project installations as required.

The memorandum also pointed out that declassified and unclassified technical reports, subscriptions to *Nuclear Science Abstracts (NSA)*, special bibliographies, and index cards were available for exchange purposes. Information materials so acquisitioned would be abstracted in *NSA* for use throughout the AEC Project.

The Panel adopted Dr. Taube's recommendation and agreed that the program should be centralized at the Technical Information Branch, Oak Ridge. For decades, the exchange program became one of the most important technical information activities. It contributed in a very large measure toward the Commission's goal of obtaining comprehensive coverage for *NSA* at an affordable, economical level.

4.8 *REPORT NUMBER PREFIXES STANDARDIZED*

Also at the Fifth Technical Information Panel meeting (June 1949) Dr. Taube introduced an agenda topic that was deliberated for several subsequent meetings. Dr. Taube's proposal related to numbering AEC Project reports in a manner that would achieve a high degree of standardization, which was much desired by Project librarians. Dr. Taube believed that, with the Panel's oversight, this standardization was eventually possible through the adoption of proposed numbering standards throughout the contractor structure of the AEC.[10]

Initially agreeing to the proposal, the Panel stated that the Technical Information Branch should formulate the necessary measures to make the system function effectively. The Panel also agreed that atomic energy reports should be limited to fewer than 30 prefix codes. Laboratories and contractors would use these codes and number reports consecutively within them.

Later, at the Seventh Technical Information Panel meeting (February 1950),[1] problems had emerged in attempts to formalize the report number coding procedure. At this meeting the Panel agreed to expand the codes in two dimensions: those related to laboratories and those to be associated with AEC offices. Thus such codes as ANL, BMI, DOW, UCRL, ORNL, CO, HO, ORO, TID, and WASH, were established and agreed on. It was further agreed that no new codes would be adopted unless shown to be clearly applicable to the agreed rules. A formalized code structure, maintained by the Oak Ridge Center, was thus begun and has been continued since its initiation.

4.9 *CHANGES RECOMMENDED FOR PREPARATION OF ABSTRACTS AND INDEXES FOR ANNOUNCEMENT PUBLICATIONS*

With the growing popularity of *NSA,* viewpoints continued to be expressed about ways to improve the presentation of abstracted information. From its inception, *NSA's* Table of Contents reflected the general program interest of the Commission's research activities. Each issue usually contained a listing of some 35 technical topics.

At the Fifth Panel Meeting in June 1949,[10] a proposal was presented to change the arrangement of *NSA* to allow a grouping under general headings. It was agreed that such a grouping would facilitate *NSA's* use by specialists in various broad fields. The fields specified by the Panel were Biology and Medicine; Chemistry; Engineering; Mineralogy, Metallurgy and Ceramics; Physics; and General. Under each of these, subheadings were created for appropriate grouping.

Although the methods of creating the subject index, through the use of IBM keypunch and sorting equipment, had been approved (following

Chemical Abstracts style of subject headings), the resulting typeface was not pleasing. The Panel desired a change in type style.

A two-column format was also recommended for the abstracts as a means of improving readability, and this suggestion was subsequently implemented. Accelerating the two-column format decision was the adoption of a single, one-time composed abstract for use both for the AEC catalog card and for the abstract journal. A photographic reduction size for the abstracts was calculated to allow their being fitted into a double-column format for use in abstract journals and to allow the same abstract to be used for the 3- by 5-in. index cards intended for AEC libraries.

The use of IBM Electronic Accounting Machine (EAM) equipment to produce the subject index was soon discontinued in favor of subject entries being imprinted by IBM composing machines onto 3- by 5-in. cards that could be arranged into columns for photographing into subject index pages. The subject index arrangement was in approximate conformity with *Chemical Abstracts* style, with main headings being adopted and standardized and eventually numerically coded. Modifier lines, containing the referenced abstract number, related specific information about the chosen subject and immediately followed the main subject headings.

The proposal to categorize *NSA* into the six general topic headings received Panel approval,[10] but the decision to further subdivide under individual topic headings was held in abeyance. The Technical Information Branch, however, was authorized to arrange the abstracts as though the topics existed. As *NSA* grew, and particularly as non-AEC nuclear science information was added to the total store of data, it became necessary not only to accommodate the subtopics but also to categorize further as well. This initial effort, however, reflected for the first time a concern to ensure appropriate categorizing of information formulated to match new discoveries and corresponding advances in science and technology.

Later, at the sixth meeting of the Panel (October 31, 1949),[11] approval was given to change the format of *Classified Research and Development Reports* abstract arrangements (later to be named *Abstracts of Classified Research*) to conform to the newly adopted *NSA* format. Also to be changed in the classified announcement journal were the subject and author indexes that were to be styled as approved for *NSA*.

4.10 *PROCEDURES REVISED FOR CATALOG CARD PREPARATION AND PRODUCTION*

The Sixth Technical Information Panel meeting (October 1949) also resulted in decisions on abstract preparation that simplified procedures for producing catalog cards.[11] As a Technical Information Service responsibility, catalog cards were produced for all AEC technical libraries in support of the libraries' responsibilities to assist researchers in accessing research and development (R&D) report information. Each AEC technical report was distributed in accordance with the AEC Standard Distribution Lists maintained by the Research Division. For each report distributed, site libraries required corresponding catalog cards for recording the report's receipt and to allow its subsequent retrieval. In 1954, catalog cards, dispatched collaterally with reports distributed by TIS Oak Ridge, were estimated at 3 to 4 million annually.

Classified and unclassified cards were divided into sets, packaged, and mailed to libraries receiving reports on standard distribution lists. Classified cards were furnished to 43 classified catalogs, and unclassified catalog cards were furnished to 81 catalogs. The cards were divided into sets using a special IBM sorting machine that counted off twelve sets of a title in one operation.[12]

"Tracings," or the file points for each card, determined the number of cards to be reproduced by the Oak Ridge facility for each of these distributed reports. File cards, measuring 3 by 5 inches, were produced for each author, corporate source, report number, and subject index point. Each card was punched with a locking rod hole.

An index to R&D reports had been started during the wartime years by the Metallurgical Laboratory, University of Chicago, in connection with the plutonium project (see Sec. 2.2). This index was concerned chiefly with that body of literature under the direction of the Manhattan Engineer District. According to Charlotte Chestnut, Oak Ridge AEC Librarian,[13] the cataloging project was transferred to the AEC Information Branch on August 15, 1946. Because certain classes of reports had not been indexed by the Chicago activity, gaps were filled in at Oak Ridge upon transfer, and the index was made comprehensive except in the areas of weapons and production (see also Sec. 6.4). The index included, however, classified information and required appropriately cleared personnel for its maintenance.

Recommendations adopted by the Panel allowed the production of catalog cards and abstracts for AEC journals to be simplified as follows:

- Abstracts appearing in *NSA* could be duplicated on the catalog cards, provided they fitted the special limitations on the card.
- It was not necessary to have the index on the cards more detailed than the index to the abstract journal.
- It was unacceptable to have the abstract so long that more than one index card was required (it could, however, be continued on the card backside).

• It was agreed that consideration would be given to revising the card format further should additional cost savings be identified—thus inviting a potential for interagency standardization or bibliographic improvement.

Much discussion by librarians and panel members always occurred when the topic on standardizing card catalogs appeared on meeting agendas. This interest became more intense as other agencies' information (and cards) was being received on exchange and incorporated into Project library collections.

At the Ninth Panel Meeting (October 1950),[14] members were informed that for several months representatives from the Army, Air Force, Navy, National Advisory Committee for Aeronautics (NACA), and the AEC had worked informally on the problem of standardizing the cataloging of government and government-sponsored R&D reports. Such standardization, it was hoped, would allow common interfiling of catalog cards. Cataloging from other agencies could be used in common systems, and each agency's abstract bulletins could incorporate the prepared abstract without reworking the information. General agreement was reached on a common format and arrangement.

The adopted format represented a pioneering step forward toward interagency cooperation in attempts to create a generalized bibliographic standard that would promote sharing and reduce duplication of effort. The adopted size permitted, in some cases, the reuse of composed abstracts for bibliographies and abstracting bulletins, in addition to allowing some interfiling of cards. Unfortunately, whereas catalog cards were generally acceptable for author and report number files, those intended for subject indexes were not so easily used by those libraries which emphasized specialized fields. Nonregularity of indexing caused by specialization created many more problems than were solved in attempts to transfer cards for individual libraries.

4.11 *CLEARINGHOUSE ARRANGEMENTS FOR FOREIGN TRANSLATIONS*

Acquisitioning information from foreign sources was a very important effort of the Oak Ridge facility in its efforts to provide comprehensive coverage for its abstracting and indexing program. Exchanged information very often was received in a foreign language and required translating before its availability could be announced. Frequently, Project scientists would request TIS to assist in translating articles or books as a service to their research effort. In accomplishing these tasks, it was sometimes discovered that the same translations were requested simultaneously from different research groups.

To avoid unnecessary duplication and to increase efficiency and coverage in foreign scientific literature government-wide, the Central Intelligence Agency (CIA) established a central clearinghouse for coordination of translation work among federal agencies, including the Department of State, Army, Air Force, and the AEC.

A plan to consider formalizing a program that would coordinate the Commission's interests in this Clearinghouse activity was an agenda topic for the Sixth Panel Meeting (October 31, 1949). At this meeting, the Panel agreed to a means for effecting the dissemination of translations to interested contractors and installations within the AEC. The Technical Information Branch (TIB) was instructed to issue a list of scientific translations that would be available from the TIB, Oak Ridge Extension. Before undertaking a translation, all AEC contractors and installations should notify the TIB, Oak Ridge, which would immediately check with the central CIA index of translations to determine whether the translation had already been completed by another agency.

On this point, the Panel pointed out that it was essential that all contractors and installations furnish the Library Section, TIB, with prompt notice of translations in progress so that the information could be recorded in the central translations index. In notifying the TIB, it was also important that the notice include the name of the author, the title, the name of periodical or book, and the anticipated date of completion. Finally, a copy of the completed translation should be forwarded to the TIB for loan to possible requesters.

Beginning with this assignment, the Oak Ridge facility established and maintained a programmatic coordinating role on behalf of the entire Commission for translations. Decades later, as the technical world gradually accepted English as the carrier language for much of the scientific information, the need for translations began to diminish. The AEC translation program, however, became internationally respected, and the coordinating role was expanded toward transatlantic cooperation in bilateral information exchanges.

Eventually, emphasis was shifted toward the selective translation of a portion or portions of foreign literature items rather than complete cover-to-cover monographic translations. For *NSA*'s translation needs, most of the scientific analysts were sufficiently proficient in another language to translate an abstract into English or arrange to secure abstract translations with local foreign language contractors.

4.12 *SALE OF AEC DOCUMENTS RETURNED TO OFFICE OF TECHNICAL SERVICES*

Arrangements had been completed on July 1, 1950, to return responsibility for sale of AEC documents to the Department of Commerce's Office of Technical Services (OTS). For approximately two years, a GPO sales outlet had been established at the Oak Ridge facility for public availability of AEC reports.

Commenting on the reason for the changes, the Notes on the Agenda for the Seventh Panel Meeting (February 27–28, 1950), stated: "It is proposed to transfer the sale of AEC documents to the Office of Technical Services, which now appears to be established permanently as the official outlet for Government documents not produced by the Government Printing Office. The OTS has a revolving fund, whereas receipts of the Document Sales Agency must be turned in to the general fund of the Treasury. This makes the Document Sales Agency unduly expensive for the Commission to operate, since the cost of handling the numerous small transactions is high and receipts do not apply against expenditures."

4.13 *BUREAU OF THE BUDGET QUESTIONS NEED FOR* NUCLEAR SCIENCE ABSTRACTS

As reported at the Eighth Panel Meeting (June 5–7, 1950), the Bureau of the Budget was conducting a survey of technical abstracting services maintained by government agencies in an effort to evaluate the service performed by all of them.[15] *NSA*'s future would be determined by the outcome of the survey. From survey results, there were indications that a preponderance of those surveyed had never heard of *NSA*. Of those who subscribed to *NSA* or used it indirectly, however, 90 percent stated *NSA* was "useful," "necessary," or "most valuable."

At the time of the Ninth Panel Meeting (October 23–25), the Bureau of the Budget had indicated that it appreciated the necessity for an abstracting service such as *NSA* to support the Commission's R&D program.[16] Aside from the usual admonitions to check mailing lists frequently, the Bureau of the Budget questioned whether a cost analysis had been made relative to publishing *NSA* in Oak Ridge versus the GPO.

The notion to print *NSA* at the AEC Oak Ridge printing plant persisted for many years, but, because of the difficulty in obtaining satisfactory printing and binding equipment for a continuously growing publication plus the necessity to provide the scientific and technical public with a well-publicized outlet, the decision to use GPO's printing and subscription service for *NSA* remained unchanged for its lifetime.

4.14 *STEADY PROGRESS REPORTED ON NNES AND COMMERCIAL BOOK PROGRAM ACTIVITIES*

Although Ross Kepler, National Nuclear Energy Series (NNES) Managing Editor, returned to the McGraw-Hill editorial offices in New York upon completion of two years' service in Oak Ridge (as provided in his contract), the program to publish the NNES was proceeding slowly but satisfactorily as reported in the 1950 meetings of the Technical Information Panel.

McGraw-Hill was requesting an increase in page sale price from $0.86 to $1.00 per page to eliminate losses suffered from publication of the Series to that point in time. Sales, in general, had been slow and highly erratic.

In summarizing the reasons for retaining McGraw-Hill, the Panel (Ninth Meeting, October 23–24, 1950) pointed out that better distribution for the books could be obtained through McGraw-Hill than through GPO (the remaining alternative), authors would be better satisfied in having a well-established technical publisher, and no additional funding would be required or budgeted for supporting GPO publication. It was further rationalized that, since the company had been given assurance that 60 manuscripts would be submitted during a two-year period and only 20 had been completed over a three-year period, an adjustment in price was justified.[16]

The Panel also supported the development of additional manuscripts commercially that might be considered important to the advancement of the atomic energy program. Dr. Samuel Glasstone's *Sourcebook on Atomic Energy* was already published and available for internal distribution. Drs. John Stehn and Hoylande D. Young reported on plans to develop a *Reactor Handbook. A* manuscript on *Reactor Theory* was also being developed by Dr. Glasstone as a classified text for use in the Oak Ridge School of Reactor Technology. Illustrations for all texts and manuscripts for commercial publishers were being processed by the Technical Information Division.[16]

4.15 *TECHNICAL LIBRARY OPERATIONS*

As a part of the earlier Manhattan District's Research Division, the Library Unit in Oak Ridge had been the focal point for matters relating to issuing and disseminating information about the District's research and development program. Information acquisitioned on behalf of the Manhattan District researchers and program directors was centralized within the Library Unit. When the Library Unit was separated from the Research Division in early 1947 as an AEC function and, with broadened responsibilities, renamed the Technical Information Branch under the newly formed Oak Ridge Directed Operations, this centralization role was modified.

Through his appointment as AEC Chief Librarian, Bernard M. Fry (headquartered in AEC Washington) assumed responsibilities for establishing library policy and coordinating AEC library activities.

With the growth in demand for AEC documents, additional printing and duplication capability became necessary. AEC management therefore, began to modify the staff structure and operations of what was once the Oak Ridge Library Unit to accommodate this growth. By establishing three line branches in the September 1949 reorganization, the Technical Information Division was subdivided into a Publishing Branch, a Document Control Branch, and a Library Branch. Heading the operational functions of the Library Branch was Dr. I. A. Warheit. His assistant chief was Gordon E. Randall.

A discussion of the development of the AEC library system appeared in *College Research Libraries* in early 1950.[17] In describing the depth and breadth of the AEC library program, which included facilities spread from the Pacific to the Atlantic coasts, it was pointed out that, whereas control of information was the earlier librarians' principal concern, providing information access to researchers and the general public was now the greater priority and responsibility. With the use of the AEC Oak Ridge library activity as an example, it was pointed out that in 1948 more than 50,000 R&D reports were distributed, more than 2,000,000 catalog cards were sent out to the 68 catalogs of the AEC library system, 2,500 reference inquires were answered, and 50,000 copies of the AEC bibliographic journals were distributed. To direct this program at the AEC Oak Ridge facility were 5 professional librarians, 13 subject specialists, 9 subprofessionals, and approximately 50 clerical employees who were hired to perform the remaining duties.

The Library Branch became the responsible entity for developing abstracting and indexing bulletins, providing catalog cards, establishing standards, working with institutions both within and outside the AEC on reference matters, and recommending and obtaining resource materials for R&D projects. To accomplish these tasks, staff members possessing the highest professional judgment were necessary for communicating recommendations and decisions affecting AEC researchers' needs and the family of contractor librarians.

Although all Project libraries used essentially the same centralized cataloging, reference, and bibliographic services (and each followed AEC regulations on control and dissemination of AEC research information), libraries were nevertheless independently operated under contract regulations. In support of this loose structure, library conferences were often called, and close coordination under the leadership of the AEC Washington Headquarters Head Librarian was necessary. (See Fig. 4.1.)

Fig. 4.1 Three AEC Technical Information Branch librarians inspect the Y-12 Plant technical library (1950). From left to right: Dr. I. A. Warheit, Chief, Library Branch, ORE; Gordon E. Randall, Assistant Chief, Library Branch, ORE; and Dr. Mortimer Taube, Deputy Chief, Technical Information Branch, Division of Public and Technical Information Service, Washington.

In reviewing the services provided by AEC libraries, Bernard M. Fry described the typical library as consisting of a comprehensive collection of scientific and technical publications plus a separate document file room for classified technical reports. In spite of their decentralized operations, the libraries, by virtue of their common interests, formed a fraternal and efficient operating system. They used the same materials; drew upon the same centralized cataloging, reference, and bibliographic services; and were limited in the exchange of documents to authorized project personnel.[17]

An early, important decision for AEC librarians that had wide programmatic consequences related to report cataloging. Dr. Mortimer Taube discussed this issue with AEC librarians in October 1949. A summary of his comments, appearing in *AEC Library Bulletin* (TID-290), stated:

> One of the major current problems is to introduce into report literature the type of control, the type of bibliographical services that exist in the general pattern of scientific publication. Book libraries can obtain assistance in their cataloging problems by purchasing cards from the Library of Congress. However, the Library of Congress doesn't catalog reports. If reports are to be controlled in the way in which ordinary book material is controlled, it is necessary to develop a cataloging system for research and development reports. The Standard Distribution List fulfills the same function that advertising book lists, etc., fulfill in the regular field of scientific publication. In essence, TIB has tried to create the same type of service with report literature as exists for published literature. The necessity of creating a new system or new type of scientific service has made it possible to attempt experimentation that perhaps could not be undertaken by the existing scientific publications. . . . AEC libraries differ from the ordinary book libraries in that it has been necessary to create the kind of tools that the book librarian gets from other sources.[18]

In subsequent years the technical information program, as carried out at the Technical Information Center, continued to reflect the strong "library" heritage that existed in its earliest manifestation. Such basic program elements as acquisitioning, cataloging, indexing, archiving, control and dissemination of reports, and preparation of announcement bulletins and catalogs remained dominant program responsibilities throughout the Center's existence. Supporting these activities as required were augmenting program elements that included document reproduction and reference and information retrieval services.

Because of expansion of work involving cataloging and announcement activities within the AEC Library Branch, the Technical Information Division sought and obtained assistance from another local Oak Ridge technical library. Handling and processing of outside (public) reference requests, procurement of journal subscriptions, and filing of journals reviewed for *NSA* were services requested. In July 1949 these support activities were obtained under contract from the technical library of the Oak Ridge Institute of Nuclear Studies (ORINS), later renamed Oak Ridge Associated Universities.[18]

For almost two decades the AEC contracted with ORINS for these services. This important technical library was founded to accommodate instructors, students, researchers, and staff in fulfillment of ORINS' educational program established to support graduate work in nuclear science. Having the periodical literature that had been announced in *NSA* on file locally provided a very worthwhile service to graduate students and local researchers. On January 1, 1967, however, this service by ORINS library was terminated because of budgetary strains.[19]

An AEC Headquarters Library evolved early in the AEC program under the direction of the Headquarters Librarian to service AEC program offices, reflect AEC library policy, and generally to support other contractor library activities. An AEC central technical library and, eventually, branch libraries would be established in the Washington Headquarters area. The Oak Ridge activity, on the other hand, would gradually lose its library identity in favor of Headquarters' library development. Oak Ridge would nevertheless supply documents, provide reference services and other types of assistance upon request to the AEC Headquarters Library operations, and assist in all library conferences and other types of conventional library-related activities involving acquisitioning, cataloging, announcing, and retrieving information.

The AEC Headquarters Library remained in a close fraternal relationship with the Oak Ridge activity—and as an official part of the technical information program—until August 1, 1969, when the Assistant General Manager approved an independent Library operation.[20] After that date the Headquarters Library funding and management were no longer responsibilities of the AEC technical information program director. (See Sec. 15.8.)

4.16 *TECHNICAL INFORMATION REORGANIZATION (1950)*

A memorandum dated September 12, 1950, from Alberto F. Thompson to all Panel Members provided a guide to the handling of technical information matters with the various AEC offices under a new organization.[21] Responsibility was divided as follows:

Director, Division of Research: Responsible for matters pertaining to compartmentation (authorizing the distribution and receipt of classified documents). Direct responsibility for compartmentation matters delegated to Dr. D. J. Pflaum.

Director, Division of Information Services: Responsible for information operations (distribution, publication, etc.). Direct responsibility for information policy, operations, and services delegated to Dr. Alberto F. Thompson.

Director, Office of Classification: Responsible for administering the Commission's program for the classification and declassification of information. Direct responsibility for classification matters delegated to Mr. C. L. Marshall; direct responsibility for declassification delegated to Mr. W. A. Strauser.

Matters pertaining to general policy were to be addressed to Dr. A. F. Thompson, Chief, Technical Information Service. Inquiries for library services, requests for reports, catalog cards, searches, etc., were to be addressed to Reference Services Branch, Technical Information Service, Oak Ridge.

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SPECIALIZING FOR SERVICE

CHAPTER 5

In July 1950 Gordon E. Dean was appointed Chairman of the Atomic Energy Commission (AEC), a position he occupied through 1952 until a new Chairman was appointed by a new President.

On the national defense front, by March 1951 the AEC had completed its first nuclear test series in the Continental United States. Operation Ranger was conducted at the Nevada Test Site, located 60 miles north of Las Vegas.[1] On the domestic side, AEC researchers would soon successfully sustain and control a nuclear reaction that would produce electric power in a breeder experiment at the National Reactor Test Site in Idaho.[1]

Earlier, in 1950, the Oak Ridge School of Reactor Technology (ORSORT) had opened. Colleges were offering more nuclear engineering courses, and a small reactor had been approved for North Carolina State College at Raleigh.[2] In support of these public activities, the AEC authorized the declassification of additional information on the nuclear properties of uranium useful in the understanding and development of low-power nuclear reactors for atomic research.

In the early 1950s, the AEC exploration program was well on its way to locating and defining ore reserves in the United States. Papers were prepared and distributed to the public on such subjects as the use of the Geiger counter in prospecting, and the AEC publication *Prospecting for Uranium* sold more than 77,000 copies in a single year.[3]

A reorganization of the Division of Information Services in September 1950 redesignated the Oak Ridge facility as the Technical Information Service (Oak Ridge). The Oak Ridge chief's office, formerly named Chief of the Technical Information Division, was renamed Technical Adviser to the Office of the Chief, Technical Information Service (Washington). Brewer F. Boardman was named Technical Adviser, and Albert W. Lutz was named Management Consultant, as shown in an organization chart dated April 9, 1951.

A major thrust by the TIS Washington headquarters office was to complete the National Nuclear Energy Series (NNES), which continued to drag. A discussion topic for the February 5–7, 1951 (Tenth), Panel Meeting concerned plans to totally wind up NNES. Quoting from the Panel *Notes*,[4] "It is anticipated that the Technical Information Service, as part of its normal activities, will maintain an editorial and production organization capable of doing high quality work on a small number of books such as the NNES volumes and on journals like *Reactor Science and Technology* after the close of the major NNES effort. However, our commitments to the Bureau of the Budget preclude a major effort on the NNES itself after July 1, 1952." Realignment of Oak Ridge work schedules to increase production, allow a more efficient use of manpower, refine procedures, and introduce and use new and emerging technologies were principal Headquarters' concerns during the 1951–1952 period.

At the Twelfth Meeting (October 1951),[5] hopes for retention of the editorial group were reaffirmed: "While there is a definite possibility that a considerable processing group will be retained at Oak Ridge to assist with the preparation of weapons test reports and other publications, this is not certain at present."

By the end of Calendar Year 1951, a reduction in force (RIF) of AEC rolls forced RIF actions at the Oak Ridge office, principally among the publications and project editorial staff. Headquarters' intentions to retain the NNES publications processing group allowed a contract rehiring option for many separated AEC employees under a reinstituted McGraw-Hill Book Company contract. The newly established contract would provide publications capability for three principal publication program needs: completion of the NNES (primarily classified volumes), expert editorial assistance to emerging and planned commercial publications outside the NNES category, and the editing, reproduction, and distribution of weapons effects reports being forwarded to Oak Ridge for dissemination.

(See also Secs. 3.4–3.6; 13.11.)

5.1 *TECHNICAL INFORMATION PANEL ACTIVITIES RESCOPED*

The three annually scheduled Panel Meetings, along with their associated activities and assignments, created considerable coast-to-coast railroad travel and extra work for most attendees. Several Panel members began to raise questions about the desirability of redefining the scope of the Panel at the Tenth Meeting. Some felt that document library matters should be dealt with by document librarians at separate meetings and should not be brought before the Panel; others felt additional activities should be added, *viz.*, declassification and its associated problems; still others felt that recent agendas had been overburdened with details better handled outside the Panel.[4]

The Minutes of the Tenth Meeting[6] cite Panel Member John Hogerton's recommendation for a number of committees to be set up and comprised of Panel Members and Project experts from outside the Panel. These committees would have the responsibility of giving the many specialized problems careful consideration and reporting their findings to the main body of the Panel for final action. He also suggested that Panel meetings be held twice a year.

There was agreement with Hogerton's suggestions, and four standing committees were instituted: declassification, compartmentalization, library services, and publication and dissemination of information. When establishing the committees, however, it was agreed that only Panel members would serve as regular members, although any committee could draw upon the services of individuals outside the Panel for advice and counsel.

In the ensuing discussion on the new committee structure, it was reiterated that the function of the Panel was advisory, both to the AEC contractors and to the Commission. Quoting from the Minutes: "The Panel functions as a group of experts in the technical information field who meet to interchange ideas and experiences and to recommend procedures. The recommendations of the Panel are not binding, but the Technical Information Service feels that the continued improvement of its centralized technical information service for Project contractors depends heavily upon continuing close contact with the requirements of the research and development contractors as expressed through Technical Information Panel members at Panel meetings."

5.2 *MICRORECORDS PROGRAM ESTABLISHED*

For a number of months a program had been established at the TIS (Oak Ridge) to microfilm project reports that had been transmitted for archival purposes. Many of the documents received were old and outdated or were peripheral to the scope of the atomic energy program. By providing a master copy to the Technical Information Service Extension (TISE) archives, needed filing space could be saved by Project libraries.

Some discussion had also occurred, particularly among librarians, about a new technology being developed that allowed the miniaturizing of documents photographically, as cards, for easy filing.

Serious discussion at the Eleventh Panel Meeting (June 7, 1951) related to a proposed study designed to bring out the facts with respect to three types of microrecords in the hope that the Panel could reach some conclusions about whether such services could be offered by the TIS (Oak Ridge).[7] Types of microrecords under consideration were

Microcards, which consisted of material photographically printed on a card in microform. The Microcard Corporation, which produced the microcards, provided a reader that could allow the cards to be read by reflected light.

Microprint, which was almost identical to microcards except that the material was conventionally printed instead of being offered as a photoprint; it was produced in a larger size card than the microcard.

Microfilm Affixed to Cards, which was created by affixing conventional microfilm to cards and reading the copy by transmitted light through a window in the card.

Technical Information Service representatives pointed out that TIS had purchased in Holland a "step" microfilm camera that could set up a document for filming 48 pages directly on one sheet of film by use of a special scanning arrangement. By contact printing, the sheet could be used to make a positive or microcard, thus the manual stripping of the individual film images into a master, which constituted the principal expense in microcard production, was obviated.

It was generally agreed that microrecords in a convenient form would play an important part in the future of the technical information program. At least eight Project sites indicated an interest in receiving such records for their research communities if and when they became available.[7]

At the Twelfth Panel Meeting (October 18, 1951), the Technical Information Service notified the Panel that a contract was in place and plans were definite for proceeding with the manufacture and distribution of microcards to all sites requesting them.[5] Personnel of the Microcard Corporation had been "Q" cleared, and arrangements had been made for the company to set up equipment at the Oak Ridge facility for production of microcards. Panel members, in their response, impressed upon the Technical Information Service "the urgency of expediting the distribution of microcards, since many laboratories are in a critical position and will need to expand their facilities for storing documents if they cannot replace their reports with microcards within the next few months."

The operational plan for microcarding AEC reports was to ensure delivery of all unclassified research and development (R&D) reports to the Microcard Corporation's onsite facility, where as a part of the TIS(OR) processing procedure all reports would be microcarded and a permanent master negative retained as a part of the Technical Information Service archives. Pages of the reports would be sequentially photographed at a reduction ratio of 18 to 1. Upon completion of film processing, the negative strips would be used to create 3- by 5-in. negative masters to which the reports' headers (title and description), also photographed, would be attached. The resulting masters would then be used for creating the opaque, positive cards through contact printing.

Initial production called for an average of 300 copies of each unclassified report for distribution to a regular mailing list. Although the program was set up for unclassified and declassified reports, microcards were later produced for classified documents as well.

The AEC Microcard Plant Supervisor was Richard Lenoir; Project Manager was Jack S. Fairburn; and Director of contract sales was Charles P. Yerkes.

The document miniaturization reproduction program would continue for four decades and constitute an essential reproduction and dissemination program of non-conventional research and development information. Tens of millions of copies of U.S. and foreign reports on energy research and development were economically created for distribution, exchange, and sale. (See Fig. 5.1.)

(For additional information on this program see also Secs. 5.6 and 12.5.)

5.3 *SPECIAL PROJECT ASSISTANCE: PUBLISHING PROGRAM*

The Technical Information Service's capabilities for providing editorial support to create, publish, and distribute specialized scientific and technical informational materials had begun to attract Project-wide attention. Besides having recruited and established a competent staff of editors, proofreaders, and compositors to produce the NNES, specialized craftsmen in the graphic arts had been assembled and trained as well. Although "cold type" composition and make-up techniques were exclusively used by the Publishing and Printing Branches, the printed result emulated the highest quality letterpress publishing. A photographic laboratory, especially equipped under the direction of Carl B. Holmes, Technical

Fig. 5.1 Plaques commemorating the production of the 20 millionth AEC Microcard were presented by Charles P. Yerkes, Microcard Corporation, during ceremonies held at DTIE's facilities in January 1962. From left to right: Jack S. Fairburn, Microcard Corporation; Richard Lenoir, Microcard Plant Supervisor in Oak Ridge; Robert Shannon, Chief, DTIE; Edward J. Brunenkant, Director of Division of Technical Information, Washington; and Yerkes.

Art Adviser, produced special type sizing and styles by means of special optical effects and photographic enlargements and reductions. Make-up artists assembled composed copy, formulas, tabular material, and illustrations in harmonious, balanced pages.

As lull periods in NNES production occurred, the Publishing Branch would often receive special project-related publication assignments. As the end of NNES drew nearer, these requests became more frequent. In addition to using graphic arts and photographic specialists to illustrate manuscripts, the Publishing Branch, in consultation with authors, prepared final manuscripts or text for commercial book publishers as approved by Headquarters.

For Dr. Samuel Glasstone's *Sourcebook on Atomic Energy* and *Elements of Nuclear Reactor Theory,* the Publishing Branch finalized illustrations for publication, and publishers' manuscripts for each were produced. Similar work was applied to ***Energy in the Future*** by Palmer C. Putnam. Many TIS staff years of concentrated effort were required to prepare the manuscript and illustrative material for John Hogerton's *Reactor Handbook.* Another project by TIS staff involved editorial assistance, manuscript preparation, and final publication of Oak Ridge National Laboratory's (ORNL's) *Liquid-Metals Handbook* by R. N. Lyon et al. The *Trilinear Chart of Nuclear Species,* by W. H. Sullivan, also of ORNL, was a project supported by TIS Branches through its many years of publication and revisions as new information on isotopes became known.

Besides the abstracting bulletins and journals, such as *Nuclear Science Abstracts,* the Publishing Branch also produced project-related catalogs, such as *Isotopes—Catalog and Price List* and *Radiation Instrument Catalog.* Manuals and instruction guides were also produced for internal educational purposes. Examples are *Manual for Organization of the AEC Card Index* and instructions on styling Project reports and preparation of "author" abstracts for R&D reports. Professional newsletters and bulletins, listings, and special bibliographies were also prepared on request.

Panel Minutes to the Tenth Meeting (February 5, 1951) noted that Ed Wiggin of the Isotopes Division requested publications assistance in producing a bulletin that would inform scientists and researchers about instrumentation necessary for isotopes work, health and safety problems, and techniques for handling isotopes. This publication, *Isotopics,* continued as a Publishing Branch cooperative venture (initially with the Isotopes Division, later with the Division of Civilian Application) until July 1956. A comparable publication, *RA-DET,* started in October 1947, was produced and distributed on a monthly basis for the AEC Instruments Branch.

(See also Secs. 2.6, 13.9, and 15.11.)

5.4 *WEAPONS EFFECTS DATA DISSEMINATION PROGRAM ESTABLISHED*

In the summer of 1951, Dr. Taube made an exhaustive study of the operations of the Technical Information Service at Oak Ridge in an attempt to locate ways to realign overall production activities. Among the recommendations were acceptance of abstracts from other government agencies as written and reliance on laboratories to include, with transmitted reports, abstracts of a quality sufficient for *Nuclear Science Abstracts*

(NSA). By using author-prepared abstracts, plus other areas where savings in production time could be effected, TIS could open up areas for additional service to the laboratory sites. In the offing, and highest on the scale of such projects, was assistance to Los Alamos in preparing, printing, and disseminating weapons test reports.

Beginning in November 1951, TISOR had begun to receive reports from organizations involved in reporting on Operation Greenhouse, a series of atomic bomb tests conducted April through May 1951, on the Pacific island of Eniwetok. As reported in *Technical Information Bulletin*, No. 1,[8] procedures had been placed in effect within the Technical Information Service for the controlled dissemination of weapons reports concerning various effects of atomic bomb detonations.

According to the Bulletin, the testing of atomic weapons had produced a mass of information both for operational and scientific applications. Originating with Operation Greenhouse, a new category of information had been developed, generally referred to as “effects” data—blast, shock, thermal and radiation effects of an atomic bomb explosion on structures, material and equipment, and miscellaneous physical effects and conditions resulting from the tests. Less sensitive than the diagnostic or developmental type of weapon data, it nevertheless was classed under the broad weapon data category because it was information obtained from an atomic explosion.

Further explaining the plans for the new weapon data program, the Bulletin stated that the Division of Military Application and the Division of Research, in recognizing the need to disseminate more widely the less sensitive effects type of weapon data, established the necessary provisions for such dissemination within the AEC. As each program report of a test operation was issued, it was examined by the Division of Military Application for possible Project distribution. If distribution was authorized, the report was then handled in the same manner as a normal R&D report (i.e., it was indexed, abstracted, distributed, and made a part of the Technical Information Service holdings). Approximately 70 reports had been released for AEC Project distribution covering “effects” programs conducted during Greenhouse, Buster-Jangle, and Tumbler-Snapper operations.

Concurrent with receipt of weapons effects reports for dissemination, subject headings had to be established by the Library Branch to permit the production of subject index headings for *NSA* indexers and for consistent filing of index cards by Project libraries.[9]

The following year would inaugurate a publications program involving weapons tests that would include services for editing, composing, printing, and distributing all weapon test reports, regardless of sponsoring agency, including foreign weapon effects reports. The accomplishment of this ambitious program would necessitate an appropriate staff and a revised organizational structure.

(See also Chap. 8.)

5.5 *SPECIAL PROJECT: DEMOUNTABLE TYPEBARS FOR COMPOSING MACHINES*

Through encouragement of the TISOR Publishing Branch employees who developed the idea,* the IBM Typewriter Division engineered special typewriting equipment in the early 1950's to allow operators the capability of changing typebars in five key positions on their newer model typewriters. By replacing or exchanging typebars, different letters, symbols, and mathematical signs of operation could be obtained on demand for incorporation into text galleys. With these new typebars, each compositor had access to more than 90 percent of all the signs, symbols, and special characters needed to build equations, create chemical compounds, and accommodate other text needs for scientific and technical publications.

In reporting on the newly installed composing demountable typebar (D-T) equipment, the Composing Section supervisor stated: "the new equipment has resulted in improved quality of work with less effort ... with no extensive difficulties in removing and inserting the D-T bars.... The time required to remove and insert a D-T key is less than 16 seconds."

To access the various typebars, each composing station was provided with typebar racks that could accommodate 60 typebars, each of which allowed two symbols obtainable by shifting.[10]

In the second issue of the *Technical Information Bulletin,*[11] a full account of typewriter composing equipment and associated composing operations is given.

The IBM Proportional Spacing Machine (PSM), described as being electrically powered and wholly manually operated, provided a standard keyboard of 88 characters. An interlock device prevented two keys from striking simultaneously. Type sizes and styles were 8, 10, and 12 point. Many styles were available, but only one style and size of type could be mounted per machine. TIS used three 8-point (Text type), three 10-point, and eighteen 12-point (Executive Bold Face type) machines and one

* In April 1956 Irene Keller, Composing Section Supervisor, received an AEC award for initiating the changeable typebar concept and overseeing its successful implementation.

12-point (Bold Face Italic type) machine. The Text type and Executive Bold Face type were closely matching type styles.

Other special features of the PSM included changeable typebars that were available for 17 key positions on the keyboard. (The PSM's used by TIS had five changeable bar positions, one each for 2-unit, 4-unit, and 5-unit characters, and two each for 3-unit characters.) Changeable typebars were also available for 8-, 10-, and 12-point machines. TIS had an inventory of approximately 60 changeable typebars for each machine, each bar bearing specially selected characters.

A reprint article from *American Documentation,* Vol. V, No. 1, describing the TIS changeable typebar technique, was published in the AEC *Technical Information Bulletin,* No. 7.

5.6 *INVENTORY OF PROJECT REPORTS COMPLETED*

Action was taken in 1952 to review the centralized store of documents that had accumulated at TIS Oak Ridge since the AEC's establishment. The sheer physical size of the stockpile had created conditions that were beginning to interfere with an effective dissemination service. The collection had outgrown all available space, and additional space was not forthcoming.[8]

During the last half of 1952, members of TIS's professional staff, working on a voluntary and uncompensated overtime basis, undertook a review of all holdings, evaluated the relative importance of documents from evidence obtained, and assessed their value for permanent storage.

It became quickly apparent that a large-scale destruction program should be initiated to bring matters under control. Reviewers found that 13,000 classified documents had had no activity for more than five years, and TIS holdings included 45,000 copies of these reports.

It also became evident that the microcard program, originally thought of as a specific solution to Project storage space problems, should be expanded in concept so that microcard production could be used as a supplement to the standard method of supplying printed copies of documents; thus only a single master could be maintained in TISOR files. It also became apparent that microcards might also be considered as a means of providing positive distribution for Project needs, which would significantly reduce, or even eliminate, printing of full-size documents. The microcard program was adjusted accordingly. Microcarded documents thus became an alternative for providing nonstandard distribution availability and allowed the reduction of stockpiled copies of printed documents stored at TIC for potential requests.

In addition to allowing destruction of 45,000 classified documents, 200,000 extra copies of nonclassified reports that had already been given wide official distribution were removed from the local files. Extra copies were forwarded to the Office of Technical Services, sales agency for AEC documents, for public availability.

5.7 *INFORMING THE PUBLIC: TRAINING FILMS AND EXHIBITS*

The earliest effort by the Technical Information Service to provide information to the general public through the use of films occurred during the 1951–1952 period, when TIS made available, on loan, training films on safe use of isotopes. Since 1946 the AEC had made available to hospitals, research establishments, and industry an abundance of radioisotopes for medical and research purposes.[8]

In collaboration with the Armed Forces Institute of Pathology, the AEC's Isotopes Division produced a series of technical training films entitled "The Radioisotope." Thirteen individual titles were produced, and through the distribution assistance of TIS, these were made available to requesters within and outside the AEC facilities.

As a training concept, the film series quickly became a highly popular technique that was adopted later by other AEC components. Training films developed into a major information program that was coordinated and managed by the Technical Information Service for more than two decades.

A traveling exhibit on atomic energy was viewed by more than 400,000 persons in 12 states in 1951. The exhibit, jointly sponsored by the National University Extension Association and the American Museum of Atomic Energy at Oak Ridge, emphasized peaceful applications of atomic energy and was shown both to school children and adults. Basic facts about the atom, radioactivity, uses of radioisotopes in agriculture and medicine, atomic-bomb effects, and prospects for atomic power were principal topics presented by means of lectures and exhibit tours.[2]

The Technical Information Service produced and published informational handouts for both the Museum and exhibit tours and answered public requests on exhibit topics mailed in from teachers, students, and the general public for the lifetime of the exhibit programs.

(See also Secs. 7.11, 9.3, 11.4, 13.10, 16.8, 17.1, and 18.6.)

5.8 SERVICING AND CONTROLLING CLASSIFIED DOCUMENTS

Three years of work and study by AEC Project Librarians culminated in 1951 with the issuance of an AEC policy directive on the servicing and control of classified R&D reports. As early as February 1948 librarians met to discuss matters relating to document control and accountability, and this topic was an agenda item on all successive Librarians' conferences.

In August 1949 the Technical Information Branch produced and distributed Report TID-249, *Manual for Servicing and Control of Classified Research and Development Reports,* which was given a standard distribution category for all AEC sites. On the basis of working experience of Project Librarians, the report contained methods and procedures designed to afford maximum use of classified reports consistent with essential security requirements. In March 1950 the document was redrafted for submittal, via the Technical Information Panel, as a proposed *GM Bulletin.*[12]

At the Ninth Panel Meeting,[13] it was announced that the *GM Bulletin* specifying policy for servicing and control of classified reports would be issued at the end of the year. Included in the Bulletin would also be a requirement for an annual inventory of classified documents on hand at each installation. *GM Bulletin 176,* dated 15 December 1950, was subsequently issued and distributed to all AEC Headquarters Offices, AEC Operations Offices, contractors, and transfer stations.

The Bulletin stipulated that the Division of Security had the responsibility for establishing standards, policies, and procedures to ensure that all reports were properly handled, safeguarded, and accurately accounted for; the Division of Research had responsibility for maintaining up-to-date standard distribution lists; and the Division of Information Services had the responsibility for the development of proper library procedures for the identification, transmittal, circulation, reproduction, accountability, and inventory of classified R&D reports held by reports accountability stations. In this regard the TIS had responsibility to coordinate and give staff supervision to the development and administration of servicing and accounting control over classified reports held by accountability stations and was required to (1) conduct periodic surveys and inspections for contractor and installation reports accountability stations, (2) prepare quarterly reports to the Division of Security on the condition of reports accountability, and (3) maintain a continual review of report accounting controls.

5.9 *REDUCTION IN TIS PUBLISHING STAFF/ REESTABLISHMENT OF MCGRAW-HILL BOOK COMPANY, INC., CONTRACT*

On November 28, 1951, with the exception of the printing section staff and a limited number of compositors and make-up personnel, all remaining members of the Editorial and Art and Composition Section staff were recipients of a letter which began: "The current work program of the AEC at Oak Ridge no longer requires the same number of personnel in certain types of positions. After careful review of staffing requirements for the remaining work to be done it has been determined that the number of positions in the competitive level which includes your position must be reduced or eliminated." Editors, proofreaders, illustrators, technical camera operators, machine compositors, make-up artists, and correction staff were all affected. The last day of active duty under federal service was December 29, 1951.

Concurrent with this notice was a verbal offer given by the Assistant Chief, Technical Information Service, to those undergoing a RIF. Such persons could be rehired in a non-federal service capacity under the renegotiated McGraw-Hill Book Company, Inc., contract. Work would be accomplished under essentially the same working conditions, in the same offices, for the same objectives, for essentially the same salaries, under the direction of the same personnel. Effective date of the new contract was January 1, 1952.

Primary objectives of the new contract were to complete the remaining NNES volumes (primarily classified); assist in the preparation of art and manuscript for all commercial books being undertaken by the Commission; and, most importantly, organize a program for the effective preparation, publication, control, and dissemination of the weapons effects program documents.

Carl B. Holmes was named chief of the new Contract Publications Group and William M. Vaden was named assistant chief. Comprising the new contract organization were the following sections: editorial, art and drafting, proofreading/composing, technical camera, and makeup. More than 40 persons were assigned or hired to the new group. The Contract Publications Group remained an essential and integral production entity, subsumed within the TIS structure, until close of business June 30, 1955. On this date the AEC's contract with McGraw-Hill Book Co., Inc., was terminated.

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ADVANCING TOWARD NEW INITIATIVES

CHAPTER 6

When Dwight David Eisenhower assumed the Presidency in 1953 he became the inheritor of one of the largest federal construction projects in peacetime history. The Korean War had focused attention on the need for a continental test site; this was ultimately established as the Nevada Proving Ground in the Nevada desert. President Truman had earlier decided to develop the hydrogen bomb; expand enriched uranium production capabilities at Oak Ridge, Paducah, and Portsmouth; increase plutonium production capabilities at Hanford; and build five heavy-water reactors at Savannah River in South Carolina. Contracts had been let for test facilities at the National Reactor Testing Station in Idaho and at the Oak Ridge National Laboratory for the development of an aircraft reactor. The Navy was also proceeding with work on a large ship reactor and on intermediate and advanced submarine reactors. For the accomplishment of these efforts, more than 3 billion dollars would be invested in the atomic energy program over a three-year period.[1]

The United States had also detonated the world's first thermonuclear device in the fall of 1952. The bomb received the code name Mike as a part of the Ivy series of tests conducted at Eniwetok. By the end of 1953 more than 30 test devices had been fired, either at the domestic site or in the Pacific Proving Ground.[1] Americans, for the first time, had been allowed to witness the explosive power of atomic weapons. Reporters, TV cameramen, science writers, and politicians were permitted access to the sites, which provided the opportunity for the world public to witness both directly and indirectly the awesomeness of this new source of energy developed only for destruction.[2]

The Commission, in reviewing for Congress the Atomic Energy Commission's (AEC's) activities for the first six months of 1952, reported on the successful operation of a new electronic digital computer, designed and constructed by staff members of the Los Alamos Scientific Laboratory. Called the MANIAC, the report stated: "Today, no one can say just why the name MANIAC was chosen, or what it meant at the time, but the machine's builders can provide some words to go with the letters and to describe the new computer: Mathematical Analyzer, Numerical Integrator And Computer. The MANIAC took 3 years to build. It is believed to be one of the smallest machines in existence capable of handling the complex problems it will be expected to solve. The machine can work 100,000 times as fast as a trained computer [sic] using a desk calculating machine."[3]

86 On May 26, 1953, the Commission issued a statement of policy on nuclear power development that began, "We believe the attainment of economically competitive nuclear power to be a goal of national importance. Reactor technology has progressed to the point where realization of this goal seems achievable in the foreseeable future if the Nation continues to support a strong development effort. It would be a major setback to the position of this country in the world to allow its present leadership in nuclear power development to pass out of its hands." A closing point to the statement related to the fact that, to attain the policy objective, full recognition should be given to the importance of reactor technology to the nation's security, and that a progressively liberalized information policy in the power reactor field be instituted as would be justified by increasing activity.[4]

On June 24, 1953, Lewis Strauss was appointed the new Atomic Energy Commission Chairman, replacing Gordon Dean. As he had promised during the Presidential campaign, President Eisenhower went to Korea. On July 23, 1953, an armistice was agreed upon, and hostilities with North Korea ceased.

With the advent of the Eisenhower Era in 1953, the Technical Information Service (TIS) soon began to receive signals that portended new directions for the AEC technical information program. Weapons testing would be intensified in forthcoming years with emphasis on civil defense. In sharp contrast to this nuclear testing program, however, would be the new president's initiative to promote the atom internationally for peaceful purposes. In December 1953, President Eisenhower would announce his "Atoms for Peace" program. Philosophically opposite in their descriptions, these new directions would impact all existing AEC technical information program activities and require that new programs be initiated.

Shown on the March 1953 TIS organization chart, as head of the Oak Ridge office, was Armen Gregory Abdian. The earlier title "Technical Adviser" had been dropped, and Abdian's new title was Assistant Chief, TIS(Oak Ridge). Abdian was named to the office vacated by Brewer Boardman, who resigned to head the technical information office at the National Reactor Testing Station, Idaho Falls, Idaho.

6.1 *INFORMATION PROGRAM REVIEWED FOR INDUSTRIAL APPLICATIONS*

Because there appeared to be an enormous potential to mankind in the harnessing of atomic power, much effort had been expended by the Commission to expose to U.S. industry the wartime research and development results on atomic energy in the hope that a transference of this technology to peaceful uses could be achieved. In 1949 an ad hoc committee had been appointed to advise the AEC on disseminating unclassified technological information to industry. In April 1952 this committee was reconstituted, expanded, and renamed the Advisory Committee on Industrial Information.[5] The purpose of the committee was to identify information of use to industry which should be submitted for declassification and to recommend arrangements for the widest possible publication and distribution of such declassified information. (See Sec. 4.5.)

To expedite the development of a uniformly effective technological information program on a Project-wide basis, an AEC Industrial Information Committee was established in 1952. Comprised of representatives from AEC operating divisions, operations offices, and principal contractors, its purpose was to assist the Commission staff in developing an information program to make unclassified and declassifiable technological information available to industry. Headed by Alberto F. Thompson as Chairman, the Committee was comprised of 35 members of AEC and contractor staff. For further facilitation of this program of assistance to industry, an Industrial Information Branch was established within the Division of Information Services, Washington, D.C. Named secretary to the Committee was Norman H. Jacobson, chief of the newly established branch.[6] The Industrial Information Committee set meeting schedules concurrent with Technical Information Panel meeting dates.

A letter dated May 28, 1954, from Information Services Director Morse Salisbury to industrial editors, reviewed technological developments in the atomic energy program of interest and use to industrial leaders.[7] Among the tools that had been supplied and made available by the AEC Division of Information Services to industrial editors was a special bibliography with titles selected from 9,000 unclassified AEC research and development (R&D) reports issued prior to July 1, 1953, that were considered of particular interest to industry. Also available was an updated monthly listing of selected AEC unclassified reports of interest to industry. For additional browsing, each of the 40 AEC Depository Libraries contained all unclassified AEC report literature available for inspection and use. Editors were also informed that any editor so desiring could reproduce and reprint any AEC report through arrangements made with the Industrial Information Branch.

A news release in 1954 issued by the Division of Information Services announced a new series of bibliographies, *Selected AEC Reports of Interest to Industry,* that had been compiled by the AEC to help industry judge its interest in non-secret literature which reported technology developed in the atomic energy program. The release stated that the new bibliographies and the depository program represented only part of the AEC's effort to pass on to industry unclassified techniques and processes developed within the atomic energy program that could contribute to technical progress generally.

Because industry was also convinced that nuclear power had great potential in meeting the world's future energy needs, the Advisory Committee sought ways to modify and simplify AEC policy for information access and to obviate other barriers to atomic industrialization that existed in the Atomic Energy Act of 1946.[5] These efforts contributed to the successful revision of the Act, the ultimate effect of which permitted the development of a civilian power reactor program and a more rapid industrialization of the atom.

6.2 *AEC DEPOSITORY LIBRARY SYSTEM ENLARGED*

As a part of the AEC's program to provide the U.S. public full availability of AEC document literature, it was decided in 1950 to establish library deposits of all AEC reports that were unclassified and declassified. (See Sec. 4.3.) Initially, it was believed that depositories, spread throughout the United States to correspond primarily to the metropolitan areas, would be the most desirable means to achieve this goal. Fifteen libraries had originally been considered as being a satisfactory number to allow appropriate public access.

The Resources Board of American Libraries of the American Library Association was asked to assist in naming the libraries and locations, and 31 libraries were initially selected. This number was determined to be too small, however, and the basic selection criteria were changed to include naming cities having a population of 500,000 or more and establishing at least one library for each state. Later, the AEC decided to add a depository collection at each U.S. university and college that had special reactor training programs. In 1953 the number of AEC libraries had grown to 42 libraries in 27 states; five years later the number had expanded to 79 AEC depositories.[6,8]

As a condition of receiving AEC reports, each depository agreed to maintain an up-to-date AEC reports collection and to provide free public access. Each depository received a subscription (as well as back copies) of *NSA* for reference purposes in addition to all other published unclassified TIS library and reference tools. Also supplied to AEC Depository Libraries were all back reports listed in *NSA* and all reports announced on a current basis, either as original printed copies or as microcards.

To provide industry with specialized materials, the AEC also set up in 1953 four special depositories. Depository collections for industry comprised some 700 nonclassified reports found to contain technological developments of special value to American industry that were not directly connected with the atomic energy program. Abstracts of these reports were published in a series of special bibliographies entitled, *Selected AEC Reports of Interest to Industry*—also made available at the depositories.

As an adjunct program, the AEC also began to allow unclassified AEC engineering drawings to be made available for inspection at the depositories. Later, this offering to all U.S. industry to review engineering drawings would develop into a major technical information program involving supplying copies of engineering materials to industry. The industrial depositories were located at the Atomic Industrial Forum, Inc., in New York City, the John Crerar Library in Chicago, the Stanford Research Institute, Stanford, California, and the Office of Technical Services, U.S. Department of Commerce, Washington, D.C.[9]

The establishment of the AEC Depository Library system permitted a unique and efficient means for the Technical Information Service Extension (TISE) Reference Branch to assist industry and the general public in responding to information requests. When TISE staff received requests to provide information on a particular subject, a response frequently given was that a depository library in the requester's city possessed a particular report (or reports) that contained the answer. Upon reviewing the report, the requester could either have it copied or he or she could purchase it from the Office of Technical Services. If the library was not in the requester's hometown, the address of the nearest depository could be provided. This type of prompt request service worked because it was known in advance that each depository was the recipient of the complete report collection. AEC depositories were not permitted to select shipments identified by special category—all reports announced in *NSA* had to be accepted.

6.3 *COORDINATE INDEXING: A PROPOSAL TO SIMPLIFY AEC CATALOGS*

From its inception, the TIS reflected a pioneering attitude toward seeking out and implementing efficient and economical systems and technologies that had promise of enhancing AEC technical information programs. Examples of early "cutting edge" technologies researched and employed by the TIS included cold-type composition involving specially designed typewriters; indexing by Electronic Accounting Machine (EAM) punch card equipment; creating specially formatted catalog cards that doubled as abstracts for announcement publications; designing and procuring demountable typebars to provide scientific and special symbols for technical composition; miniaturizing documents by photography; installing Thermo printers for quick copy reproduction; and transmitting text optically via telephone lines.

A strong motivator toward using modern technologies in the technical information program was Dr. Mortimer Taube, Deputy Chief of the TIS. Having served at the Library of Congress, Dr. Taube was particularly interested in technologies involving specialized indexing techniques and especially those having mechanization potential such as edge-punched and IBM cards.

Dr. Taube remained as Deputy Chief, TIS, until mid 1952, when he left federal employment to found Documentation Incorporated, a private information company established in the District of Columbia area.

A letter from Dr. Taube, dated February 16, 1953, and directed to his former colleague and boss, Alberto Thompson, details his enthusiasm for a new indexing concept that, he asserted, would simplify the problem of indexing and retrieving the rapidly growing AEC report literature.[10] Attached were copies of papers that summed up the advantages of "unit terms" that were employed in coordinate indexing. He reported in his letter: "On the basis of our results and experience thus far, we can state that the use of the Uniterm method of coordinate indexing by the Atomic Energy Commission and its contractors would result in a saving of at least 50 percent of the present expenditure for cataloging service and the maintenance of the card catalogs. Additional savings would accrue from the improvement in both quality and speed of references and bibliographic service."

Taube closed by saying that Documentation Incorporated had been contracted to catalog new Armed Services Technical Information Agency (ASTIA) documents in accordance with the Uniterm system. Concurrently, the Library of Congress (LC) intended to index the same information using conventional LC techniques. A segment of the material indexed by both systems would be compared, and the result, he felt, would prove his thesis. He ended by proposing an AEC study that would cover the AEC report literature, with the Panel being the final judge.

The use of Uniterms (descriptors)—an innovation in 1953—involved the same intellectual approach toward indexing and retrieval as one might later consider in structuring a large database system for online computer interrogation. However, the preparation of the index as proposed by Dr. Taube was intended to be created and used manually. The recommended use of Uniterms was directed to AEC card catalogs, which were becoming almost unmanageable and the bane of Project librarians. New subject headings were being continuously added, headings were frequently modified, literature scope and coverage continued to grow, and lags in the filing of backlogged cards existed in most libraries. Almost every Panel meeting gave some attention to this problem.

The idea suggested by Dr. Taube was therefore received with some guarded enthusiasm. As described in his letter: "Under the Uniterm system, the central office at Oak Ridge would be required to send out the present type of card carrying descriptive information and abstract; but the present type of subject heading would be replaced by unit terms. Each site would be expected to do its own posting and could, if it wished, use its own numbering system and handle its internal documents in the same system that it used for documents cataloged by the central facility."[10]

As further explained in a separate report, "A coordinate index card is prepared for each term used in the coordinate index. This card is divided into columns, indicated by digits 0 through 9. As reports are indexed, instead of filing cards behind a subject heading for each individual report, the number of the report is written in the appropriate column on the card."[11] Thus, to create the new index, the librarian would assign a number to each literature item being indexed, perhaps as provided by the central facility. Another option could be the use of a sequential numbering machine to uniquely identify documents in local files. When a particular document was to be indexed, the Uniterm card headings selected to index the document would be pulled and the document identification number written on the cards.

Conversely, when a literature search was being performed, cards with the indexing points that related to the search would be pulled and reviewed to determine which document numbers were in common for the reviewed cards. A coordination would occur in those instances where documents in common were recorded on the different Uniterm cards. For example, to search for effects of acids on steel, the cards for *acids* and *steels* would be pulled, and the posted document numbers appearing in common for each would be noted. Theoretically, this coordination would essentially ensure the appearance of information on the effects (corrosion) by acids on steel in the noted documents. Abstracts or other bibliographic data, incidentally, would be maintained in a separate file arranged by the accession number used in posting.

92 Today, when using online search techniques, Boolean search strategies are set up for the simple example given as well as for more complicated search aspects involving document exclusions.

Advantages cited by Taube were that Uniterm indexing would greatly lessen the number of conventional subject headings required and would reduce the space for the catalog to a size or area needed only for the number of Uniterm cards aggregated for posting documents. In addition to reducing cataloging space, maintenance costs would be lower and indexing consistency, he claimed, would be much improved.

At the Sixteenth Panel Meeting,[12] held at Las Vegas on March 26, 1953, the Library Committee, which had been given the responsibility of reviewing Dr. Taube's proposal, recommended postponing action on the proposal until the study for ASTIA was completed. Apparent disadvantages cited by the Library Committee were that scanning and browsing were impossible because posted entries and abstracts were in separate files, catalog size was decreased only in the subject area (report number and author files would remain the same for both systems), the proposed system was susceptible to greater human error when numbers were involved, false drops were possible, and a complete reindexing program by TIS and all libraries would be required.

For several subsequent meetings of the Panel, the topic of coordinate indexing versus conventional subject indexing was discussed, and Dr. Taube's idea was ultimately dismissed. Although this concept was introduced much too soon to be of practical value to the early AEC cataloging program, it was an idea well explored, and its potential usefulness known when, decades later, computers proved to be very useful tools for dealing with indexed data using descriptors or "Uniterms" for coordinate indexing.

6.4 *INDEXING GUIDELINES AND CATALOGING AUTHORITIES FORMALIZED*

With the establishment of a TIS Cataloging Board (upon recommendations of the Panel at its October 1952 meeting), monthly meetings of the Board were scheduled beginning in 1953 to examine policies, procedures, and products and to plan and effect improvements wherever need was apparent. Bernard M. Fry, Deputy Chief, TIS (Washington), provided consultative service. TIS (Oak Ridge) Assistant Chief Armen Gregory Abdian served as chairman, with Melvin S. Day, TIS (Oak Ridge) Deputy Assistant Chief, reporting on cataloging content. Other members of the Board from TIS (Oak Ridge) were Ewin B. Kiser, Everett J. Hoffman, Howard F. Gunlock, Mary H. Newman, Donald D. Davis, A. F. Blustein, Alden G. Greene, Charlotte F. Chestnut (Librarian), Paul E. Postell, Robert L. Morgan, and Margaret L. Pflueger.

Subject Heading Authorities. Chief among the projects receiving the Board's review was Report CA-1927, *Subject Headings Used in the Catalogs of the United States Atomic Energy Commission.* (The "CA-" prefix designates University of Chicago-originated documents.) Report CA-1927 had been created almost a decade earlier to record authorized subject headings for use in indexing nuclear science information for the University of Chicago Metallurgical Laboratory card catalog. The first edition, published July 1944, was titled *List of Current Subject Headings for the Indexing of Reports.* Both the original and first revision originated at the Metallurgical Laboratory, University of Chicago.

When the TIS was established in Oak Ridge, the card catalog that had been developed at the Metallurgical Laboratory was taken over as the base catalog for the new operation. Because CA-1927 had been developed as a register of subject headings for the card catalog, it was likewise acquired and accepted as a foundation for subsequent growth and expansion in the new AEC program. The second revision of CA-1927, dated January 1947, cites the Information Branch, Research Division, Field Operations, Oak Ridge, as the document's originator. The original title for CA-1927 (2nd and 3rd revisions) remained. Later, in February 1951 (4th revision), the title had been changed to *Subject Headings for the Indexing of Reports,* and by the sixth revision, the title became *Subject Headings Used in the Catalogs of the United States Atomic Energy Commission.*

To illustrate the growth of the heading authority, the first AEC (1947) publication of CA-1927 contained 71 pages; in five years the publication had grown to 574 pages and contained approximately 11,000 main headings and 1,100 subheadings. During this period, several revisions, supplements, and appendixes were also created with titles of these publications selected to fit specific technical areas (e.g., *Subject Headings for the Indexing of Reports for the RALA Process* and *Subject Headings for the Indexing of Reports on the PPF Process*).

Because the increase in headings reflected a proportionate expansion in all AEC Project library card catalogs, and hence workloads, TIS personnel were given the task of attempting to provide more utilitarian "authorities" for librarians' and indexers' use. The TIS Cataloging Board therefore rereviewed CA-1927 headings on a word-by-word basis, provided *see* and *see also* cross references, added *refer from* and *refer also from* references as appropriate, and provided cross references from subjects to ideas when considered of help to users. The TIS card catalog contained references to all research report literature, classified and unclassified. In the aggregate, it had security protection equivalent to Top Secret. Report CA-1927 had therefore been recognized as the authority for indexing and retrieving information for the total catalog program activity.

With the growth of unclassified information (particularly with the addition of journal literature), however, *Nuclear Science Abstracts* and other unclassified announcement journals (as well as unclassified card catalogs) began to require a separate authority as an indexing tool. For nonclassified literature purposes, Report TID-5001, *Subject Headings Used in the Catalogs of the U.S. Atomic Energy Commission* (containing subject headings extracted from CA-1927), was therefore assembled and published for unclassified information program needs. [Although unclassified and appearing with a different report number, TID-5001 retained the same title as the classified (6th revision) version of CA-1927 in its earlier printing.] Title variations, similar to those occurring in CA-1927, also occurred in the revisions to TID-5001. For the 1967–1971 five-year cumulative index to *NSA,* the title for TID-5001 was *Subject Headings Used by the USAEC Technical Information Center.*

Corporate Author Authority. In recognizing the importance of corporate authorship, the Board also attempted to organize and establish a uniform list of corporate entries for catalogers' and indexers' use. The purpose of a corporate author authority was to identify organizations doing research in the nuclear science field, standardize the format for recording organizations' names in bibliographic citations, and assigning a numeric code to facilitate data entry. A professional study of the problem was undertaken, and a full-time staff member was assigned the task. Drafts of proposed corporates were submitted to the Technical Information Panel Corporate Entries Subcommittee, and, as approvals were obtained, Report TID-5059, *Corporate Entries Used in Cataloging Reports by*

Technical Information Service, AEC, was created and subsequently published.[12]

Journal Title Authority. The TIS also adopted the *List of Periodicals Abstracted by Chemical Abstracts* as the basic journal abbreviation authority for use in preparing TIS bibliographic materials. It was felt that this was a universally accepted list, and through its adoption, inconsistencies in citing journal references in TIS products would be reduced. This list was gradually enlarged to include journals other than those cited in *Chemical Abstracts.* This listing eventually became the authority for cataloging all scientific periodical information appearing in AEC secondary announcement publications.[13]

These indexing and cataloging authorities became the foundation stones on which to establish other important Technical Information Center (TIC) and TIC-related programs requiring bibliographic control. For example, in 1952, in the building of TID-9000, *Weapon Data Index Subject Heading List,* relevant CA-1927 headings were incorporated in the new authority. The Euratom Thesaurus, which later became the base tool for creating the International Nuclear Information System (INIS) thesaurus, owed much to the *NSA* subject headings standardized in TID-5001. In addition to the subject authorities, the standardized corporate authors and journal listings were also made available and freely used for absorption and expansion into these and other more-specialized information programs.

(Additional information on *NSA* and the indexing program may be found in Secs. 3.8, 4.10, 4.13, 6.7, 9.12, 9.13, 10.11, 11.5, 11.13, 12.8, 13.3 to 13.6, 16.9, 16.13, 17.5, and 18.4.)

6.5 *REPORTS AND RECORDS ACCOUNTABILITY THROUGH CENTRALIZATION AT TIS OAK RIDGE*

In addition to the increasing dependence by Project Sites on the Oak Ridge TIS for guidelines, authorities, and general advice in indexing and retrieving AEC research and development results, the central TIS information activity was gaining importance and respect among the Sites for its archival responsibilities and actions as well.

In January 1954 the *Technical Information Bulletin*[14] reported that an estimated 1000 to 1500 unclassified copies of various reports were received and mailed by TIS, either automatically or on request, during each working day. The volume of classified report copies received and mailed each day was estimated at the same level. The scope of the document control activity embraced the receiving, stockpiling, distributing, inventorying, and accounting of documents. Besides managing documents in deleted, undeleted, printed, Photostated, or microcarded forms, the TIS document control center was also concerned with the distribution and filing of 3 to 4 million printed catalog cards each year.

For the distribution of the classified materials, approximately 850 addresses were maintained on IBM cards by an accountability records unit. Through the assistance of the Security Division, Oak Ridge Operations Office, the address list, with the exception of those listed in Report M-3679, *Standard Distribution Lists for United States Atomic Energy Commission Research and Development Reports*, was continuously updated. Receipts were prepared for each classified document transmitted. Approximately 150 receipts were prepared each working day, and during the month of June 1953, an average of 1164 classified reports was covered by these receipts.

In addition to retaining a master record showing all distribution and cataloging information for each classified and unclassified AEC report, stock copies of reports were maintained for subsequent distribution or for handling individual requests. Although efforts were made to keep stock copies to a minimum and storage related to the most popular and most recent reports, 160,000 stock copies were available for additional requests in early 1954. The TIS Master Copy Report File comprised about 60,000 classified and unclassified titles.

As an additional service to Project report libraries, the TIS publication, *Abstracts of Classified Reports (ACR)*, was used as an announcement instrument to inform all holders of classified reports of changes of report classification and downgradings. This information was provided to TIS by the Declassification Branch, and the announcement in *ACR* provided the authority for Sites to adjust the classifications accordingly in their report holdings.

AEC Bulletin GM-INF-3 specified that an annual TIS (Oak Ridge) inventory of classified R&D report holdings be accomplished. This requirement was met by a continuing inventory that required the full-time work of one staff member. Approximately 1000 to 1500 copies were inventoried each working day, depending on type and stock of documents being reviewed. A continuous destruction program was operated in connection with both classified and unclassified holdings. Monthly and quarterly reports of the status of holdings and unaccounted-for documents were provided to the Oak Ridge Operations Office Security Division and TIS (Washington).

6.6 *1953 PERSONNEL CUTS THREATEN TISE OPERATIONS*

On September 29, 1953, TISOR Assistant Chief Gregory Abdian advised all employees[15] that "For the first time we now have what appears to be a firm basis for planning operations throughout the remainder of this fiscal year. With the reductions in funds available for all activities financed by the Federal government, it was inevitable that the TIS at Oak Ridge would experience similar reductions in its funds. Originally, we had planned on 172 positions for this fiscal year; however we have now been informed that funds for personnel will be available to the following extent: 2nd Quarter, 160; 3rd Quarter, 156; 4th Quarter, 152."

After a discussion in his memorandum of additional threatened cuts by the Bureau of the Budget, Abdian concluded by stating: "I am counting on your good common sense to keep you alert to the dangers of rumor mills and mass hysteria. Although these personnel cuts may require some proportionate curtailment of certain phases of our past services, I am relying strongly on each of you to continue your individual efforts toward maintaining our reputation as an efficient and productive service agency."

As was often experienced by TIS (Oak Ridge) managers, here was voiced the exasperated concern by the manager where more service, greater production or output, and additional programs (on the horizon for implementation) must be accomplished with fewer personnel.

Tightening-up procedures to gain improved efficiency was one measure of the "front office" response to the problems of personnel deficits. During 1953–1954 "Technical Information Service Standard Operating Procedures" were introduced for all TIS (Oak Ridge) operational activities. Melvin S. Day, Deputy Assistant Chief, was designated the official to review and approve the written procedures for each activity. Each SOP was numbered and included a purpose, scope, background discussion, and procedure for accomplishing the objective along with detailed instructions.

In further refinements to the organizational structure, it was reported in the latter part of 1954 that the Administrative and Production and

Control Sections had been abolished and duties absorbed at the Branch Office level.[16] It was also reported that, on November 15, 1954, Robert L. Shannon had assumed responsibilities of Chief, Reference Branch, and Walter Koester, Jr., formerly Chief of the newly formed Weapon Data Section, was being transferred to the Production Division of the Oak Ridge Operations Office. Designated as Acting Chief was Thomas B. Abernathy, Jr.

6.7 NUCLEAR SCIENCE ABSTRACTS *VERSUS AEC PROJECT CARD CATALOGS*

Although requiring many hours of staff time and much management oversight, there were good and valid reasons for maintaining the AEC Project card catalogs. Catalogs for the larger sites were established primarily to provide access to Project report literature that was both classified and unclassified. *NSA* covered only unclassified information and included both report literature and citations to articles published in the "open" literature, such as journal articles, books, patents, and translations. To this point in time, *NSA* was only relatively recent in adopting procedures for indexing that used subject headings that were compatible with the card catalog. The card catalog was considered superior because of the browsing capability it afforded. The card catalog was also cumulated continuously; *NSA* cumulative indexes occurred only annually.

Nevertheless, with the problems of catalog maintenance already noted, there were constant inquiries among Panel members about ways to reduce the amount of staff work to keep a card catalog well maintained. It was also obvious that, although librarians desired perpetuating the catalog, a considerable amount of duplication was occurring in the publication of *NSA* and catalog cards.

It was on this issue that, at the October 5–7, 1954 Panel Meeting,[17] considerable discussion surrounded TIS's work involving catalog card preparation, printing, and disseminating. Several suggestions were offered for a possible reduction in this activity which, if modified, would affect considerably the work of others project-wide. Among suggestions considered were to provide fewer analytics on progress reports and to reduce the volume of catalog cards being distributed to the smaller sites. As stated in the Panel Minutes, "this latter proposal was predicated on the use of *NSA* by smaller sites in lieu of the card catalog."

The Library Committee pointed out that the annual cost of supplying cards for each card catalog was estimated at $1,441, an amount considered quite low when compared with the usefulness of the catalog as a reference tool. It was also noted that $71,000 would be expended if only one catalog were provided for internal TIS uses. Catalogs being serviced or maintained for AEC depositories or Project sites included 43 classified and 66 unclassified libraries.

Ultimately, as *NSA* was to improve its ability to cumulate its indexes more often and as the depository library community continued to grow—making the replication of a complete card catalog for each an almost impossible physical task—*NSA* would gradually replace the card catalog as the primary resource for the retrieval of unclassified nuclear science information.

(See also Secs. 9.12 and 9.13.)

6.8 *QUALITY LEVELS ESTABLISHED FOR EDITORIAL PROCESSING*

Owing to the widely diversified kinds of information introduced into the Contract Publications Group, it became necessary in early 1954 to set up editorial processing standards from which choices of varying degrees of editing quality could be stipulated by the requesting organization. Five classes of editorial treatment were described in a memorandum[18] dated February 15, 1954, from Carl B. Holmes, Chief, Contract Publications Group, to Melvin S. Day, Deputy Assistant Chief, Technical Information Service, Oak Ridge.

Class A was designated as the highest editing category. As described, 20 production steps were required from receipt of the manuscript to submission of completed made-up pages to the printer. Many of these steps included art preparation. At the lowest end of the scale (Class E) were documents requiring minimally explanatory front matter, the handling of obvious corrections, no made-up pages, and a request for printing. Between these extremes were Level B (basically the same as Class A, but a relaxation of certain steps), Level C (style sheets less comprehensive and styling inconsistencies permitted), and Level D (only limited editorial treatment, generally little more than copy marking). Each manuscript transmitted to the contract group was flagged accordingly by the supervisor receiving the document for processing.

Publishing highlights for 1954 included:

- Delivery by Commercial Controls Corporation of TIS's first Justowriter–Flexowriter machine.[19]

• A noting of the fact that TIS was a testing ground for and pioneer in the use of "white-out" for correcting typographical and page make-up errors. This correction fluid was supplied by Battelle Memorial Institute without obligation, and TIS's use of this product in all of its publication areas (i.e., machine composition, the Correction Unit, and in the Art and Drafting Section) proved its ultimate commercial value. In April 1954 Battelle informed TIS that this product would soon be marketed commercially as Snopake.[19]

• A visit by a representative of Records Service Corporation, Los Angeles, in late July 1954 to present specifications on an electronically controlled, automatic step-and-repeat camera that used 3- by 5-in. sheet film

for the production of microcards. Included was a titling device that permitted titles to be applied to negatives on which 36-page exposures had already been made. Equipment was also susceptible of making sheet film microcard negatives as well as positives; thus the door was opened for the efficient production of a later, optional version of the photo-miniaturized document known as "microfiche."[20]

6.9 *NEW NUCLEAR DATA COMPILATIONS IN* NUCLEAR SCIENCE ABSTRACTS

Because of the rapid growth of new nuclear data resulting from research during the decade of the 1950s, the TISE incorporated new nuclear data statistics as a part of *NSA* for a number of years. Beginning with *NSA*, Vol. 6 (1952), new nuclear data results selected and compiled by the Nuclear Data Group were published in the quarterly, semiannual, and annual indexes to *NSA*.

Heading the Nuclear Data Group publication project was Dr. Katharine Way, Oak Ridge National Laboratory, assisted by readers from offsite AEC projects. The Nuclear Data Group was sponsored by the National Research Council and supported by the National Bureau of Standards and the AEC.

Whereas items reported by the Nuclear Data Group were abstracted in the nuclear physics section of *NSA*, "New Nuclear Data" provided information on particular nuclei in tabulations on Radioactivity, Levels, Abundances, and Moments. This information was also prepared for printing on 5- by 8-in. cards that were collected into sets and sold through the National Research Council. More than 5000 nuclear data items were published in *NSA* during the 1952–1955 period; data on more than 1500 neutron cross sections were provided and 366 *NSA* pages were required for publication.[21]

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ATOMS FOR PEACE: SHARING INFORMATION AT HOME AND ABROAD

CHAPTER 7

Several features of the 1946 Atomic Energy Act were found troublesome to the Atomic Energy Commission (AEC) in its efforts to industrialize the atom and to strengthen cooperative ties with friendly nations associated with the atomic energy enterprise. Section 10 of the Act provided for a category of information referred to as "Restricted Data" that was defined to include nearly all atomic energy information of any security significance. Section 10 also prevented the dissemination of restricted data to foreign nations and required a full background security investigation of persons involved in the transmittal or receipt of restricted data.[1] The 1954 Atomic Energy Act was drafted to provide for various licensing regulations to permit the receipt, ownership, transfer, manufacture, and sale of nuclear materials. Also included in the draft were new procedures and rules for disseminating classified information and downgrading and declassifying certain specific areas of information.[2] Extensive areas of technology, such as the reactor field, could be declassified under the proposed 1954 Act; this allowed a broader sharing of information on nuclear science with American industry and with other nations.

Regarding technical information, the Atomic Energy Act of 1946 states that: " . . . The dissemination of scientific and technical information relating to atomic energy should be permitted and encouraged so as to provide that free interchange of ideas and criticisms which is essential to scientific progress."

In the Atomic Energy Act of 1954, the last phrase was expanded by Congress to go beyond scientific progress to include, as well, industrial progress, public understanding, and an enlargement of the fund of technical information. This obvious effort by Congress to modify its intent with respect to information emanating from atomic energy research resulted in vast changes within the AEC's public and technical information programs over the succeeding two decades.

7.1 NEW U.S. INFORMATION INITIATIVES EFFECTED THROUGH PASSAGE OF 1954 ATOMIC ENERGY ACT

With the passage of the 1954 Atomic Energy Act, the AEC's technical information program was vigorously expanded to accommodate United States' initiatives that resulted from President Eisenhower's "Atoms for Peace" speech to the United Nations General Assembly on December 8, 1953. In this speech the President proposed a pooling of nuclear materials that would be made available by "have" nations and a sharing of nuclear science technology with all peaceful nations. Revision of the basic Act authorized various actions in the international field that had previously been impossible.

Of the five major projects that the AEC undertook to develop within the President's Atoms-for-Peace initiative, all, in one respect or another, had an impact on the AEC's scientific and technical information program. As described in the Commission's Report to Congress for the January–June 1955 period,[3] they involved

- Negotiating and drafting an organizational structure that looked toward early establishment of an International Atomic Energy Agency (IAEA), as recommended by the President.
- Negotiating bilateral agreements for cooperation between the United States and other nations in the civil uses of atomic energy.
- Preparing for United States' participation in the International Conference on the Peaceful Uses of Atomic Energy, to be held in Geneva, Switzerland, August 8–20, 1955, under the aegis of the United Nations.
- Organizing and conducting United States' programs for training and orientation of students and professionals of other countries in the peaceful uses of atomic energy.
- Providing Atoms-for-Peace libraries of AEC-published reference materials on atomic energy development to other nations that desired such a collection of technical literature in this field.

On the domestic side, the Atoms-for-Peace Program also provided for U.S. civilians' access to hitherto embargoed information caused by classification rules. The Act of 1954 provided encouragement to private and public groups to build, own, and operate power reactors. On January 10, 1955, the AEC set up the Cooperative Power Demonstration Program under which industry and the AEC would cooperate in the construction and operation of experimental power reactors.

7.2 AEC RESTRUCTURED TO ACCOMMODATE PROVISIONS OF NEW ACT

In June 1955 the Division of Civilian Application was established to manage and administer the Commission's responsibilities relating to licensing and other matters pertaining to the civilian use of atomic energy under the Atomic Energy Act of 1954. Harold L. Price, Deputy General Counsel, was appointed director of the new Division.[4]

Under the revised act the AEC was also authorized to perform specific activities in the field of international cooperation to "promote the common defense and security and to make available to cooperating nations the benefits of peaceful applications of atomic energy." Because of the increased involvement in foreign matters, the Commission established, on November 13, 1955, a new Division of International Affairs, whose responsibility was "for developing and directing a program of international cooperation in the area of peaceful applications of atomic energy to the extent authorized by the Atomic Energy Act of 1954 and consistent with United States policy."[5]

Through the new International Affairs Division, technical advice and assistance would be provided to other nations, as authorized, through the exchange of technical and nontechnical reports, AEC libraries, special visits to the United States for specialized training, and the use of materials and equipment. John A. Hall, formerly Director of the AEC Office of International Affairs, was appointed Director of the newly established Division of International Affairs.

7.3 UNITED STATES OFFERS ATOMS-FOR-PEACE LIBRARIES TO COOPERATING NATIONS

The offer to make AEC report literature available to foreign nations was formally announced by Ambassador Henry Cabot Lodge to the United Nations on November 5, 1954. In his address, Ambassador Lodge stated: "Always mindful of the day when it might be beneficial to present the material in package form despite the fact that it has always been available in individual items, we have accumulated 10 complete libraries of our own material, which we are prepared to give to the principal technical libraries of cooperating nations. And we will provide more than 10 if there is a demand for more."[6]

To initiate the program to share atomic energy information internationally, it was necessary first to determine what interest, if any, existed on the part of other nations in receiving Atoms-for-Peace collections. As this interest became known and by working with the individual embassies and with the assistance of the Division of International Affairs, the Technical Information Service (TIS) was authorized on a case-by-case basis to make shipments to approved locations. To reciprocate, receiving countries were asked to provide similar technical materials produced in their countries to the United States. This information, if of value and in scope, would be abstracted and announced in *Nuclear Science Abstracts* (*NSA*).

The first all-depository foreign library was established in Japan, and shipments of materials to the Japanese Embassy began on December 14, 1954. Following Japan in the first half of 1955 were shipments to France, Italy, Spain, Peru, South Africa, Australia, Israel, Norway, India, Sweden, Argentina, Greece, Burma, Denmark, Austria, The Philippines, Egypt, and Conseil Europeen des Recherches Nucleaires (CERN). The conventional mode of transmittal was to ship materials in bulk to the American Embassy in the country receiving the collections; this allowed formal presentations when considered appropriate.[6] Each shipment was essentially identical and contained the following materials:

1,501 research and development reports (full size)
6,819 research and development reports (microcarded)
34 NNES volumes and case-bound books
11 volumes of *Abstracts of Declassified Documents (ADD)* and *Nuclear Science Abstracts*
22 miscellaneous handbooks, pamphlets, etc.
55,000 catalog cards for the research and development reports

A *Guide to the Atoms for Peace Document Collection*, prepared by the TIS staff to instruct depository librarians in the use, management, and housing of the supplied collection, accompanied all shipments.

For complete shipments to all libraries, considerable reprinting was required, particularly to replicate card catalogs. To maintain the currency of libraries, TIS supplied, gratis, new materials to all library collections as documents were released or announced in *NSA*. Eventually, the number of domestic depositories grew in excess of 90; foreign depositories averaged slightly fewer. Library totals fluctuated because of terminations and additions during the lifetime of the program. The program expired in 1968 when it became apparent that the essential functions of the program could be supplied through the services of the IAEA International Nuclear Information System (INIS).

7.4 FIRST GENEVA CONFERENCE ORGANIZED

The United Nations General Assembly, in December 1954, endorsed President Eisenhower's proposals both for an international agency and for the United Nations conference.[3] Dr. I. I. Rabi of Columbia University, and Chairman of the Advisory Committee, was selected to head the United States' delegation to the proposed conference. The conference, which was held in Geneva, Switzerland, August 8–20, 1955, was attended by 3600 scientists, engineers, world political leaders, and industrialists from 73 nations.[5]

The first reactor to be placed in operation in Western Europe was a pool-type reactor that had been built in a record time of three months by the Oak Ridge National Laboratory and flown to Geneva especially for the conference. It was the President, himself, who activated the reactor on July 20, 1955, in the midst of a Geneva Summit Meeting. The President used the event as a symbolic act to share with the world his hope that the properly controlled atom could provide an almost unlimited supply of economical power.[1]

The United States proposed allocating space at the conference for a technical exhibits area. In response, the conference authorities provided 15,000 square feet of floor space for a U.S. Atoms-for-Peace exhibit. As an assigned responsibility of the U.S. Information Agency (USIA), the exhibit provided display opportunities for models, reactor components, materials, and other technical aspects of atomic energy for the visiting delegates. To portray nuclear science in film, the United States also established a schedule of film showings based on a collection of seven films recorded in each of the four official languages of the United Nations. The films covered technical areas related to reactors, radioisotopes, chemistry, metallurgy, and biology and medicine.

Alongside the USIA technical exhibits area was the technical reference library assembled and shipped by TIS Oak Ridge (TISOR). It contained all the unclassified publications issued by the AEC. A cross section of scientific and technical journals and commercial books published in the United States, containing subject matter related to nuclear science, had also been collected for inclusion in the shipment. The assembled library was essentially the same as that provided to foreign depositories and included:

- The AEC depository collection (5,200 full-size printed reports)
- 55,000 catalog cards
- 11 volumes of *NSA* and its predecessor *ADD*

- 150 books furnished by commercial U.S. publishers
- 62 journals carrying articles on atomic energy
- Informational material describing the components of the U.S. exhibit (48 reports, 4 copies each)
- 7,000 microcards of AEC reports
- Two microcard readers
- Two sets of conference papers
- Complementary literature for the exhibit (estimated 17,000 items)

To supplement material presented in its technical and scientific papers, the United States presented to representatives of 73 nations and 8 United Nations agencies sets of "Selected Reference Material" that consisted of 8 volumes in blue and gold bindings plus an introductory volume. The introductory volume was published in the four official languages of the Conference and carried a dedication statement from President Eisenhower. Other volumes were *Research Reactors* (Volume I), *Reactor Handbook: Physics* (Volume II), *Reactor Handbook: Engineering* (Volume III), *Reactor Handbook: Materials* (Volume IV), *Neutron Cross Sections* (Volume V), *Chemical Processing and Equipment* (Volume VI), *Eight Year Isotope Survey* (Volume VII), and *Information Sources* (Volume VIII). Much of the presented information was comprised of TIS-originated materials, including the *Reactor Handbook* volumes that had been declassified from an earlier published classified edition. The declassified volumes were reproduced and rebound in new case bindings. Material represented in the *Information Sources* Volume was also a TISOR effort.

In addition to serving as a display, the exhibit also functioned as a working reference library for conference delegates.

On August 20, 1955, Dr. Willard F. Libby, vice-chairman of the U.S. delegation, presented the entire Atoms-for-Peace technical library to the United Nations Library in Geneva. In presenting the collection, Dr. Libby pointed out that the Library was a depository collection similar to those maintained in other countries and international organizations under the President's Atoms-for-Peace Program. As such, it would be kept up to date by the AEC, and all new unclassified published information that originated in the AEC program would be automatically provided gratis.[5]

Although all management and coordinating details relating to TIS-assigned projects associated with the Conference were the responsibility of TIS Headquarters, TISOR provided major publishing and printing assistance. TISOR also provided special library and reference help in identifying and assembling the U.S. technical materials used in the exhibits and the Technical Reference Library. Publications and print materials specified for the Library and U.S. exhibits were also packaged and shipped from TISOR.

In a postmortem statement summarizing the Conference, the report of the Official Representatives to the Secretary of State declared that the Conference had fully justified the money, effort, and time that the United States had invested in it, inasmuch as the President urged that this Conference should be followed by another to continue "this great beginning of international cooperation."[5] Believed to have been one of the most successful international technical gatherings in modern history, the "Geneva Conference" was to be repeated again in 1958, 1964, and 1971.

7.5 *INDUSTRIAL PARTICIPATION PROGRAM EXPANDED*

In its Seventeenth Semiannual Report to Congress, the Commission acknowledged that the new [1954] law recognized that industrial development of atomic energy, particularly nuclear power, could be accelerated by allowing access to restricted data of a low degree of sensitivity that was related to nonmilitary areas. Additionally, it was felt that the economy and efficiency of AEC operations, especially in construction, could be promoted without requiring the complete background investigation of every single worker. Accordingly, the Commission completed the necessary action to set up a new personnel security clearance category known as "L," for limited access.[2]

At the Twenty-First Meeting of the Technical Information Panel,[7] Edward J. Brunenkant, Chief, Industrial Information Branch, TIS Headquarters, reviewed the Civilian Application Information Program. He reported that some 325 firms had been granted special information access permits and that approximately 90 per month were being added.

The July–December 1955 Semiannual Report to Congress[5] described four initiatives introduced by the AEC for increasing the dissemination of information to industry: improving access to published documents, initiating a technological advisory service, writing and publishing documentary materials in areas relevant to industry, and providing access to Project engineering drawings.

Access to Published Documents. As an indication of the technical information program under development to supply relevant AEC reports to industry, a paper[8] was prepared for the Twentieth Meeting of the Technical Information Panel, April 8, 1955.

Submitted as an appendix to the Agenda, the paper reported that new technical documents prepared annually by AEC contractors, estimated at about 400 unclassified and 900 classified titles, would be made available to participants in the Civilian Application Program as they were printed. In addition, arrangements had also been made for review and selection for reprinting of a substantial body of data on reactor technology and basic research that the AEC program had generated since its beginning.

It was further reported that a complete set of all AEC technical reports outside the weapons field was maintained by the TISOR, including numerous compilations and bibliographic aids to these materials. Analysis of the report collection revealed that approximately 14,000 classified reports would very likely fall into the Confidential–Restricted Data category and that about 6,500 unclassified reports would be of interest to industrial groups.

Technological Advisory Service. Access permittees were notified of and encouraged to seek out the services of the Industrial Information Branch office staff. TIS Headquarters staff were made available to advise access permit holders on such matters as where work was being accomplished, who was doing the work, and what progress was being made in the various fields of interest to industry.[5]

Writing Program. In spite of the AEC's efforts to effect broad dissemination, it was also recognized that available resources were limited. To further assist industry, the AEC, through its Industrial Information Branch, planned a writing program calculated to bring together the best information on broad subject areas of importance to investors in the new atomic energy enterprise.[5]

Engineering Drawings. AEC report holdings (classified and unclassified) had been reviewed for possible Civilian Application Program interest, along with bibliographic tools, reference sources, and other aids, to allow American industry to gain access to AEC research and development information. Requests were beginning to come as well for access to AEC Project engineering drawings, specifications, standards, and related data. In early 1955 TIS began to study ways to provide effective and standardized procedures for making such information available within the Project on a scale as might be required.[9]

(See also Secs. 4.5, 7.9, and 9.4.)

7.6 *PLANS FORMULATED FOR RELOCATING TIS IN OAK RIDGE*

Working space provided by the Oak Ridge Operations Office (ORO) for TIS's reports receiving, filing, labeling, and disseminating operations became steadily more crowded as printing and distribution grew to fit the needs of the AEC's expanding research and development programs. Conditions became untenable, however, with the increased printing reflected by the newly developed Industrial Participation Program, activities associated with the Atoms-for-Peace libraries, and work required to print, assemble, and ship information materials for the Geneva Conference.

The printing plant had been allocated 6700 square feet of space in one ORO building, and the Document Control Section occupied 5700 square feet of space in a separate building. Having these two functions separated produced a cumbersome and uneconomical operation in terms of the extensive trucking involved, maintenance of dual mailing points, and the lack of flexibility in the use of available productive manpower.

On February 28, 1955, TISOR informed ORO of these warehouse space needs with warnings of continued programmatic increases.[10] It was suggested that the Supply Division consider relocating the printing plant, along with consolidated Document Control functions, in the warehouse area at the east end of the Oak Ridge Turnpike. Further, if all of TISOR's activities could ultimately be combined in this newly developed space, the move would free space in the ORO Administration Building where offices were much needed for expanding ORO programs.

The TISOR request was favorably received, and authority to initiate advance planning for this move was granted by the Director, Division of Production, on November 10, 1955. Included in the ORO budget for Fiscal Year 1957 were funds for relocation and consolidation of the entire TISE function (now renamed Technical Information Service Extension). The project would provide for the conversion of about 70,000 square feet into necessary offices, work and file areas, vaults, and other space requirements essential to TISE operations.

The plan and moving schedule were based on the assumption that, by June 30, 1956, final construction plans would have been completed by the architect-engineer and also, by that date, the portion of the warehouse building occupied by five other organizations would be vacated. Construction would start soon thereafter and would be completed about March 1957. Movement of TISE into the modified building would be in two phases. The planned move would involve, roughly, half the entire organization in each phase to maintain at least 50 percent productivity throughout the process. ORO agreed to assume the increased rental, utility, and other service costs for the final quarter of Fiscal Year 1957; thereafter TISE would budget for these costs.

In advance of the phased construction and move, however, approval was granted for that portion of Document Control involved with order handling and sales of industrial documents to proceed to move to Warehouse 1916-T-1. The physical relocation of this TISE unit to the proposed new location was reported in the Monthly Report of Operations for September 1956.

7.7 KEY EVENTS AND CHANGES IN TISE ORGANIZATION (1955–1956)

In early 1955 McGraw-Hill Book Company, Inc., contract employees were informed of a contract termination to be effective June 30. Employees were given encouragement that efforts would be made to rehire employees dislodged from the McGraw-Hill contract in comparable federal positions without loss of salary for those desiring to continue employment with the TISE.[11]

On May 11 a TISE announcement was issued to all employees informing them that various organizational changes were being planned. An Editorial Branch would be established to continue the technical editing function of the McGraw-Hill Book Company whose contract termination was impending. Other contract activities (art, illustration, composition, and drafting) would be integrated with the Art and Composition Branch. The Document Processing Branch would be enlarged to accommodate assignments and commitments arising from the Atoms-for-Peace and Industrial Participation programs. An Industrial Request Section would be established to provide customer relations service and to control physical aspects involved in the sale of reports to organizations in the Industrial Participation Program.

Prospective attendees to the Twenty-Second Panel Meeting were informed by a special note that, resulting from a review of the duties and responsibilities connected with the control of AEC classified information, the classified information control function performed by the Materials and Information Branch, Division of Research, was transferred to the Division of Information Services effective July 31, 1955. The Materials and Information Branch was renamed Classified Distribution Branch, with its information control duties and responsibilities substantially unchanged. Effective January 1, 1956, the Washington and Oak Ridge components of the Classified Distribution Branch were incorporated within the Technical Information Service. The purpose of the organizational realignment was to promote a more effective handling of closely related functions.[12]

In September 1955, Gregory Abdian, who had headed the AEC Oak Ridge technical information program since 1952, joined the Division of Organization and Personnel, AEC Headquarters, Washington. On October 28, 1955, Dr. Alberto Thompson, organizer and first director of the AEC's technical information program, resigned from the AEC to head the National Science Foundation's science information program. John Martens, greatly respected assistant to Dr. Thompson, who had also served since AEC's establishment, transferred to the Argonne National Laboratory.

In a memorandum to all TISE employees dated January 27, 1956, Acting Chief Melvin S. Day confirmed the reassignment of the Classified Distribution Branch. Personnel affected by the reorganization were John W. Norris, Chief; Robert C. Kelly, William B. Kenna; and Martha C. Mitchell.[13]

On January 29, 1956, the Engineering Materials Section, Cataloging Branch, was established. R. R. Brookshire, formerly with the ORO Engineering Division, was appointed Chief of the new Section.[14]

On February 6, 1956, Bernard M. Fry was appointed to the position of Assistant Director for Technical Information Service, Division of Information Service (formerly, the title was Chief, TIS). Fry had held positions at AEC Washington Headquarters since October 1947, when he transferred from the Oak Ridge Extension. At Headquarters he served as Chief Librarian, Deputy Chief of the Technical Information Service, and from November 1955 as Acting Chief, Technical Information Service. Prior to World War II, Fry was an instructor at the University of Virginia and worked in the Legislative Reference Service, Library of Congress. From 1943 to 1946, he served as an Army officer with the Manhattan Engineer District at Los Alamos and later at the Metallurgical Laboratory at Chicago. During the period 1946–1947, Fry served as a civilian employee with the Research Division, Oak Ridge.[15]

On May 15, 1956, additional key personnel changes were announced by Melvin S. Day in a memorandum to all employees. Robert L. Shannon, Chief, Reference Branch, was designated Acting Assistant Chief, TISE; Paul J. Blaetus, formerly Administrative Officer, was designated Assistant to the Chief, TISE; Paul E. Postell, in addition to his duties as Chief, Cataloging Branch, was designated Acting Chief, Reference Branch; Raymond L. Metter, formerly Production Control Officer, was designated Chief, Art and Composition Branch; William M. Vaden was designated Production Control Officer; and James H. Parks was designated Administrative Officer, TISE.[16]

Thomas B. Abernathy, TISE Weapon Data Section, left Oak Ridge on May 1, 1956, for an approximate six weeks' duty assignment to the Pacific Proving Ground where he served as Assistant to the Test Classification Officer for the Pacific Weapons Tests.

7.8 ENGINEERING MATERIALS PROGRAM ESTABLISHED

In setting up the Engineering Materials Section in the Cataloging Branch, TISE moved forward in designing a program that would facilitate industry's access to engineering materials originating in AEC research and development projects. In this function the new section began plans early in 1956 to centralize the cataloging, organizing, and announcing of engineering drawings, specifications, photographs, and supporting textual materials.

As a major responsibility of the Engineering Materials Section, engineering drawings acquisitioned by TISE were reviewed and indexed for announcing in a new periodical entitled *Engineering Materials Lists (EML)*. *EML* included, in abstracted format, descriptions of "packages" of drawings relating to devices, machinery, structures, etc. that were deemed pertinent to the new program. Each issue contained subject, corporate author, and number indexes patterned after *NSA*. [17]

The first issue of the unclassified *EML* announced approximately 30 packages of drawings and related materials. The cataloging of the 30 packages required numbering and assembling approximately 2000 individual drawings, specifications, and photographs.

In initiating this program, TISE began an effort that lasted as a formal sales and announcement activity for more than a decade.

7.9 SPECIAL ANNOUNCEMENT SERVICES CREATED TO BENEFIT INDUSTRY

In 1954 the TIS began a publication activity within the Atoms-for-Peace program intended to provide industrial organizations with positive access to project reports of direct industrial interest, as distinguished from reports covering developments in the scientific or theoretical fields. Entitled *Nuclear Notes for Industry,* monthly listings of abstracted unclassified documents were published and provided to all addresses managed by the Industrial Information Branch. Any organization interested in receiving these releases could apply for free access. *Nuclear Notes for Industry* continued as a service to the U.S. industrial public until April 26, 1957, after which, readers were requested to consult *NSA* where the identical information was published.[18]

A series of bibliographies, especially scoped toward industrial interests, was also compiled and released by the AEC to help American industry become better acquainted with the atomic energy program.

From about 9000 reviewed reports that had been issued prior to July 1953, about 800 were considered of particular interest to industry. These bibliographies, sold individually or in sets, were divided topically into Chemistry and Chemical Engineering, Construction and Civil Engineering, Mining and Geology, Electronics and Electrical Engineering, Health and Safety, Industrial Management, Mechanics and Mechanical Engineering, Metallurgy and Ceramics, and Nuclear Technology.[19]

7.10 *INTERNATIONAL ATOMIC ENERGY AGENCY CHARTERED*

The concept of an international atomic energy agency had been presented as one of President Eisenhower's Atoms-for-Peace proposals in his address before the United Nations General Assembly on December 8, 1953. A year later the General Assembly endorsed the idea, but the drafted statute was not submitted for conference consideration until September 1956.[20] At the United Nations Conference on October 23, 1956, the statute to establish the International Atomic Energy Agency (IAEA) was unanimously adopted. Representatives of 72 nations signed the statute after it was voted by the Conference in New York.[21]

Significant interaction between the TISE and the technical information program of the IAEA was destined to occur as a result of the establishment of the IAEA in Vienna, Austria. When the IAEA became recognized as an official United Nations institution, the United States authorized an AEC depository collection for the IAEA library. As a designated depository, AEC-distributed unclassified information was routinely forwarded to Vienna for depository updating. Through the initiation of the IAEA technical book writing program, an additional channel was provided for the production of scientific publications, and IAEA-sponsored international conferences became a prominent means for international technology sharing. Eventually, the concept of the International Nuclear Information System (INIS) would materialize into a healthy, functioning institution. INIS would establish *Atomindex*, and *NSA* would recede from the international stage.

7.11 *DOMESTIC ACCESS TO ATOMIC ENERGY INFORMATION BROADENED*

During the latter half of 1956, considerable progress had been reported on the Commission's program of establishing and operating traveling exhibits on the peaceful uses of atomic energy. Two types of Atoms-for-Peace exhibits were in operation on behalf of the AEC. Operated by the Oak Ridge Institute for Nuclear Studies, they consisted of a large exhibit requiring about 5,000 square feet of floor space for displays and a smaller module that could be set up in a truck trailer. Exhibits were available rent-free and were prepared and scheduled for widest possible showings to adults and for junior and senior high-school students. During the Fall of 1956, five of the smaller mobile exhibits were being utilized, primarily for rural and small urban areas.[20] (See also Sec. 11.4.)

Between January and December 1956, motion picture films on 60 atomic energy subjects had been loaned to the public for 9,913 showings. An estimated 400,000 persons had viewed the films.

In the new writing program, 21 new volumes were in preparation, with plans for six additional books covering fields of interest mainly for the AEC Civilian Application Program. Works proposed included an *Atomic Energy Fact Book*, a monograph on *Reactor Control and Safety*, a *Handbook on the Production of Uranium, Handbook on Waste Disposal, Fuel Fabrication Techniques*, and *Recovery and Beneficiation of Uranium and Thorium Ores*. A monograph series of texts of special interest to industry was also being planned.[21]

The "Industrial Atom" series of nonclassified monographs was established to present articles of current industrial interest which could be made available for sale through the Office of Technical Services. Within the area of industrial applications, the Commission initiated, in 1956, a new program designed to summarize the literature reported in certain atomic energy fields. Called Technical Progress Reviews for quarterly issuance, they were established to update subscribers with the most recently reported or discussed information on the covered topics. Categories included reactors, radiation applications, instrumentation, spent fuel processing, raw materials, feed materials, fuel element fabrication technology, radiation safety, and nuclear physics. The first issue of a Technical Progress Review (on Radiation Applications) was scheduled for publication in early 1957.[20]

In addition to the growing AEC unclassified depository library program, the Commission authorized the establishment of six classified depositories to be located in areas reasonably accessible to access permit holders. An especially designated reference center for government-generated information on atomic energy (classified and declassified) was established within the TISE Reference Branch. To assist access permit holders and industry in obtaining information from the archived information at TISE, a literature search service was initiated. A charge of $6.00

per hour was levied for this service. At the end of calendar year 1956, more than 1,100 permits had been issued; thus a greatly expanded customer relationship with the TISOR was established for purchase of classified information.[22]

A new monthly abstract journal entitled *Civilian Applications of Atomic Energy: A Classified Abstract Journal (CAAE)* was also established for the benefit of the Civilian Application Program. The first issue was dated July 31, 1955.

(See also Secs. 5.7, 9.3, 11.4, 13.10, 16.8, 17.1, and 18.6.)

7.12 *AEC MANUAL CHAPTER 3201 "REPORTING AND DISSEMINATION OF INFORMATION" DRAFTED*

Panel members attending the Twenty-second Panel Meeting held at AEC Headquarters, Washington, February 27–29, 1956, were requested to be ready to discuss a proposed AEC Manual Chapter on contractor reporting. The proposed draft stated AEC policies, responsibilities, and procedures for the reporting and disseminating of scientific and technical information that resulted from research and development work supported wholly or in part with AEC funds.[12]

Included among the responsibilities of the Director, Division of Information Services, were

- Developing AEC-wide policies and procedures for the preparation, handling, and dissemination of scientific and technical information
- Maintaining liaison with Headquarters Divisions and Offices in the development of criteria for evaluating the effectiveness of contractor reporting and dissemination of information resulting from AEC research and development activities
- Advising Managers of Operations with respect to promptness, adequacy, and completeness of contractor reporting on research and development work
- Following closely contractor reporting on research and development work and making recommendations to Managers of Operations for additional or modified reporting where necessary to fill in information gaps of interest to the AEC
- Preparing technical briefs in areas of research and development, reporting where the editing of existing reports for wide dissemination is not practicable
- Arranging for the preparation of new handbooks and compendia, condensing into compact and usable form information existing in separate collections of documents

• Administering the technical information operations and service required of the Division, in particular the programmatic and planning activities assigned to the Headquarters Office and the service operations assigned to the Oak Ridge Extension. (Services supplied by ORE included maintenance of a central file of research and development reports, reproduction and distribution of reports as required, preparation of abstracts, indexes, bibliographies, etc., and provision of a reference service, translation service, document control service, and consulting service.)

Managers of Operations and Heads of Divisions directly administering contracts were cited as being responsible for assuring that contractors under their jurisdiction prepared and submitted reports fully and promptly and were "expected to seek the advice and assistance of the Division of Information Services in planning and carrying out measures to assure the effective operations of contractor report issuance systems."

Although Manual Chapter 3201 was modified slightly from time to time to reflect programmatic emphases, this original draft contained the primary essentials used in guiding information program managers during the lifetime of the Atomic Energy Commission.

7.13 *READEX MICROPRINT ATTEMPTS MARKETING OF AEC R&D INFORMATION*

Under contract AT(40-1)-2035, Readex Microprint Corporation, headquartered in New York, on February 23, 1956, began to film all AEC reports that were announced in *NSA*. TISE made available work space for camera, operator, and equipment required by the company to accomplish filming. Microcopy cards measuring 6 by 9 in. were produced for sale by Readex Microprint. In a letter from Bernard M. Fry, Assistant Director for Technical Information, dated February 15, 1956, published as a Foreword to the Readex Microprint Corporation catalog, it is stated that, "We believe that your proposal to Microprint the published literature would prove to be an unusually effective vehicle for making available microcopy of all unclassified information in the National Nuclear Energy program." However, after a number of months' production with indifferent sales, Readex suspended its microprint filming program as an unprofitable enterprise.

7.14 *DECLASSIFICATION ACTION ACCELERATED FOR CIVILIAN APPLICATION PROGRAM*

A "Crash" declassification program, inaugurated to provide more prompt access to Project reports that were considered pertinent to the

Civilian Access Program, resulted in a large number of older reports being made available for public announcement and release. The decision of the Technical Information Panel on processing these older reports, as reported in the "Notes on the Agenda for the 23rd Meeting"[23] was to list these reports in supplements to regular *NSA* issues. Abstracts in these supplements were numbered consecutively with those in the regular issues to facilitate uniform bibliographic control. Author indexes and report number indexes for these reports were included in each regular issue; subject indexing was included only in the regular semiannual and annual index issues, however.

Publication of the classified journal *Nuclear Science and Technology* was discontinued because of a lack of contributions from Project sites. The problem was caused by the liberalized policy on declassification that reduced the numbers of articles that could be chosen for a classified publication. The editors recommended discontinuance of publication after the December 1956 issue.[23]

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INFORMATION SUPPORT SERVICES FOR WEAPONS TESTING PROGRAM

CHAPTER 8

As earlier reported, unclassified weapons effects information had been received by the Technical Information Service since Operation Greenhouse for announcement in *Nuclear Science Abstracts (NSA)* and for general public availability (see Sec. 5.4). As was the case for routine Project-associated research and development reports, these weapons effects reports required abstracting, indexing, and cataloging. When insufficient printed copies were received, additional copies were reproduced for the stipulated distribution requirement.

Subsequent to the Greenhouse Series, Los Alamos Scientific Laboratory requested and received editorial assistance from the Technical Information Service Extension (TISE) to bring together the various reports and technical notes relating to the Project Ranger series of tests held at Nevada Test Site, January–February 1951. This publications assignment, completed in 1952, required the editing, composing, and printing of the first complete series of weapon test reports assigned to TISE.[1,2]

As shown in the TISOR Organization Chart for March 1953, a Weapon Data Section, headed by Walter Koester, had been established for the official receipt and handling of weapon data information. The Weapons Data Section reported to the Chief of the Special Projects Branch, then headed by Robert L. Shannon.

Initially, indexing and reports reproduction and dissemination were the two principal TISE activities associated with the weapon test report program effort.

In a letter dated November 27, 1953, from Brigadier General K. E. Fields, Atomic Energy Commission (AEC) Director of Military Application, to Morse Salisbury, Director of Information Services, authorization was given for the Division of Information Services to provide services for editing, composing, printing, distributing, and controlling all weapon test reports, regardless of sponsoring agency, including Foreign Weapon Effects reports.

8.1 *WEAPON TEST REPORTS REPRODUCTION AND ISSUANCE*

The Division of Technical Information provided overall guidance for the preparation of reports resulting from the U.S. atomic weapons tests. Report editing, composing, printing, and distribution to authorized AEC/ Department of Defense (DOD) recipients were accomplished at the Division of Technical Information Extension (DTIE). With the exception of the first two overseas test operations, reports emanating from all other aboveground tests were processed by the Extension. These reports were issued in three categories: Interim Test Reports (ITR), Weapon Test (WT) Reports, and Project Officer's Reports (POR).[3]

The ITR publications were preliminary reports based on all data available at the close of a given operation and were subject to change upon completion of the test evaluation. After a thorough evaluation of the test results, final reports were issued in the WT series. Later, beginning with the 1962 series of tests, DOD-sponsored final test reports carried Project Officer's Report (POR) numbers. These reports were also published and distributed by DTIE.

Certain other weapons effects reports, received by the AEC from the United Kingdom and Canada under the Tripartite Agreements between the United States and these countries, were reproduced by DTIE. These Foreign Weapon Effects (FWE) reports were distributed to the AEC/ DOD agencies in the same manner as other WT reports.

In addition to the report series described, DTIE also reproduced and distributed Civil Effects Test Operations reports. These reports were issued in the Civil Effects Exercises (CEX) series. A series of reports concerning tests to determine the peaceful uses of nuclear explosions (PNE series) were also published and distributed by the Extension. All these reports were announced in *NSA* and *Abstracts of Weapons Test Reports* and were included in the Weapon Data Index.

The weapon data information program continued through 1970 but reached its apex during the middle 1950s and early 1960s. During this period more than 3000 reports, many marked with the highest security classification, were produced and distributed by DTIE. Reports were reproduced on the average of 300 copies for each printed title, some requiring as many as 900 printed copies for complete distribution.

In addition to standard distribution accomplished from published lists in each titled report, supplemental distribution was continuously being provided to Project Sites by DTIE. The TISE management, in reporting on activities for a typical month (November 1958), stated that during that one month 104 requests were filled; this brought the cumulative total for 1958 to 4355 copies distributed on supplemental distribution. In 1957 a total of 3285 copies was distributed, 3340 copies in 1956, 4404 copies in 1955, 2256 in 1954, and 2168 in 1953. Prior to 1953, 323 copies were distributed.[4]

Besides producing weapon test reports for distribution, DTIE also printed and distributed catalog cards corresponding to the reports being added to weapons data libraries. More than 1,100,000 cards had been printed and made available to the Cooperative Weapon Data Indexing Committee members as of May 1958.[5]

8.2 *JAWTIG GROUP STRUCTURE*

A Joint Atomic Weapon Technical Information Group (JAWTIG), representing all participating federal agencies and their contractors involved in the testing program, was formed as an interagency group to oversee and coordinate this information activity. JAWTIG, as described in *Weapon Data Indexing Manual* (TID-9037) (Rev. 2), was composed of AEC/DOD activities having prime responsibility for a major phase of the national atomic weapons program. Membership was held as stable as possible and included both supervisory personnel with authority to speak for their respective organizations and personnel directly concerned with indexing the reports. Organizations having JAWTIG membership were AEC Division of Military Application; AEC Division of Technical Information; AEC Division of Technical Information Extension; Air Force Weapons Laboratory; Bureau of Naval Weapons, Department of the Navy; Defense Atomic Support Agency, Field Command; Defense Atomic Support Agency, Headquarters; Joint Atomic Information Exchange Group; Lawrence Radiation Laboratory, Los Alamos Scientific Laboratory; Naval Ordnance Laboratory; Picatinny Arsenal; Sandia Corporation, Albuquerque; and Sandia Corporation, Livermore.

It was agreed that the DTIE representative would serve as secretary of JAWTIG to facilitate a close liaison between JAWTIG and DTIE as JAWTIG's publishing and printing agency.

The AEC Division of Technical Information (DTI), Washington, was appointed as the responsible agent to act for the interests of the Group in relation to outside agencies and organizations. This office was responsible for the recognition and formalizing of the Group. The DTI also acted as a facilitator for cooperation between the JAWTIG and the AEC indexing and abstracting services. In addition, it provided a link between the JAWTIG and the Division of Military Application, AEC.

Outside the AEC structure, DTI also provided liaison with indexing and abstracting services of other federal agencies. JAWTIG required occasional, and sometimes frequent, contacts with the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), Clearinghouse for Federal Scientific and Technical Information (CFSTI), Committee on Scientific and Technical Information (COSATI), and Defense Documentation Center (DDC). In some cases the need for coopera-
tion could extend beyond government agencies to include technical societies, engineering associations, and commercial organizations.[6]

8.3 *WEAPON DATA ABSTRACTING AND INDEXING*

Established to control the atomic weapon literature, the weapon data index was comprised of information related to the design, development, manufacture, storage, utilization, characteristics, performance, and effects of atomic weapons or components thereof, including thermonuclear weapons.

In guiding indexers in the selection of information considered appropriate for inclusion in the index, the Committee agreed[4] that the following areas were likely to contain information of significance:

- Areas directly related to atomic weapon studies, development, or application.
- Areas directly related to or undertaken as a part of the operating weapon program of atomic weapon agencies.
- Other areas of interest to the group as a whole in connection with the overall weapons program.

8.4 *TOOLS FOR WT CATALOGING AND INDEXING*

Much committee work surrounded the standardization of terminology for use in indexing and retrieving weapon data information. A comprehensive list of subject headings was developed to be used as a tool for indexers and was titled *Weapon Data Index Subject Heading List* (TID-9000).

The first formal meeting of the Cooperative Weapon Data Indexing Committee was held at Sandia Corporation in July 1951 to review and consider a preliminary subject heading list compiled by the Technical Information Service. By the end of the meeting, a revised and greatly enlarged list had been compiled together with a list of indexing principles. Initially distributed as Report WASH-69 as a preliminary set of subject headings, it was officially issued in September 1952 as the first edition of TID-9000, *Weapon Data Index Subject Heading List.* The following month the recently issued TID-9000 was compared by the Indexing Committee with headings appearing in CA-1927, *Subject Headings Used in the Catalogs of the United States Atomic Energy Commission.* The review was considered important in view of the need to include relevant "fringe material" in the index that might require subject headings not necessarily found in

TID-9000.

After many years of committee review and refinements, which included the gradual incorporation of nomenclature from participating members, the authority for indexing weapon data became a responsibility of DTIE. To help the indexer in selecting the most nearly applicable subject headings, extensive cross references, limiting statements, and definitions were included in TID-9000.

Report TID-9000 is recognized as being a glossary of defense-related code words, projects, and programs plus definitions. As such, it is an encyclopedia for the DOE/DOD weapons program and contains approximately 15,000 defined terms. Program Analyst Larry T. Whitehead, in the capacity of Defense Programs Coordinator for the Weapons Data Steering Committee, has had the editorial and publications responsibility for revising and disseminating TID-9000.

In addition to the Subject Heading Authority, WTI-14 *Corporate Entry Authority and Report Series Codes Used by the AEC/DOD Joint Atomic Weapon Technical Information Group* was issued by TISE as an authority for cataloging weapon data information.

8.5 *THE WT CARD CATALOG, ANNOUNCEMENT JOURNAL, AND OTHER PRODUCTS*

The weapon data index was comprised of catalog cards that contained complete bibliographic information and abstracts of the reports to which they pertained. Cards were produced by TISE for filing by subjects, personal authors, corporate authors (issuing organizations), report numbers, and contract numbers. The 3- by 5-inch cards were standardized in format to correspond to the AEC catalog. The catalogs were maintained at a limited number of installations that possessed legitimate requirements for the information contained in the index. Twelve organizations were authorized to maintain weapons data catalogs.[3]

Under the cooperative indexing program, all participating organizations indexed the reports prepared under their jurisdiction and then submitted the manuscript to DTIE for coordination, reproduction, and issuance. The Extension performed the indexing and abstracting for the reports.

Abstracts of the weapon test reports were included in the journal *Abstracts of Weapon Test Reports (AWTR)*, which was issued semiannually and distributed to the approved AEC/DOD installations. The journal contained author, report number, project number, and subject indexes to all weapon test reports abstracted in the journal. The first issue of TID-9050, *Abstracts of Weapon Test Reports*, was dated January 31, 1957, and was classified Secret, Restricted Data.

The DTIE also issued a bimonthly bulletin to all participants in the interagency indexing program. Included in the *Interagency Weapon Data Indexing Bulletin* were proposed and approved subject headings and other information of general interest to the overall program.

Also issued by DTIE were monthly status reports on the production of WT reports; and, from time to time, special WT bibliographies were prepared upon request of the participating parties.

A modern counterpart to the catalog is Classified Energy Online (CLEO), a multiuse, interactive computer system maintained by the Office of Scientific and Technical Information (successor agency to DTIE) for authorized DOE weapon data users.

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THE SECOND DECADE: MOVING TOWARD THE ATOM'S DOMESTICATION

CHAPTER 9

The end of the Atomic Energy Commission's (AEC's) first decade (1947–1957) found a public constituency strongly supporting the development of the atom for peaceful purposes. Much of the American public now believed that atomic energy could be used as a positive force that could help preserve world peace, provide mankind with an economical and unlimited source of energy, and assist in reducing world misery through the use of isotopes in biological and medical research. Complementing these public beliefs were the well-nurtured research and development programs being carried out by the AEC in its national laboratories and through hundreds of contracts to U.S. industrial organizations and universities.

A portion of the AEC's favorable image could be credited to the positive efforts of the AEC to bring to the public basic facts and general information about nuclear science that would reduce the mystery associated with the atom. In support of these efforts to better inform the public and to promote a more rigorous domestic research capability, the AEC's second decade found an information program broad in its coverage and vigorous in application.

9.1 *NEW LOCATIONS SELECTED FOR TISE AND AEC HEADQUARTERS OFFICES*

The Year 1957 was a period of significant change for the AEC and the Technical Information Service. Oak Ridge and Richland were well on schedule toward becoming self-governing cities. In Oak Ridge, 87 percent of housing property offered by the U.S. Government had been sold, and the Tennessee Legislature was preparing legislation under which the city could incorporate.

A recently built AEC warehouse building, renovated to accommodate the operational and office needs of the Technical Information Service Extension (TISE), was now ready for occupancy. Provided by Oak Ridge Operations Office, engineering planning for the modified structure had been started in 1955. The new TISE quarters included space for warehousing printed copies of reports furnished by Project sites as well as informational materials produced by the local printing plant. Also accommodated in the newly adapted structure were storage vaults for classified operations and offices sufficient for all remaining operational activities. TISE completed the move to its new location at the east end of Oak Ridge Turnpike on June 30, 1957.[1] (See Fig. 9.1.)

Atomic Energy Commission Headquarters offices began planning an official move to a new 400,000 square foot site at Germantown, Maryland, some 23 miles northwest of Washington, D.C. To facilitate the transition of Headquarters' employees from Washington, D.C., to their new rural location, TISE published *Relocation Manual, AEC Washington,* comprised of 118 pages. Prepared at the special request of the Division of Organization and Personnel, a print order of 5000 copies was placed for printing at TISE facilities to allow all Headquarters employees to have copies available in March 1957, well in advance of the moving date scheduled for January 1958.[1,2]

9.2 SPUTNIK *APPEARS*

On October 4, 1957, a startling technological feat shocked the entire U.S. scientific community. Its effect on the political, industrial, and educational strata of American culture reverberated among scientists, educators, and lawmakers for decades. Americans, who had come to view U.S. science as being unmatched by any other nation, found that *Sputnik,* the first satellite in history to be placed into orbit around the Earth by man, was an achievement of Soviet science and technology.

The reaction of the United States to *Sputnik,* as stated by Hewlett and Holl, was "a feverish effort to improve the nation's scientific and technical capabilities, all the way from restructuring secondary school education in the sciences to giving scientists a stronger voice in the highest policy councils of the Federal government. During the last three years of the Eisenhower Administration, the special assistant to the President for science and technology and the President's Science Advisory Committee gave scientists and engineers the greatest influence on national policy decisions that they have enjoyed before or since."[3]

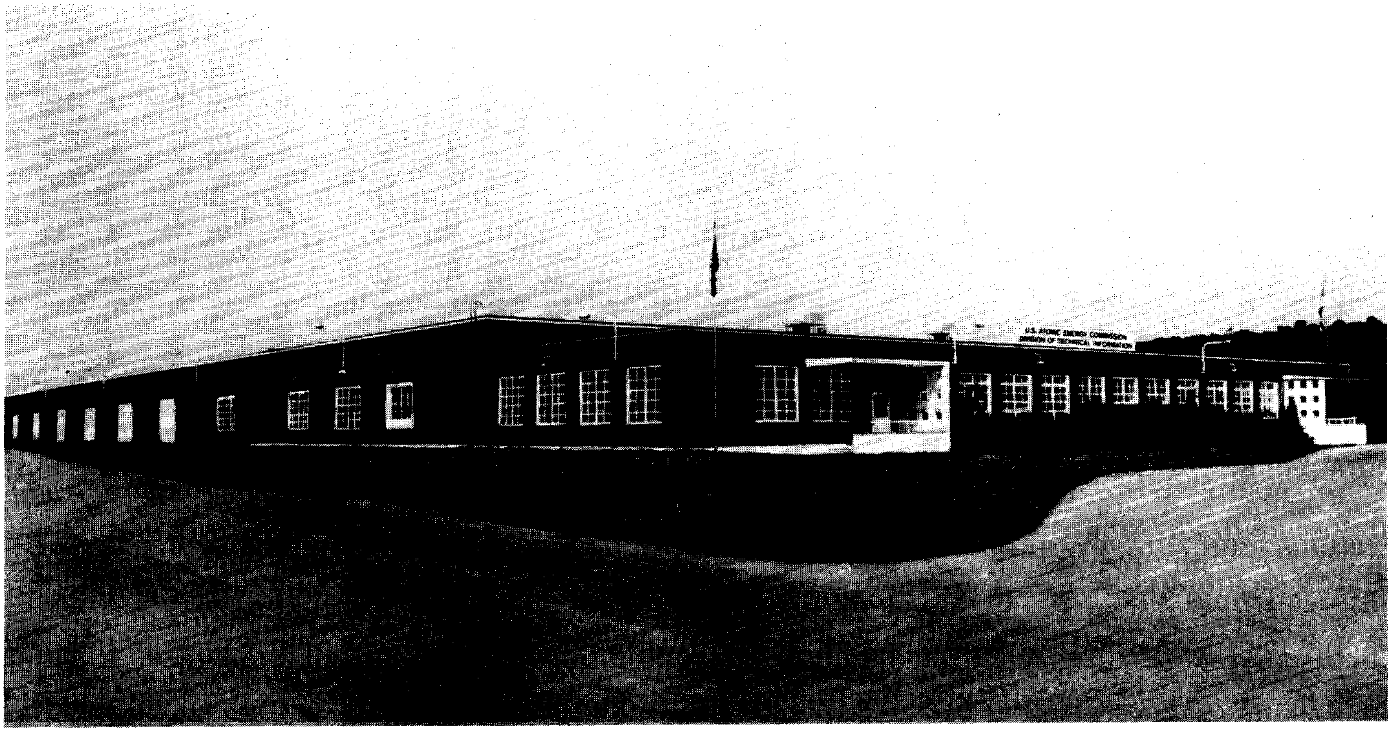

Fig. 9.1 The AEC Technical Information Center building, southeast view (1970s).

9.3 *AEC TECHNICAL INFORMATION PROGRAMS SET FOR THE PUBLIC*

If *Sputnik* were to become a dominant influence in the development of strong science and research programs in U.S. government installations, it could only have accelerated what was already established and working within the AEC. At the beginning of 1957, the Commission had a number of educational and informational programs firmly in place. As measured from the previous year, an estimated three million persons had viewed the traveling Atoms-for-Peace exhibits. Three large exhibits (86 panels each) and eight truck-housed exhibits were continuously booked by American civic, industrial, and educational institutions. Twelve regional motion picture libraries were now maintained by the AEC, and films had been loaned for over 7,500 showings to an audience estimated at approximately 415,000 persons. Information kits had been distributed to high school students and teachers in response to inquiries; these had exceeded 2,000 a month.

A "traveling teachers" program had been inaugurated the previous summer under the sponsorship of the National Science Foundation with support by the AEC. All 48 states and the District of Columbia had been visited by personnel of the Oak Ridge Institute of Nuclear Studies which conducted the program. From these school visits, requests for information, elicited by teachers and students, were serviced by the Division of Technical Information Extension (DTIE). For the first half of 1957, more than 11,000 kits of published materials had been distributed to elementary and high school students and teachers, more than doubling the number of items requested for the previous six-month period. To increase the supply of scientists and engineers for nuclear science research projects, the Commission established an Education and Training Program that included the provision of grants to help equip college and university laboratories.[1,4]

Domestic depository libraries serviced by the AEC totaled 79 at the end of 1957, with collections now available in every U.S. metropolitan area of 500,000 or more. Each depository was being continuously supplemented with current AEC research and development (R&D) literature and bibliographic tools from the TISE. In addition to the public's access to AEC research and development reports through the Depository Library System, sales of reports were accomplished through the Office of Technical Services, Washington, D.C., the Government Printing Office, and (when microcarded) from the Microcard Corporation.

(See also Secs. 5.7, 7.11, 11.4, 13.10, 16.8, 17.1, and 18.6.)

9.4 ADDITIONAL TECHNICAL INFORMATION RESOURCES CITED FOR INDUSTRY

To transfer technology of value to U.S. industry and to promote the "industrial" atom, special programs of assistance had for many years been inaugurated to facilitate access to Project research. As previously stated, libraries containing results of the AEC's declassified and unclassified laboratory research were made accessible to the entire U.S. public through the AEC Depository Library System.

To further assist industry, the Commission by the end of 1956 had completed an accelerated review of classified documents on the basis of a revised 1955 declassification guide. Almost 11,000 of 30,000 reviewed documents were declassified, with 8,000 more being downgraded. A subsequent declassification guide, developed later in 1956, resulted in removing from security restrictions nearly all industrial information but maintaining safeguards over military information. A planned second accelerated review of remaining classified material was announced.[4]

By 1957 year's end, 57 percent of the industrial access permits that were in force were allowed access to secret and confidential restricted data. The remaining 43 percent were allowed access to confidential data only. Of the total permits certified, 13,385 "Q" clearances and 8,967 "L" clearances had been assigned. Using the purchase of documents as a gauge of industry's interest in the AEC's industrial applications program, 27,875 confidential and nearly 8,500 secret reports had been purchased. From 1954 through 1957, a grand total of 1,017,000 copies of AEC technical reports, engineering drawings, and other information material, classified and unclassified, had been purchased by the public.[4]

During 1957, the AEC reported publication of the first volume of the Nuclear Technology Series, *Experimental Boiling Water Reactor,* with *Atomic Energy Facts, Neutron and Gamma Irradiation Facilities,* and *Hot Laboratory Equipment* being in press. Twelve additional NTS volumes were in planning stages.

The *Engineering Materials List* was now routinely provided to industrial organizations requesting access to AEC engineering drawings and materials associated with Project research activities. The Commission continued expanding its program of supplying translations of foreign scientific literature to the national atomic energy program; collaterally, it continued and enlarged its support of the joint translation program with the National Science Foundation and other federal agencies engaged in making foreign scientific periodical literature available.

An estimated 9,000 persons had visited the AEC's industrial information booth at the 1957 Nuclear Congress held in Philadelphia in March. Several thousand each of 16 Commission publications were provided gratis to attendees.

At a newly inaugurated series of technical information workshops held in Oak Ridge, May 1957, 70 access permittees were provided orientation materials and bibliographic tools for locating and selecting AEC R&D literature for review or purchase.

Assembled in Room 220 of the AEC Oak Ridge Operations Office administration building was a reference library established especially for the Civilian Application Program. Separate card catalogs for the secret, confidential, and unclassified files were set up to correspond to the collection of reports, partially in microcard form, that constituted the special industrial library. Bibliographies, announcement bulletins (including lists of engineering materials), and abstract journals complemented the collection. A special search service was provided at a $6.60 hourly rate (in January 1960).[5] A brochure, TID-4575, *Guide to Atomic Energy Literature for the Civilian Application Program*, was prepared as a comprehensive digest of information useful for access permit holders and for inclusion in information packages sent to new applicants.[6]

In addition to industry's having access to the AEC's R&D information through the Depository Libraries, four special industrial depositories were made available for industry in New York City, Chicago, Stanford University, and Atlanta. Six additional classified depositories had been authorized for installation at specially designated population centers for industrial use.

(See also Secs. 4.5, 6.1, and 7.5.)

9.5 *WEAPONS EFFECTS TESTS AND NUCLEAR FALLOUT ISSUES*

In contrast to AEC's apparent success in familiarizing the public with the potentials of nuclear science through its civilian applications program, the American public began to register anxieties about radioactive fallout that was occurring from atomic bomb tests.

In early 1954, Test Operation Castle was held at the Marshall Islands in the Pacific by the United States. The largest announced U.S. nuclear test, Bravo, produced massive fallout,[7] and unsuspecting Japanese fishermen in the area became radiation victims through exposure to the bomb's fission products. All fishermen became ill and one subsequently died.

Fallout from the bomb blast and injuries to the fishermen were dominant topics in the Japanese newspapers for weeks, and international attention was quickly drawn to the fallout issue.[3]

Within the United States, as radioactive clouds from bomb tests drifted eastward and were measured by the National Monitoring System stations, concerns were being raised about exposure limits and amounts of particulate matter that were being deposited on U.S. towns and cities. Of particular concern was the quantity of radioactive strontium and iodine that might ultimately be taken up by dairy herds grazing contaminated pasturelands. Soon, U.S. voices began to join a worldwide outcry about the dangers associated with atmospheric fallout from atomic bombs that were being tested in profusion by the U.S. and the U.S.S.R.*

Health effects from fallout became a focal point of U.S. research interest, and by the end of 1955, AEC laboratories and headquarters staff began to publish large amounts of data associated with fallout from nuclear testing.[8] A series of reports prefixed "CEX" (Civil Effects Test Operations) was produced as a consequence of increased concern about the potential hazards caused by fallout from nuclear detonations.

A note appearing in an early CEX report explains that, through the AEC Division of Biology and Medicine and Civil Effects Test Operations offices, the Atomic Energy Commission conducted tests, exercises, surveys, and research that were directed primarily toward practical applications of nuclear effects information and "toward encouraging better technical, professional, and public understanding and utilization of the vast body of facts useful in the design of countermeasures against weapons effects."[9]

These reports, processed through the publications offices of TISE, were reproduced and disseminated in the tens of thousands over the years the program was in effect. Although information was indexed and included in the weapon test operations catalog, unclassified reports were also made publicly available through the routine publication outlets and announcement media.

9.6 *COMMISSION ACTION TO INFORM THE PUBLIC AND THE TEST BAN EFFORT*

The Bravo publicity had alerted the world to potential fallout dangers. With the tempo of testing increasing, voices eventually became loud and

*"From 1950 to 1958, 84 atmospheric tests were conducted at Nevada Test Site at the top of steel or wooden towers, suspended from balloons, dropped by aircraft, launched by rockets, or fired from a cannon." —*ERDA News*, p. 4, November 29, 1976.

shrill for weapons testing abatement. Calling for a complete test ban and the elimination of the "silent killer" were world figures that included such personages as Winston Churchill, Indian Prime Minister Nehru, Albert Schweitzer, and the Pope. In the United States, a concerned public prompted almost six hundred letters to be sent to the Commission in May 1957 from people worried about testing hazards. Ultimately, the Commission and the Joint Committee on Atomic Energy held fallout hearings to attempt to gauge the risks.[10]

To inform Congress and the public fully on the fallout issue, certain positive actions were taken by the Commission. In October 1958, a 359-page Health and Safety Laboratory report, *Environmental Contamination from Weapons Tests*, was issued. Many other specially produced topical reports from laboratory sites considered of use to the news media were also made available for sale.

In an attempt to assure the public that full disclosure on the possible effects of fallout was being made, a special declassification team was organized to locate and review relevant classified report literature. In the January–December 1959 report to Congress, the public was informed that a total of 2160 documents had been identified as containing information relating to the contamination of the atmosphere by fallout. Approximately one-fourth of these had been previously released or duplicated in other reports. Slightly more than one-fourth were found to be classified; of these 79 had been declassified for the use of the public and for sale through the Office of Technical Services, Department of Commerce. All other previously declassified and unclassified documents were also made available in the same way, and all were summarized in the Commission's announcement publication, *NSA*.[11]

Because of President Eisenhower's desire to obtain a test ban treaty that would be militarily acceptable to the United States and yet reduce or eliminate fallout dangers, many diplomatic efforts were made to engage the Soviet Union in dialog. Technical Working Groups, comprised of U.S.S.R. and U.S. representatives, were established to study ways that would be amenable to both sides for detecting nuclear explosions. At the convening of a Conference of Experts in Geneva in 1958, President Eisenhower announced the willingness of the United States to negotiate a test ban treaty; further, upon completion of the *Hardtack* test series in the fall, the United States would voluntarily suspend all weapons testing. As a result of this action, an unpoliced moratorium period on testing began on October 31, 1958, during which time both the United States and the Soviet Union refrained from testing nuclear weapons.[12]

Three years later, however, the Soviet Union ended the moratorium and tested a large number of high-yield weapons during the fall of 1961. The United States continued to limit its tests to underground shots until President Kennedy (who was now in the White House) in an address to the Nation on March 2, 1962, deplored the necessity of beginning testing once again. Eventually, after many additional months of negotiations, a Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space, and Under Water (the Limited Test Ban Treaty) was finally signed on August 5, 1963.[13]

The gradual subsidence of weapons testing mitigated the need for a formal AEC weapon data information program, and TISE's involvement was correspondingly reduced. Maintenance of the weapon test report master copies, updating and refining the online indexed literature, and continuing responsibilities for the Weapon Data Thesaurus remained in the program, vestiges of a one-time giant information activity (see Chapter 8).

Two important publications that provide detailed technical and general information on these issues are *The Effects of Atomic Weapons,* by Samuel Glasstone (first published in 1950), and *Public Safety & Underground Nuclear Detonations,* also by Samuel Glasstone. The latter publication is a publishing product of the TISE, coordinated by the AEC Headquarters' book program staff.

9.7 *PROJECT PLOWSHARE: TESTING FOR PEACEFUL PURPOSES*

In 1957, the AEC added another program involving peaceful applications of nuclear explosives to its testing activities. Since the release of information on first atomic bomb detonations, much interest had been exhibited in exploring possible ways to use underground nuclear explosives for the excavation of canals, for mining and quarrying, and in stimulating the flow of petroleum. The Plowshare program was developed for such investigative purposes. Numerous underground detonations, designed to produce information on such specific areas of interest, were carried out under AEC auspices, principally at the Nevada Test Site.[14] These reports, abstracted and indexed by TISE staff, were reproduced and distributed in accordance with classification and dissemination regulations.

9.8 *INTERNATIONAL INFORMATION PROGRAM EXPANSION: LATIN AMERICA*

A regional Latin American conference, organized to assist in better understanding recent atomic energy developments, was held in Puerto

Rico in early 1957 and was attended by 1200 persons. Discussions were arranged for students and faculty members by the Oak Ridge Institute of Nuclear Studies. Plans were put in place for a Spanish-language center to be established at the University of Puerto Rico.

Approval was given by the Commission for the establishment of an Inter-American Nuclear Energy Commission within the Organization of American States to serve as a consultation and coordination center on the peaceful uses of atomic energy. More than a hundred scientists, engineers, and government officials from American republics attended the First Inter-American Symposium on the Peaceful Application of Nuclear Energy, May 13–17, 1957. Conducted by Brookhaven National Laboratory, the Symposium was the product of groundwork effort by the President's brother, Dr. Milton Eisenhower.[1]

Spanish language films, exhibit materials, and educational brochures were developed by the Technical Information Service to respond to information requests arising from these Inter-American program activities.

9.9 *INTERNATIONAL INFORMATION PROGRAM EXPANSION: EURATOM*

With the statute of the International Atomic Energy Agency approved, the Commission's attention was directed toward assisting in the establishment of an organization of European nations to cooperate in the development of nuclear power. The treaty establishing Euratom (European Atomic Energy Community) was made effective January 1958. Membership was comprised of Belgium, France, the Federal Republic of Germany, Italy, Luxembourg, and The Netherlands.[15] From its earliest establishment, the AEC's Technical Information Service cooperated closely with Euratom's technical information program by providing an AEC Depository Library, by arranging technical literature exchanges, and by supplying other relevant bibliographic system tools to the newly established nuclear energy agency.

At the Twenty-Seventh Meeting of the Technical Information Panel (November 1958), the meeting was opened to especially invited foreign technical information officers. Included were visitors from Euratom, the U.K. Atomic Energy Authority, the German Ministry for Atomic Energy and Water Power, the Israel Atomic Energy Commission, and the International Atomic Energy Agency. Dr. Roelof Houwink, Euratom's Deputy Director of the Research Division, described how Euratom had established a Working Party on Scientific and Technical Documentation and

Information. The purpose of the working party was to develop a policy and program to meet Euratom's technical information needs. One of the first decisions was to adopt English as the carrier language for the Community. It was also agreed that there would be full cooperation with *NSA*. In this regard, it was proposed by the working party that assistance be given *NSA* for broader coverage of journals within the Community, coupled with improved response time for their announcement.[16]

Mr. Rudolph Bree was appointed Director, Center for Information and Documentation (CID). In January 1962, he and terminology specialist Loll Rolling visited DTIE for a general orientation and updating of cooperative program plans and procedures being initiated for developing a mutually

shared program of indexing nuclear science literature. Significant points of discussion included Euratom's plans for control and retrieval of scientific literature by a machine system using key terms (descriptors) patterned after *NSA* subject headings, coordination of patent literature coverage, contributions by Euratom of hard-to-get materials for *NSA*, and other matters of mutual concern.[17]

In describing the Euratom Nuclear Energy Documentation Project, Dr. Herbert Coblans of ASLIB (London) stated: "In a sense it was fortunate in having at its disposal a very complete record of this new subject area born in the mid-forties, in the form of the *Nuclear Science Abstracts* of the U.S. Atomic Energy Commission. Since then they have taken their input from some fifty abstracting periodicals. But the undertaking was nevertheless formidable, each abstract had to have descriptors (on the average twelve) assigned to it from the Thesaurus. . . . By 1973 about 1.3 million documents had been indexed, probably the most complete coverage ever achieved in one subject."[18]

Eventually, the sharing of a common nuclear science indexing effort, using a mutually agreed-upon indexing language (thesaurus), became a major cooperative venture, and many exchange visits were required to organize and develop the operational machinery adequate for indexing, to Euratom's specifications, all of the nuclear science literature published in *NSA*. The Euratom collaboration continued for approximately a decade.

9.10 *SECOND GENEVA CONFERENCE ORGANIZED*

In May 1957, a United Nations Advisory Committee met to formulate plans for a 1958 International Conference on the Peaceful Uses of Atomic Energy. Again, Dr. I. I. Rabi headed the United States delegation, and again Geneva, Switzerland, was selected as the conference site. The agenda for the second conference, set for September 1–13, 1958, placed emphasis on the atom's commercial power potential.[1]

At the 25th Meeting of the Panel, a resolution was passed relative to a need to highlight the AEC's comprehensive technical information program. The Panel felt that, in considering the possible U.S. technical contributions to the 1958 Geneva Conference, the AEC's attention should be directed toward the importance of emphasizing the unique features of AEC's program of technical information dissemination. It was the belief of the Panel that in this field the United States could derive considerable prestige in demonstrating to other countries the relatively efficient and speedy systems whereby the results of its unclassified research were brought to the attention of, and readily made available to, scientists in all
parts of the world.

The Panel recommended, therefore, that the USAEC display at Geneva include an exhibit featuring the scope and mechanics of technical information dissemination. Such an exhibit should include such procedures as abstracting, cataloging, and micro-reproduction and rapid-service reproduction of documents. In addition, the Atoms-for-Peace libraries should also be described.[19]

Upon completion of the 1958 Conference, the Commission in its Report to Congress[20] stated that in most respects the second conference nearly doubled the size of the first. Some 6300 persons participated as compared with about 3600 in 1955. There were 911 accredited members of the world news media from 36 countries.

The Commission's report described the U.S.'s Technical Information Center as having a complete collection of AEC scientific and technical publications in microcard form and some 11,500 engineering drawings on microfilm which could be inspected on illuminated viewers. A catalog, listing all the books and journals on display at the Center, was provided. A brochure, printed in four languages, provided information on availability and prices of the displayed products.

A special feature at the Center was the display of a specially prepared set of 13 technical books, which was a gift by the United States to principal representatives of the other nations. Another gift publication, *Atoms for Peace, USA 1958*, was distributed at the Center.

The Commission's report, in closing, enthusiastically stated, "The Information Center soon became the most crowded area in the building. More than 25 tons of publications were taken to Geneva to give to delegates and observers from 67 nations. A barrier had to be placed across the balcony stairway and only a small group allowed to enter at a time. In addition a self-service stand was set up for distributing the special publications. So great was the demand that by the middle of the second week, stocks of 10 of the 25 titles initially available were exhausted."[20]

Preparing the technical collection of reports, microcards, brochure give-aways, and overseeing the shipment of conference supplies and equipment were the responsibilities of TISE. With the exception of TISE's assistance in preparing references and illustrations for the majority of the volumes, the presentation set was the product of the Industrial Information Branch, Washington, headed by Edward J. Brunenkant. All volumes except *The Physical Theory of Neutron Chain Reactors*, by Weinberg and Wigner, were published by Addison-Wesley Publishing Company, Inc. All volumes were case-bound in common bindings, including the Weinberg and Wigner volume, published by the University of Chicago Press.

Book project officers from the Industrial Information Branch who managed the production of the presentation volumes included, besides Brunenkant, James D. Cape, Van A. Wente, James R. Aswell, Jefferson D. Bates, William E. Boardman, and Sidney F. Lanier. Lanier had been temporarily reassigned to Washington from his Oak Ridge Extension duties to assist the Industrial Information Branch staff on this project.

9.11 *INTERNATIONAL CONFERENCES ON TECHNICAL INFORMATION*

Prior to the Second Geneva Conference, the Technical Information Service initiated a conference of representatives from friendly European countries who were information officers or librarians involved primarily with atomic energy literature. A publication entitled, *Utilization of Atomic Energy Scientific and Technical Information: Minutes of the International Conference Held in Geneva, Switzerland, May 26–29, 1958, Sponsored by the United States Atomic Energy Commission*, provides a full account of this meeting.[21]

The agenda allowed each attendee to describe his own institute or information activity, and an opportunity was given to direct questions to the U.S. delegates regarding matters that related to AEC Depository Library collections. Since most of the representatives (14 countries and 6 international organizations) were recipients of depository collections, they were also involved in selecting materials for exchange and of value to *NSA*. Thus, *NSA* became a dominant topic of discussion, particularly with respect to ways to obtain satisfactory coverage of atomic energy literature in the countries represented by conference attendees.

Although the principal aim of the meeting was to facilitate a better understanding of the AEC's technical information program, particularly as it related to AEC Depository Library collections in foreign countries, it was also important as an event that initiated decades-long friendly relations involving information exchanges, bilateral agreements, and special international technical information arrangements. In addition to the United States, countries represented were Austria, Belgium, Denmark, France, Germany, Israel, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.

Representing the Technical Information Service (Washington) was Bernard M. Fry, Assistant Director, who chaired the meeting, and I. A. Warheit, AEC Librarian. Donald Eichner represented AEC Division of International Affairs. Representing the Technical Information Service Extension at Oak Ridge was Melvin S. Day, Chief.

A second International Conference on Scientific Information, held in Washington, D.C., to reciprocate the earlier Geneva meeting, provided an opportunity for many of the European conference representatives to visit the TIS Extension at Oak Ridge during the period November 24 through 26, 1958.[22]

British visitors included Sir John Gaunt, Senior Representative, UKAEA, Attache of the British Embassy in Washington; Dr. Martin Fishenden, Head, Scientific Administrative Division, Harwell; Marian Gosset, Librarian, Harwell; Ian Hogg, Head, Scientific Administrative Division, Risley; J. M. Jones, AERE British Representative, Washington; Pat King, Librarian, U.K. Scientific Mission, Washington; Roland Smith, Librarian, Risley.

Other foreign representatives were Dr. Roelof Houwink, Deputy Director, Division of Research (Euratom); Dr. V. A. Lasareff, Commissariat (Belgium); Dr. Erich Pietsch, Director, Gmelin Institute (Germany); Mrs. Myra O. Kaye, AEC (Israel); Mr. Dimitri R. Stein, Gmelin Institute (U.S. Citizen).

9.12 *PHOTOMECHANICAL METHODS INTRODUCED TO IMPROVE* NSA *INDEXES*

In 1955, *NSA* carried 8,004 abstracts, indexed by subject, personal author, report number, and corporate author. Five years later in 1960, the number approached 25,000. An objective of the Technical Information Service was to manage not only these continuing increases and amply index each issue but also to cumulate *NSA's* indexes quarterly, semiannually, annually, and, ultimately, quinquennially.

At the May 26–29, 1958, technical information meeting in Geneva, Melvin S. Day, Chief, Technical Information Service Extension, described new photomechanical technology being investigated for the production of *NSA* indexes. This technique not only promised considerable savings in staff effort but also provided the capability of producing indexes with each issue—a highly innovative concept at the time. Furthermore, once processed, the indexed material could be retrieved for reuse in future cumulations.

The new process involved imprinting indexing text (along with keypunched codes) onto IBM 80-column Electronic Accounting Machine (EAM) cards. These individual cards provided the text medium that could be fed to an industrial-type camera that was capable of rapidly photographing card images onto continuous-roll film. Index entries were composed on specially designed Varitypers (occasionally IBM typewriters were used) that created text made up of proportionally spaced, boldface characters. The main subject index headings were composed in a typeface slightly larger than that for subentries. Within the body of the card, the mainheading number code (each heading had a discrete number) would be keypunched. All subheadings (modifier lines similar in construction to *Chemical Abstracts* indexes) would similarly be prepared, appropriately indented. For groupings of main and subentries, the main heading code number, together with a sufficient amount of the subheading necessary for alphabetic arrangement, would be keypunched in each subheading card. Cards for main headings and corresponding subheadings could then be sorted and arranged alphabetically by the EAM sorting equipment.

Once sorted in correct order, the cards were ready to be photographed into galleys for printing. The rate of photographing was 230 cards per minute. If one assumed that each card had an average of 6 words per line imprinted, the photocomposition rate approached 1400 words per minute directly onto film. This was very impressive composition for the mid-1950s and was faster than could be accomplished by computers for a number of years.[23] Upon completion of film processing, the film would be cut into galleys for index page make-up and forwarded to printing. Once photography was completed, the cards would be retained for mechanical interfiling with other index cards intended for the next index cumulation.

The photomechanical technique was successfully introduced at the beginning of the 1959 volume year. In advising the Depository Libraries about the change, the TIS Assistant Director explained that each semimonthly issue of *NSA* carried four indexes: corporate author, personal author, report number, and subject. These indexes were cumulated and published as special index issues four times each year—the first quarter cumulation covered issues 1–6, the semiannual covered 1–12; the third quarter covered issues 13–18; and the annual covered issues 1–24. The technique of using IBM electronic accounting machine punch cards as a medium for the Recordak Listomatic Camera to create indexes for each issue of *NSA* was considered a technological breakthrough. The new methods of production had actually lowered unit production costs in issuing indexes, Day claimed, and permitted rapid publication of cumulated indexes on a schedule unequaled by any other major abstract journal.[24]

To prepare and complete a five-year index cumulation (*NSA* Volumes 11–15), back index issues (Volumes 11 and 12) were recomposed to allow their incorporation into the newly adopted photomechanical style. The TISE Fiscal Year 1959 Summary Report of Operations stated: "It is necessary that the modifiers in the Subject Index be made consistent in style with those used in Vol. 13, that report numbers be added as necessary, and that subject heading codes be added to each of nearly 90,000 cards." Recomposition of all back-copy indexed material was necessary, of course, to permit its being merged with text created by the newly adopted index processing system.

For years, the Recordak Listomatic Camera (Model No. 1) was successfully used for the production of indexes to all of TISE's announcement journals and bibliographies with minimal downtime. The Listomatic was not totally abandoned until computer technology was sufficiently developed to allow a trustworthy marriage of computers and photocompositors in the mid-1970s. (See Figs. 9.2 and 9.3.)

(Additional information on *NSA* and the indexing program may be found in Secs. 3.8, 4.10, 4.13, 6.4, 6.7, 9.13, 10.11, 11.5, 11.13, 12.8, 13.3 to 13.6, 16.9, 16.13, 17.5, and 18.4.)

9.13 *PANEL RECOMMENDS DISCONTINUING CARD CATALOGS IN PROJECT LIBRARIES*

Now that *NSA* and other AEC announcement journals provided prompt author, corporate author, subject, and report number indexes for each issue analogous to index cards created for card catalogs, Project libraries were now free to reevaluate whether to allow their notoriously manpower-intensive card catalogs to expire.

At the 28th Panel Meeting in St. Louis, the panel noted that production of detailed indexes in *NSA*'s individual issues had become routine, and that the quarterly, semiannual, and annual cumulations were also being systematically produced. Under the assumption that these indexes would be continued, the Panel therefore recommended that, effective June 30, 1959, TIS discontinue the preparation and distribution of unclassified catalog cards for reports covered in *NSA*.

Total savings to the AEC, Project-wide, as a result of this action were considerable. Savings were especially noteworthy at TISE. Not only were savings realized through the elimination of work associated with preparing and printing the cards but also costs for supplies and for shipping of tons of cards annually were eliminated. To these savings could be added Project-wide costs saved in each library that had been staffed to receive, file, and maintain the catalog according to agreed subject arrangements.[25]

The Panel recommended, in addition, that some of TISE's savings resulting from the elimination of catalog card production be used for improving the depth and quality of *NSA*'s subject indexing.

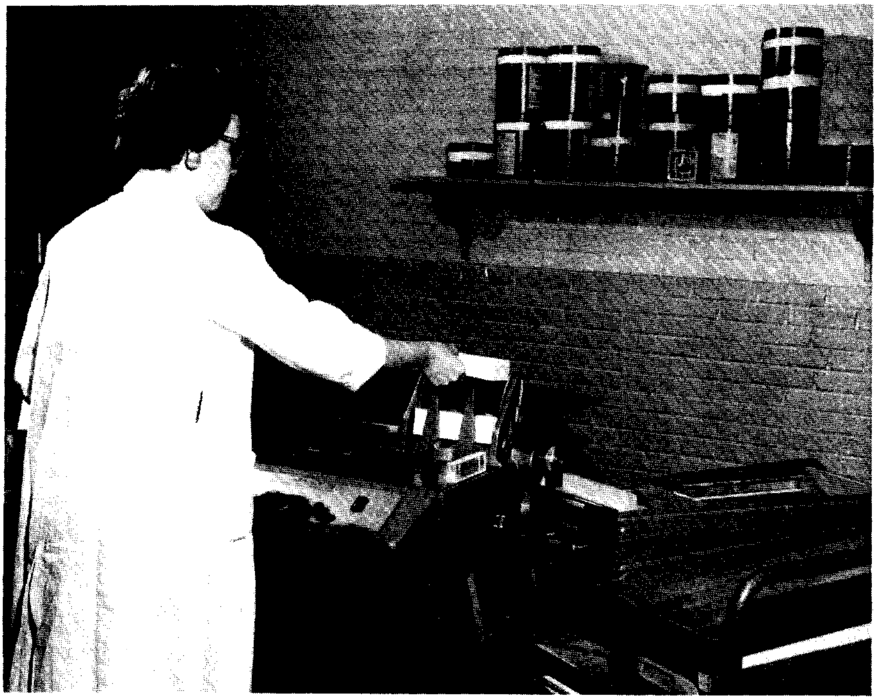

Fig. 9.2 A Recordak Listomatic camera sequentially photographs cards to create indexes to *NSA* and other secondary announcement publications. Indexed information being photographed has been imprinted on IBM electronic accounting machine cards by Varitypers. Operator is Sara Williams. (AEC photograph by W. E. Hall.)

Fig. 9.3 Cards are processed at 230 lines per minute onto roll film. After developing, the film is stripped into two-column index page negatives using vacuum-equipped light tables (right). Developing room is at rear. Pictured left to right are Howard Jacoby, Chief, Technical Camera Section; Sara Williams; James Miller; and Henry Lansford. (AEC photograph by W. E. Hall.)

9.14 *SECOND* NSA *CUMULATIVE INDEX COMPLETED*

At the 26th Meeting of the Technical Information Panel (April 1958), TISE announced the impending publication of the Second *NSA* Cumulative Index. Comprising *NSA* Volumes 5 through 10, the index required a professional rereview of approximately 120,000 subject index cards. Consolidation of headings and removing inconsistencies that had resulted from *NSA*'s expansion over the six-year period constituted the main improvements. Modifier lines were also created and added as required for all subject headings to conform to *NSA*'s adopted style. Also bound within the volume was the Personal Author Index. Everett J. Hoffman edited and compiled the subject index, assisted by Thomas R. Henley and Lawrence T. Whitehead.[26]

9.15 *INCREASED INTEREST IN COVERAGE OF FOREIGN INFORMATION*

Partially in response to the national interest in all foreign scientific research and development that developed from *Sputnik* and partially because of the real need to have faster and more immediate access to known programs being developed in the foreign nuclear science, the Technical Information Service supported, at the Twenty-fifth Panel Meeting (November 1957), an intensified program to acquire foreign literature of interest to *NSA*.

Many new sources of reports and monographic materials had been opened up through recently established bilateral programs. In addition, the TIS exchange program, established on behalf of *NSA*, was being expanded and made more effective through the Depository Library program. In addition, contractors who had established contacts with their foreign counterparts were encouraged to effect exchanges, under existing protocols, to widen the resource areas of foreign information. The publication, TID-4552, *Guide to Coverage and Scope of Nuclear Science Abstracts*, was published as an aid in establishing contacts and promoting exchange interest. Through the assistance of the National Science Foundation, a national center to collect, abstract, and disseminate translations of foreign research was being established. Arrangements were made to allow advance copies of abstracts relating to nuclear science to be submitted to TISE for *NSA* announcement.[19]

9.16 *TECHNICAL PROGRESS REVIEWS INAUGURATED*

Recognizing the urgent need of scientists, engineers, and administrators in the nuclear energy program for a digest that would provide them with a brief summary, review, and evaluation of developments and studies in their fields, the Technical Information Service Headquarters office initiated a new publication program in 1957. Named Technical Progress Reviews, titles in the series, to be published quarterly, were *Isotopes and Radiation Technology, Nuclear Safety, Power Reactor Technology, Reactor Fuel Processing,* and *Reactor Materials.*

AEC contractors and Laboratory sites prepared the Quarterlies and forwarded the manuscripts to Technical Information Service, Oak Ridge, for editorial review and preparation for publication. Sold through the Superintendent of Documents, Government Printing Office, the Reviews were quite successful during the development of the commercial power reactor program. Only one survived, however. *Nuclear Safety,* prepared by the Oak Ridge National Laboratory, celebrated its thirtieth anniversary of publication in 1987.

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INFORMATION PROGRAM HORIZONS EXPANDED

CHAPTER 10

The term of Lewis L. Strauss, Commission Chairman, expired on June 30, 1958. Also on this day, Kenneth F. Fields resigned as General Manager. John A. McCone was sworn in as Commissioner and appointed Commission Chairman on July 14, 1958, for a term to extend to January 20, 1961.

In July 1958 the National Aeronautics and Space Act instituted the National Aeronautics and Space Administration (NASA). Established to conduct civilian aeronautical and space research, NASA absorbed the National Advisory Committee for Aeronautics. In a Note to the Panel, which met in December of that year, Melvin S. Day, Chief, Technical Information Service Extension (TISE), reported on NASA's initiation of a periodical to announce the documents available from NASA.[1]

On August 25, 1958, Day was reassigned to Washington to the post of Assistant Director, Technical Information Service (TIS). Day replaced Bernard Fry who accepted a technical information post with the National Science Foundation.

Robert L. Shannon succeeded Day in early January 1959 as Chief, TISE in Oak Ridge. Shannon, who had been associated with the technical information program since 1946, had held various technical information positions at TISE, including Special Projects Branch and Reference Branch supervisory responsibilities before his appointment as TISE Chief. Shannon served in the U.S. Naval Reserve during World War II and held a reserve commission as a Lieutenant Commander. He was recalled by the Navy in March 1951 and remained on active duty until 1952. During that time he was assigned to the Test Activities Branch of the Division of Military Application in the Commission's Washington headquarters. For his weapon test activities work while in Washington, Shannon received a special commendation by U.S. Atomic Energy Commission (AEC) Chairman Gordon Dean.[2]

10.1 *DOCUMENT MANAGEMENT BRANCH ORGANIZED; EDUCATIONAL MATERIALS PROGRAM ESTABLISHED AT TISE*

The TISE Document Management Branch was established in January 1959 to perform functions formerly assigned to the Document Control, Records Control, and Unclassified Distribution Sections of the Reference Branch. Thomas W. Laughlin was appointed Chief of the newly established Branch, which was made up of Receiving, Control, Distribution, and Records Sections.

An additional responsibility of the newly established Branch was the assumption of public distribution of educational materials. The TISE Monthly Report of Operations for November 1959 reported that arrangements for TISE to begin distributing educational materials, previously distributed by the Educational Services Branch (Washington), had been completed. Bulk stocks of these materials were being shipped to TISE, scheduled for arrival on December 9. The Document Management Branch had assumed this function and began making arrangements for the storage and distribution of the informational materials. Along with the shipment of educational materials was a catalog that enumerated the items for distribution by the new Branch.

The types of publications made available under this program included booklets, brochures, fact sheets, reference lists, and reprints of portions of AEC publications on topics of interest to teachers and students at various educational levels. Approximately 75 items of literature were selected from materials evaluated as being suitable for this purpose, and stock supplies were created for responding to requests. To provide information to students and teachers that was better focused to their needs, TISE entered into arrangements with the Oak Ridge Institute of Nuclear Studies[3] to prepare 16 booklets tailored to cover subject fields most frequently requested.

More than 70,500 kits of atomic energy information literature were distributed during 1960 in response to requests from college, secondary school, and elementary school students, teachers, and guidance counselors; from adult study groups, teachers' institutes, and seminars; and from the general public.[4]

(See also Sec. 11.4.)

10.2 *PUBLICATIONS EXCHANGE PROGRAM: A DECADE OF SUCCESS*

During the 10 years since its establishment in 1950, the AEC's Publications Exchange Program had expanded to include more than 500 sources of information from which materials suitable for announcement in *NSA* were selected. Under this program, scientific, technical, and professional society journals; research and development (R&D) reports produced by other research institutions; theses; and preprints were obtained by the Commission in exchange for an *NSA* subscription or selected report literature (see Sec. 4.7).

Technical information sources were also greatly expanded through the AEC's Depository Library program. Countries accepting a depository collection of AEC reports were obligated to provide relevant information to TISE for *NSA* announcement. The more than eighty international libraries accounted for a considerable enrichment to *NSA*'s collection of information from foreign sources.

A total of 251 foreign reports and translations were received in one month (August 1959) by TISE.[5] Publications that were received in exchange, besides being abstracted in *NSA*, were made available to the U.S. scientific community through the AEC's Depository Libraries. In 1959, *NSA* was supplied to 420 organizations in 44 countries, including laboratories, research institutes, and universities, in return for monographs, research and development reports, and scientific journals from these foreign sources.

In the first revision of *Exchange List: Organizations Having Publication Exchange Agreements with the AEC Division of Technical Information* (October 1961), 585 information sources (primarily technical and professional journals) were listed.[6]

Also included were 84 domestic sources, each agreeing to provide publications in scope in exchange for an *NSA* subscription. As *NSA*'s place in the international arena became better known, technical publishers and industrial research organizations supplied gratis (and often without TISE's requesting them) informational materials, such as books, technical articles, and conference information for announcement in *NSA*.

Owing to the large amount of AEC research being reported in *Physical Review* and the delays experienced in receiving published issues, in late 1959 TISE inquired whether editors could supply advance copies of *Physical Review* articles to allow more prompt announcement in *NSA*. After publication of individual journal issues, more than three months' delay of announcement was being experienced.[7] The request was favorably received, and this action led the way in later years for further cooperative arrangements with the American Institute of Physics, which ultimately culminated in TISE's contracting to obtain abstracts and indexed information on magnetic tape concurrent with the articles' publication.

One U.S. professional society organization that freely used abstracts of AEC reports in its abstracting service was never able to reciprocate this practice, however. For many years, thousands of copies of AEC unclassified reports were provided on a complimentary basis for announcement in *Chemical Abstracts*. When TISE offered to supply Chemical Abstracts Service (CAS) with reports distributed in microcard form, in addition to

full-size reports, a subscription to *Chemical Abstracts* was requested in exchange. The response from CAS was that the Board of Directors of the American Chemical Society had severely restricted the use of *Chemical Abstracts* as an exchange journal because of the very large and expensive nature of the publication.[8] Subsequent overtures to the Society to obtain a subscription of *Chemical Abstracts* on exchange, as a reference tool only, were without success.

10.3 *BILATERAL AGREEMENT PROGRAM COUNTRIES APPROVED FOR SERVICE*

In a memorandum dated February 16, 1959, from the Director of Division of International Affairs to the Director of Information Services, procedures were outlined for the approval and transmittal of classified information in certain categories to "agreement" countries. Delegations of authority to service this constituency, emanating from the General Manager, were handed down to all participants in the Bilateral Agreements Program. On March 2, 1959, in a memorandum from Day to Shannon, this authority was redelegated to the Chief, TISE. On March 9 the function was assigned to the Chief, Reports Analysis Branch, for programming and execution.

Agreement countries as of March 1959 were the United Kingdom, Canada, Belgium, Australia, Switzerland, and The Netherlands. Requests from these countries received by the Division of International Affairs totaled 272 in March, and these were forwarded to TISE for action. Upon completion of the reviews by Patents Branch and the Declassification Branch, TISE began making transmittals in July. To avoid confusion with reports forwarded in response to specific requests, a special transmittal form was prepared to accompany the reports which indicated that the reports selected by TISE were in accordance with specific agreements for cooperation.[8]

10.4 *INFORMATION EXCHANGE HIGHLIGHT: McCONE/EMELYANOV AGREEMENT*

Scientific and technical publications had been exchanged between institutions within the U.S.S.R. and TISE for a number of years. A United States scientific team comprised of AEC Chairman John A. McCone, Commissioner John H. Williams, Frank K. Pittman, Kenneth S. Pitzer, Lyman Spitzer, Jr., and Alvin M. Weinberg visited the U.S.S.R. atomic energy installations during the period October 9 to 18, 1959. A report, *Visit of U.S. Team to USSR Atomic Energy Installations* (TID-6793), dated October 1959, is a record of that visit. TISE prepared and printed the report.

Formal exchanges of information between the U.S.S.R. and the United States were arranged pursuant to a Memorandum of Cooperation arranged by AEC Chairman John A. McCone and Professor Vassily S. Emelyanov, Head of the U.S.S.R. Main Administration for Utilization of Atomic Energy and member of the U.S.S.R. Academy of Sciences. The memorandum (signed on November 24, 1959) provided, on a government-to-government basis, for "reciprocal exchanges of unclassified information, of visits by scientists, for exploration of the desirability of engaging in unclassified joint projects in the peaceful uses of atomic energy, and for making available new scientific instruments on a reciprocal basis and as permissible under the laws and policies of the two countries."[4]

Although all reports exchanged were forwarded to the International Atomic Energy Agency (IAEA) for use of all IAEA member countries, TISE recorded the exchanged data between the countries during the lifetime of the agreement.

10.5 *SECOND GENEVA CONFERENCE: A PRODUCER OF INFORMATION*

At the Twenty-Eighth Meeting of the AEC Technical Information Panel, TISE reported that 736 of the 742 papers presented by United States' attendees at the Conference had been received. In addition, of the 1379 foreign papers presented, 1336 had been received by TISE. Those received at TISE were microcarded and distributed to Project addressees.

Two special issues of *NSA* included abstracts to the Conference and accommodated the corresponding indexes. The U.S. papers were abstracted in *NSA*, Volume 12, No. 20 Supplement, and the remainder appeared in *NSA*, Volume 13, No. 8 Supplement.

10.6 *IAEA SUPPORTED AS CENTER FOR INFORMATION*

At the Second General Conference of the IAEA held in Vienna, September 22–October 4, 1958, AEC Chairman John A. McCone made proposals emphasizing various initiatives that could be undertaken by the newly established agency. Proposed initiatives included a major training, research, and application program in the field of radioisotopes; development of international safety standards; an intensified fellowships program; a research program (financed by the U.S. but assigned to the IAEA) for contracting to universities throughout the world; a long-range program to make nuclear power available to less-developed countries; and the development of the IAEA into a major center for exchange of information and sponsorship of conferences.[9]

In the President's Report to Congress for the year 1959, as required by law on U.S. participation in the IAEA,[10] considerable improvement in the IAEA's information program was reported. During the year the Agency began to exercise its functions in four main areas of the information program: the IAEA library, editing and publication, conferences and symposia, and documentation.

With regard to library operations, the report commented on the continued expansion of the Agency's library. At the end of 1959, the IAEA library contained about 15,000 books and reports. Contributed by the United States were all the unclassified technical materials published and announced by the AEC during 1959 to supplement the U.S. Atoms-for-Peace Library that had been donated in 1958. In addition, the Agency had assembled a large collection of microcards. The film library, to which the United States had contributed 45 films in 1958, continued to grow. Among the new acquisitions were nine U.S. films.

10.7 *DEPOSITORY LIBRARY INFORMATION GUIDE ISSUED*

A summarization of what constituted an AEC Depository Library, how it was to be used, the library's responsibilities upon acceptance of an AEC report collection, and instructions on the library's maintenance was published in *Guide to AEC Reports for the Depository Libraries* (TID-4565).[11] Issued in early 1960 by TISE, the Guide provided information and advice on these matters for all librarians working within the AEC Depository Library system.

On serving the public, the Guide stated that, when a library agreed to serve as a depository for AEC reports, it was understood both by the library and the AEC that the public had free availability of the collection. The degree of service given was usually determined by the library's own policy. The AEC considered as minimum public service, however, that any person who desired access to AEC reports could consult them in the library. The Guide further stipulated that the library should provide the requester access to *NSA* and its indexes in order that the requester could perform his own searches. The library was not expected to perform subject searches for public requesters unless it so desired.

The library was expected to act as liaison between the requester and the AEC for any AEC R&D report which the requester desired to consult but which was not in the depository collection. In such instances the library was expected to request the needed report rather than refer the requester to the AEC.

Additional types of service considered desirable by a depository were supplying reference help in locating reports by subject, photocopying service (photostat and microfilm), and interlibrary loan service according to the American Library Association Interlibrary Loan Code.

Depository libraries received, either in full-size or microprint copy, all unclassified or declassified R&D reports announced in *NSA*, and this service was continuously updated. Thus the AEC depository librarian was empowered with the capability to provide service to the general public in a manner analogous to AEC project librarians, who provided similar unclassified information service to their constituents. This service to the public through the Depository Library Program, although requiring considerable reference effort by TISE staff, also permitted quick responses to the general public. In responding to the requester, location and other information about the depository library that would have the document available for personal review or copying could be cited.

10.8 *NEW PANEL CHALLENGE: MACHINE STORAGE AND RETRIEVAL*

Taking its cue from a National Science Foundation program to study new techniques of storage, retrieval, and machine searching for technical information, the Panel, at its Twenty-Fifth Meeting (November 25, 1957), recommended that future meetings consider expanding discussions to include such areas as scientific documentation and machine storage and retrieval.[12] The Panel further recommended that a new committee be established to study these and associated areas as they might relate to the future AEC technical information program.

A newly formed committee met at Cincinnati on April 23, 1958, to outline its terms of reference and discuss some of the topical areas likely to come under its purview. Named Committee on Development of Information Systems, the group considered the following broad areas as lying within its future responsibilities for Panel reporting: studying systems for the storage and retrieval of information, suggesting means whereby U.S. technical information services could be coordinated and centralized, studying systems for the mechanical processing of information, studying the means whereby scientists gather and use information, and studying foreign technical information systems, in particular those in the U.S.S.R.

Constituting the Committee were panel members Brewer F. Boardman, Fred E. Croxton, J. B. Dodd, Frank R. Long, E. J. Murphy, Helen Redman, Chris G. Stevenson, Raymond K. Wakerling, and Dennis Puleston, Chairman.

At the Twenty-Sixth Panel Meeting (April 24, 1958), the Committee announced its plans to study machine systems for information processing, including such functions as translating, abstracting, rapid reproduction, and retrospective retrieval of information.[13]

An invited speaker was Dr. Burton W. Adkinson who had recently replaced Dr. Alberto Thompson as Director of the National Science Foundation's (NSF's) science information program. Adkinson briefed the Panel on NSF's activity in supporting and coordinating translation programs and other research programs for information retrieval. He pointed out that large sums of U.S. Government money were being spent on studies of machine systems for the control and retrieval of scientific data. Consideration was being given to establishing a central government office to coordinate and to act as a clearinghouse for all available information on government research projects of this type. He reported that NSF planned to establish such a clearinghouse in cooperation with the National Bureau of Standards. Dr. Adkinson also described the status of several U.S. Government-sponsored projects for development of machines for translation purposes. He predicted, on the basis of moderately successful efforts reported to that point in time, that within one to two years rough translations would be possible by machines and that in five to ten years one could expect machines to provide refined translations.

The Panel approved the Committee's report and endorsed its terms of reference for future studies and reporting. The Committee, however, warned that, although efforts should be made to evaluate new systems and to adopt them when desirable, the systems in place and working should not be neglected at Project sites.

10.9 *PANEL MEMBERS PROBE ADVANCES IN DOCUMENTATION*

Melvin S. Day, in his new role as AEC Assistant Director for TIS, reported to Panel Members on August 31, 1959,[14] that the National Academy of Sciences–National Research Council had established a new Office of Documentation. The new office announced three major areas of interest: advice to NSF and others as appropriate in broad problems of scientific documentation, including the recording, storing, retrieving, and disseminating of information to serve the needs of science; provision of a mechanism for the participation of United States' scientists and documentalists in international activities relating to scientific documentation; and advice and assistance to the several activities of the National Research Council in problems of documentation that were encountered from time to time. Close liaison was being maintained with NSF's Office of Science Information Service and with others, such as the AEC.

An award of a contract for the first phase of a study on the problems of mechanical indexing and retrieval of information to Ramo-Wooldridge (a division of Thompson Ramo Wooldridge, Inc.) was announced in late 1959 by the Council on Library Resources, Inc. The research program was planned to include the recording, in machine language, of a small library of text (approximately 300,000 words) that had not been previously organized, classified, or indexed. A computer was to be programmed to search the text, in response to questions by scientific workers, with a view to discovering ways of approaching the study of automatic indexing.[14]

Day subsequently reported to the Panel on other projects and meetings incidental to the interests of the newly formed Committee on Development of Information Systems.[15] An International Conference for Standards on a Common Language for Machine Searching and Translation was held in Cleveland in September 1959 under the sponsorship of Western Reserve University and the Rand Development Corporation. Twelve countries, including the United States, were represented. Papers included reports of work in progress in machine searching, machine translation, studies on interconvertibility among languages, and advanced applications of computer information systems.

Included in the report to the Panel was the news that the newly established organization, National Federation of Science Abstracting and Indexing Services, had announced its first project. A grant by the NSF permitted a compilation of a union list of periodicals covered by major abstracting and indexing services within the United States. The results would be shared with all member services.

In *Panel Bulletin Number 9,* it was also reported that the annual meeting of the American Documentation Institute was held at Lehigh University on October 22–24, 1959. The theme of the meeting was "Roundup of Document Retrieval Experience in Small Collections, 50,000 Documents or Less." Attendees compared experiences in indexing and retrieval.[15]

Notes accompanying the Agenda for the Twenty-Ninth Technical Information Panel (June 1959) included a statement that several AEC Project Sites had started using computers for the storage and retrieval of technical information. From the evidence cited, it was obvious that a concerted study of the topic within the Commission should be carried out in order that full advantage could be taken of all new developments in this field.[16]

In the Panel discussion at the Thirtieth Meeting (May 1960), the Committee on Development of Information Systems posed several questions relating to a perceived need for a machine system (sudden grown spurts seemed to indicate a great need), such as what kinds of machines existed that could meet set goals, how should information be stored for retrieval, and what were the costs involved.[17]

Another series of questions related to the information itself. Once the scope of the system had been decided, what depth of indexing should be considered, how should the appropriate dictionary be created, and how should the system be made to function effectively to meet primary users' needs.

The belief was that work should be started immediately on a dictionary of key words (descriptors) for use in a machine system. This task, the province of the Library Committee, involved studying whether a single dictionary could be devised or whether it would be more effective to have multiple dictionaries representing various disciplines, such as the medical and biological areas, chemistry, and physics. By handling the fields separately it was assumed that the storage and retrieval problems (considered the most difficult areas associated with electronic machine processing) might be simplified.

Many references were made to current studies and start-ups by others, but consensus of the Panel was that, in such a new territory, it was imperative that services of a consultant be obtained to find answers to the questions posed. Discussion of this topic was concluded by Melvin Day's stating that TIS would complete, as rapidly as possible, negotiations for a contract with Documentation, Inc., to study the information retrieval problem of the Commission.[17]

10.10 *DOCUMENTATION, INC., SELECTED FOR MACHINE SYSTEMS STUDY*

An announcement that a contract had been negotiated with Documentation, Inc., for a study of the applicability of machine systems to the AEC technical information program appeared in the TISE Monthly Report of Operations dated July 1960. The study, to be directed by Mortimer Taube, was to be conducted over a six-month period beginning July 1, 1960.

Scope of the work included studying procedures employed by the Office of Technical Information (OTI), acting as the primary group responsible for the acquisition, organization, and dissemination of atomic energy information. The study required a review of those aspects of the program which could be improved through mechanization and an identification of the systems and equipment needed to accomplish the job.

Additionally, the work required the setting up of a pilot mechanized system covering a selected group of approximately 2000 reports and an investigation of the operational problems involved in the transition to a mechanized system. Three AEC locations were identified for the pilot studies: Office of Technical Information Extension (OTIE) (Oak Ridge), Sandia Corporation, and Lawrence Radiation Laboratory.[18]

10.11 *COVERAGE IMPROVEMENTS INITIATED FOR* NUCLEAR SCIENCE ABSTRACTS

Contract negotiations were completed with Tennessee Technical Translators, Oak Ridge, for the preparation of abstracts of foreign language literature considered in scope for *NSA*. Signed in June 1960, the contract involved the use of foreign language professionals located in Oak Ridge to scan and abstract articles from foreign journals received on exchange by OTIE.[19]

The Danish AEC, while reviewing the list of Dubna (Russian) reports abstracted in *NSA*, discovered that OTIE probably had not received all copies that had been made available to other institutions. A check indicated that upward of 100 reports were in Risoe's possession and copies were forwarded to OTIE for inclusion in *NSA*. As a result of this discovery, a change in numbering of Dubna reports was effected, and a "JINR" (Joint Institute for Nuclear Research, Moscow) prefix was henceforth applied or cross referenced in *NSA* to all such reports.[20]

An inquiry by TISE directed to the Japan Information Center of Science and Technology (JICST) (Tokyo) in early 1960 pertained to a JICST program (announced in a UNESCO bulletin) that provided availability of Japanese scientific literature. A quick and favorable response indicated that JICST would prepare English abstracts of Japanese periodical articles and patents at $2.50 each, including surface postage.[21]

Arrangements were also completed for Mrs. Julia S. Redford, Oak Ridge (a former TISE employee), to prepare abstracts of foreign language literature and to index the abstracts under a contract with U.S. Joint Publications Research Service. French, German, Russian, and Spanish journals were forwarded to Mrs. Redford for scanning, translating, and abstracting.[22]

10.12 *SPECIAL NONTECHNICAL INDEXES REQUESTED BY AEC HEADQUARTERS*

In addition to performing routine duties related to abstracting and indexing scientific and technical literature for *NSA*, special requests were received by OTIE from time to time to index administrative, management, and legislative documents for the AEC.

In April 1960 three separate indexing projects were being carried out for AEC Headquarters. For R. G. Hewlett, Chief Historian, Minutes to the 1951–1955 Commission Meetings were being indexed. This project was a continuation of an earlier project to index the earlier AEC years. A semiannual index to the AEC Manual was in continuous preparation, and an index to public information releases was completed (through March 1960) and entered into printing in April 1960 for the AEC Office of Public Affairs.[21]

10.13 *AEC INFORMATION SERVICES RESTRUCTURED*

On May 27, 1960, Morse Salisbury, formerly the Director, Division of Information Services, was appointed Assistant to the General Manager.

Also, effective May 27, 1960, the Division of Information Services was restructured into two new organizational components. Technical information functions were assigned to a newly established OTI, which reported to the Assistant General Manager for Administration. Public information activities were assigned to a newly established Office of Public Information, which was responsible to the General Manager. Duncan C. Clark, formerly the Assistant Director for Public Information Service, Division of Information Services, was appointed Director, Office of Public Information.

Melvin S. Day, formerly the Assistant Director for TIS, Division of Information Services, was appointed Director for OTI, effective May 27, 1960. The Oak Ridge component was designated Extension status. Shortly after his appointment, however, Day left the Commission (on August 27, 1960) to join the newly established NASA, where he later headed the technical information program. Van A. Wente, Scientific Adviser to the OTI Director's office, also elected to transfer to NASA.

On August 29, 1960, Edward J. Brunenkant was designated Acting Director, OTI.[23] To assist Brunenkant, Richard M. Berg was appointed Deputy Director.

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A PRESAGING OF THE INFORMATION AGE

CHAPTER 11

John F. Kennedy, thirty-fifth President of the United States, was the White House occupant in 1961. Elected, along with Kennedy, as Vice President was Lyndon B. Johnson. On March 1, 1961, President Kennedy named Glenn T. Seaborg, Chairman of the Atomic Energy Commission.

Although disappointing setbacks had occurred in the Commission's power reactor development plans, the new administration strongly supported a program that would develop nuclear reactors for worldwide commercial use as dependable resources of unlimited power.

Setbacks had also occurred between the U.S.S.R. and the U.S.A. in their mutual observance of an unpoliced moratorium on aboveground nuclear tests that had begun October 31, 1958. Now, ignoring the moratorium, the Soviets had begun to test a large number of high-yield weapons in the atmosphere during the fall of 1961. Although the United States had limited its testing during this period to underground shots, President Kennedy, on March 2, 1962, stated that he found it necessary for U.S. tests to resume. The United States began atmospheric testing with the *Dominic* series on April 25, 1962. This was the last U.S. atmospheric test series, however, because some months later agreements to cease aboveground testing were negotiated with the Soviet Union, and a limited test ban treaty was signed in Moscow, August 5, 1963. Signatories to the treaty, which took effect in November 1963, were the United States, Great Britain, and the Soviet Union.[1,2]

A determination by the Commission to terminate the Aircraft Nuclear Propulsion program in March of 1961 resulted in the identification of some 30,000 classified documents Project-wide. When declassification review was completed, approximately half the reports were made available for announcement and ultimate public availability; this caused a serious, unscheduled workload for OTIE.

The numbers of Access Permits in the Civilian Application Program, which had shown a slowdown in the late 1950's, continued their decline in 1961. At the end of the year, 835 Access Permits were in effect compared with 1060 in 1960. The AEC's program of continuously declassifying technical information over the years and making it publicly available was considered to be the chief cause for the reduction of participants in the Civilian Application Program.[3]

Outside the AEC, but adding greatly to the excitement of the period, was the U.S. success in the newly inaugurated space program. On February 20, 1962, John Glenn, Jr., became the first U.S. astronaut to enter orbit by circling the earth three times. It was also in 1962, on June 8, that President Kennedy created the Office of Science and Technology in the Executive Office of the President.[2]

11.1 *SIGNS AND PORTENTS OF CHANGE*

At the opening of the decade of the 1960's, the OTI Director and Extension Manager might have wondered at how well the initially designed technical information program, developed by earlier managers, had become so firmly grounded in the AEC's operational activities. Acknowledged as one of the important Commission programs, the technical information program had long ago fulfilled its initial objective (i.e., publication of the U.S. historical record of the atom). In addition, it had announced for AEC researchers, U.S. industry, and the general public the AEC's latest research findings as they became available for release. Under regulations provided, the program had controlled the dissemination of research information that was classified. It had successfully secured foreign information for both federal and domestic program enrichment. And it had become immersed in a new effort to provide information to the public, at all levels, on the benefits of atomic energy.

It was a relatively uncomplicated program initially, but domestic and international events and the strong influences of changing Administration policies had, through the years, considerably modified directions the technical information program was obliged to take. As each incoming President announced new initiatives for the Atom and ordered new courses for its development, the technical information program would be adjusted accordingly.

As a result, heavier information program burdens were now being carried by OTIE, with minimal staff and few financial improvements. The amount of scientific and technical information chosen worldwide for announcement was doubling each five years and had to be accommodated. To the AEC's early information program, rooted primarily in carrying out the requirements of the Atomic Energy Act, were now added:

- The needs of the Civilian Application Program, along with the creation of special scientific and technical books; Technical Progress Reviews; the engineering drawings and announcement program; the domestic depository library program; and special industrial participation activities;
- The enormously large report publication and indexing programs associated with results of U.S. weapons testing;
- The providing of foreign access to U.S. AEC research information for U.S.-supported international conferences on peaceful uses of atomic energy, the foreign depository library program, the bilateral arrangements activities, and requirements connected with the U.S. initiatives in setting up Euratom and the International Atomic Energy Agency;
- An educational program that would create a better understanding of the uses of the atom both as an energy potential and for its promises in medicine. Associated with this program were the traveling exhibits, museums, film libraries, and special technical brochures—all of which included plans for a highly responsive capability by OTIE to handle public requests for publications and films.

As it had in the past, Management was continuously searching for ways to design systems that would improve production and provide a more efficient utilization of staff. Mechanization, where possible, had been (and continued to be) the best means of coping with increased workloads when commensurate staffing needs were not forthcoming. However, now appearing on the horizon were clouds, somewhat ominous to many, that portended radical change in ways information could be recorded, processed, communicated, and retrieved.

Those bold enough to speculate about the future hypothesized a different world for everyone involved in the field of information. Changes were imminent it was believed, and everyone was expected to prepare for radical change. In the coming new age, information would be recorded, processed, and used in ways that were electronically based. Future systems would be designed to process information faster, more accurately, and with fewer hands involved. A complete reeducation of information managers would be required to facilitate changes and to introduce workable new systems geared to a new Information Age.

Most of the anxieties surrounded the threatened changes related to what was still perceived by some as the mythical Computer. Although fears and uncertainties existed in connection with a computer-related future, offsetting these concerns were the promised riches about which everyone confidently believed: the ability of computers to do a great deal more without additional money and staff. Ready to adapt, the Division of Technical Information attempted to become fully attuned to and synchronized with all of these portents of change, and DTI worked diligently to discern those aspects of the emerging Information Age which could be practically implemented to the Commission's advantage.

Much of the AEC's technical information program for this period reflected the energies of the Panel and program managers in their efforts toward discerning a clearer picture of the future into which all participants were being inexorably drawn and to identify and understand the equipment, systems, and processes likely to be required for the new decade.

11.2 *OFFICE OF TECHNICAL INFORMATION REORGANIZED*

Effective April 6, 1961, Edward J. Brunenkant was appointed Director, Office of Technical Information. Since August 29, 1960, he had served as Acting Director.[4] In his first position with the AEC, Brunenkant had served as an Industrial Information Officer with the Industrial Information Branch. Later, after becoming Chief of this Branch, Brunenkant developed a staff dedicated to facilitating industrial access to information developed as products of AEC research. It was under Brunenkant's leadership that a successful and highly regarded technical book-writing program was established, including the initiation of the Technical Progress Reviews. These much respected activities, which received assistance from the OTIE Publications Branch (Oak Ridge) in their implementation, were developed primarily in support of the Civilian Application Program.

On May 17, 1961, Brunenkant announced an organizational restructuring of the Office of Technical Information.[5] In recognition of the then strong interest among federal agencies in gaining knowledge about automated systems utilizing computers for processing and communicating information, Brunenkant established an Information Services and Systems Branch. Edward T. Sullivan was named chief of this new branch. Although computers suitable for practical adoption in large information systems were still on the horizon, there was reflected in the new organization structure the intention of management to study and explore the computer's potential for recording, processing, controlling, and disseminating technical information.

A Scientific Publications Branch, headed by Joseph G. Gratton, was also named in the new structure. Its purpose was to plan, direct, and administer a program for the writing and publication of scientific books, handbooks, monographs, technical progress reviews, technical newsletters, and proceedings of scientific meetings.

An Exhibits and Educational Services Branch was headed by Richard M. Berg as Acting Chief. Berg had also been named Deputy Director of OTI and thus served in a dual capacity. The purpose of this branch was to plan and administer a program of exhibits and demonstrations to inform U.S. students, teachers, and the lay public of the fundamentals of nuclear science and its applications. This branch was also responsible for developing educational booklets and brochures for use in answering inquiries from students and teachers. Planning and managing technical information centers in international exhibitions and scientific conferences were also this branch's responsibilities.

Also under Brunenkant was the Headquarters library, headed by Madeleine Losee, Acting Chief. The library's responsibility involved providing technical library services to AEC Headquarters and legislative reference services to both AEC Headquarters and field offices. It also coordinated purchases of books and technical periodicals for Headquarters offices' use.

An Administrative Unit, headed by Florence E. Buckley, provided staff assistance on budget and financial matters. This group also developed and administered office procedures and carried out other miscellaneous administrative duties on behalf of OTI.

Last box in the new organization chart was the Oak Ridge Office of Technical Information Extension (OTIE), headed by Robert L. Shannon, Chief. OTIE Assistant Chief was William M. Vaden, who had been named to that position on January 3, 1961. As stated in the organizational announcement, the Oak Ridge Extension "plans, directs and coordinates all publishing and reference functions assigned to the Oak Ridge Branches of the OTI Extension, including the acquisition, organization, reproduction, and dissemination of scientific information in support of the AEC's research and development, civilian application, weapons, international cooperation, and educational assistance programs."

11.3 *ORGANIZATIONAL NAME CHANGE: DIVISION OF TECHNICAL INFORMATION (DTI)*

In the following year (August 1962), a new organization chart showed a slightly modified organizational name change. The Office of Technical

Information (OTI) had been accorded divisional status. The Oak Ridge office, retaining the position of Extension, thus became Division of Technical Information Extension (DTIE). Organizational changes a year and a half later showed the position of Chief, Headquarters Library, being filled by Walter A. Kee. Occupying the Exhibits and Educational Services Branch as Chief was J. William Young.

Except when the changing of program emphases and reassignment of personnel made revisions to the organization necessary, this DTI headquarters structure, as well as its name, remained basically unchanged for almost a decade. A still later organizational modification involved the development of a stronger coordinating role related to international conferences. In 1967, the necessity for an information services and systems group, staffed as a Headquarters activity, was no longer considered necessary and was eliminated.

The preponderance of effort involved in carrying out the operational aspects of the Division of Technical Information program was a function of the Oak Ridge Extension. The major portion of the program budget was consigned to DTIE for program necessities involving materials and supplies, salaries, and overall administrative effort. For Fiscal Year 1962, the authorized ceiling strength for the Extension was 223 regular positions. For Headquarters, although fluctuations occurred during the years, approximately a tenth of that number was required for program and policy needs.

11.4 *EXHIBITS AND EDUCATIONAL SERVICES PROGRAM INTENSIFIED*

In 1961, the Commission reorganized its educational assistance activities by establishing a coordinator of nuclear education and training within the Office of the Assistant General Manager for Research and Development. Objectives of this new office were to assist in orienting the public on nuclear energy and to diffuse nuclear technology throughout all pertinent curricula.[3]

In 1962, to help educational institutions in broadening training in nuclear energy education and to strengthen scientific education generally, the AEC offered several kinds of assistance. In order to consolidate the then existing educational programs, the Division of Nuclear Education and Training was established.[6,7] Russell S. Poor was named Director. The kinds of assistance included

- Grants to colleges and universities for equipment and nuclear materials.
- Fuel-cycle assistance for college and university reactors.

- Fellowships for engineering and science students.
- Institutes for high school and college teachers (frequently cosponsored by the National Science Foundation).
- Cooperative projects for educational institutions by AEC laboratories.
- Support for publications, visual aids, and curricula development.

Through the coordination of the DTI Headquarters Exhibits and Educational Services Branch, DTIE became the principal service point for supplying educational materials and answering requests for information pertinent to this educational program activity. (See Fig. 11.1.)

Twenty-three traveling atomic energy exhibits were operating within the AEC's Domestic Exhibits Program in 1961. It was estimated that, during the six years the program had been in formal existence, more than 38 million persons in the 50 states had viewed the exhibits.[3]

The Oak Ridge Institute of Nuclear Studies (ORINS), contractor operator of the American Museum of Atomic Energy, counted its millionth

Fig. 11.1 Students visiting the Oak Ridge Office of Technical Information Extension select educational materials for class projects (1963). (AEC photograph by T. R. Cook.)

visitor in 1961. Opening date of American Museum of Atomic Energy was on March 10, 1949—the first day that free public access to the Oak Ridge community had been given. The museum had been installed in a refurbished wooden frame cafeteria building built during World War II. By 1961, the Museum had grown to a size that comprised approximately 12,000 square feet of exhibit space.

In addition to two large manned "You and the Atom" exhibits designed for State Fairs and large population centers, ten unmanned package-type "Atoms in Action" exhibits were booked continuously in schools, conventions, county fairs, and museums. A new "Your Stake in the Atom" exhibit was housed in an "Exhibitdome." This structure, comprised of a 50-foot aluminum geodesic frame supporting a plasticized nylon sheeting, was constructed in 1961 as a traveling exhibit. Inside were animated exhibits, shown in three-screen, multiple-sequence motion pictures. A short stage presentation, to assist visitors in a better understanding of nuclear science, was also provided.

For the 1964–65 New York World's Fair, an exhibit was prepared in two sections: "Atomsville USA," a children's display, and "Radiation and Man," an exhibit for older students and adults.

To inform scientists and engineers about the scope of nuclear science information available to them, where it could be located, and how it could be used, a special exhibit had also been constructed. Known as "Nuclear Information for Science and Industry," this exhibit was manned by Commission staff members who scheduled their showings at professional meetings, conventions, and scientific forums.

From 1965 through 1967, Charles W. Pelzer, as Assistant Director for Exhibits, headed the Headquarters program that incorporated both foreign and domestic exhibits. Assisting Pelzer in 1965 were J. William Young, Special Assistant for Halls of Science; John B. Cassoday, Chief Exhibits Operations Branch; and Thomas E. Hughes, Chief Exhibits Development Branch. Assigned as Overseas Exhibits Managers were Burrell L. Wood, Jr., Harry O. Compton, and Milton H. Clark. In 1969, Burrell L. Wood, Jr., was appointed Assistant Director of Exhibits, and Thomas S. D'Agostino replaced Cassoday as Chief, Exhibits Operations Branch.

In foreign nations, the AEC established these scientific exhibits in cooperation with host atomic energy authorities. Extensive planning was involved from the point of conception to execution of the exhibit. Raymond L. Metter, well known throughout AEC field offices and Project sites as the DTIE Production Control Officer, began in 1962 to devote much of his time and effort to the Headquarters Exhibits Program.

Production Control Office responsibilities were left to his assistant Daun Sample during Metter's frequent overseas exhibits assignments.

DTIE's responsibilities included selecting materials for the exhibits' scientific libraries (books, reports, microcards, films, brochures, indexes), boxing, shipping the materials, and from time to time, "manning" portions of the exhibit. Frequently, special publications (obtained from public sources) and visual materials were procured and shipped.

Eventually, Metter's foreign exhibit responsibilities involved planning as well as directing the actual installations. From DTIE's Monthly Report of Operations, it was reported that, in 1963, exhibits were planned for Vienna, Austria; Bogata, Colombia; Belgrade, Yugoslavia; and Montevideo, Uruguay. In 1964 exhibits were arranged for the Third Geneva Conference and the New York World's Fair. In 1965, planning began for exhibits in Lisbon, Portugal; Utrecht, The Netherlands; and San Jose, Costa Rica. For 1966, work was begun for exhibits in Dublin, Ireland; Nicaragua; and Bari, Italy. In 1967 and 1968, plans were made for exhibits to be shown in Tehran, Iran; Taipei, Taiwan; Seoul, South Korea; and Rio de Janeiro, Brazil.

In addition to Metter, other DTIE employees who assisted manning foreign exhibits from time to time were Paul Postell, Margaret Pflueger, John W. Norris, and Daun Sample. In 1963, Dr. Raymond K. Wakerling, Head, Information Division, Radiation Laboratory Berkeley (as a Headquarters assignment), assisted in managing the exhibit library in Belgrade, Yugoslavia.

Aside from the literature provided at the various exhibits and demonstrations, printed cards listing documents available from the AEC for the asking were distributed as hand-outs to visitors. The Educational Materials Section of the Office of Technical Information Extension, Oak Ridge, had the responsibility of responding to these card requests. To answer these information inquiries in 1961, packets of informational literature, reading references, and individual answers to specific questions were forwarded to more than 85,000 requesters comprised of college, secondary school, and elementary school students; teachers, librarians, and guidance counselors; to adult study groups; to teachers' institutes; to attendees at conferences and seminars; and to the general public. During 1962, the numbers of packets sent to these organizations rose to 92,000.[8]

In the last half of 1962, the first booklets of the series "Understanding the Atom," written to simplify and improve the answering of inquiries on nuclear topics, were published. These educational publications were printed in the millions of copies during their lifetime as a series. Their publication, maintenance and revisions, and distribution to requesters were accomplished by DTI's Extension in Oak Ridge.

(See also Secs. 5.7, 7.11, 9.3, 10.1, 11.2, 13.10, 16.8, 17.1, and 18.6.)

11.5 *PLAN TO MECHANIZE* NSA'S *INDEXES RECOMMENDED BY DOCUMENTATION, INC.*

A progress report on the contract with Documentation Incorporated (commonly referenced as Doc. Inc.) for a machine systems study was presented by the Technical Information Panel's Committee on Systems on April 20, 1961. The study had been recommended by the Panel at the preceding meeting.

The Committee's Minutes reported that it was the Committee's understanding that Doc. Inc. planned to work from the original document material in order to provide a deeper indexing of the coordinate type suitable for mechanized handling. The study would thus allow a comparison of the retrieval power of such indexing with subject indexing used in *NSA*. It was also the Committee's understanding that Doc. Inc. was to experiment with the format of indexes as outputs from a machine store to determine whether they would be suitable for a publication such as *NSA*. Thus, there were two important phases of the study: the actual indexing and the mechanics of presenting the product.

The Committee complained that in the interval since the last Technical Information Panel meeting an agreement apparently had been reached between OTI and Doc. Inc. to limit the effort to the second part of the problem. The Committee did not know of this change. The reasons given to the Committee for the change were not particularly satisfying, and both aspects of the problem were important.

In commenting on a circulated paper on preparing mechanized indexes for *NSA*, the Minutes indicated that, although the computer apparently was effective in sorting, sequencing, and arranging a set of indexes comparable to those published in *NSA*, there was no indication in the paper how deeply the matter of the comparative quality of the two types of indexes was examined. Until this was known it was the Panel's view that little was added to their knowledge of the situation.

Aside from the matter of depth of indexing, the study did illustrate the suitability of a computer to accomplish rote operations expertly and with great rapidity. The procedure then currently used to produce *NSA*'s corporate and personal author indexes was to repeat a short title under the selected headings for these indexes. For the subject index, however, intellectually derived subentries (modifier lines) were obtained from the text and were unique to each newly announced item. All modifiers were prepared for alphabetical listing under chosen main headings.

A unique aspect of the Doc. Inc. study was a proposal to create a single "uniform entry" for each new document and to associate this uniform line of information with each index: corporate author, personal author, and subject. Thus one intellectually created uniform entry would be used as often as required by the computer for all index entries (whatever the numbers needed) and as was stipulated by the indexer.

To prepare subject indexing for the *NSA* system, intellectually derived time-consuming modifier lines were created to fit each chosen subject heading, and these had to be composed and keypunched for each subject entry. A purpose of the study was to illustrate how such entries could be simplified through machine manipulation of only one uniform entry line used in conjunction with each identified subject. In addition, instead of selected subject headings, keywords (i.e., descriptors) would be used with the uniform entry line instead of standardized and coded *NSA* subject headings that required individual modifiers.

At the Thirty-Third Panel Meeting (October 1961), the Minutes stated that, although the study demonstrated that an index similar to *NSA*'s could be produced with the help of a computer, it did not prove to the satisfaction of the DTI staff that acceptable computer indexes could be prepared on a production basis with measurable savings in dollars or staff years. The hard-to-read, all-capitals typeface produced by the IBM computer printer was also much inferior to the *NSA* style and was considered unacceptable.[9]

Many years later, however, a variation of the uniform entry would be used for *NSA*. Instead of the manufactured uniform entry line, a shortened version of the title would be used in its stead, enhanced by a subheading or "filing" term for each of the document's index entries. Improved upper- and lower-case typefaces eventually to be provided by IBM (and still later unlimited type selections from photocomposition devices) would be available at the time of the adoption of a uniform entry line for *NSA*'s indexes.

Before that indexing change would occur, however, the concept of a machine-derived index, as proposed by Doc. Inc., would be adopted by the then youngest Federal government technical information activity: NASA's Office of Technical Information and Education Programs. There, it would be used for the creation of *STAR** indexes. When the new machine-structured index (designed by Doc. Inc. to incorporate a uniform title with descriptor terms) was announced for NASA, Melvin S. Day had only

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*Secondary announcement publication for NASA reports.

recently arrived from the AEC to become Director of NASA's new scientific and technical information program.

11.6 *AEC DEPOSITORY AND PROJECT LIBRARIANS MEET IN OAK RIDGE*

The AEC Depository Library program was very useful as a basis for talks between U.S. and foreign country representatives and as a bargaining instrument for bilateral exchange discussions. Each Atoms-for-Peace Library was being maintained by DTIE through shipments of the most recently received and announced reports, either as hard copy or microcards. Domestic depositories were very useful as referral addresses by DTIE reference personnel when responding to public inquiries. How well the libraries' obligations to the public were being met was not very well known, however. Occasional side-trip inspections by DTI/DTIE personnel—made possible while conducting other assignments—had provided hints that in many cases AEC-supplied materials were ill-housed and poorly recorded and displayed for public use by the designated depositories.

A meeting of depository and AEC project librarians[10] was held in Oak Ridge on September 11–13, 1962, at the DTIE facility. It drew more than 150 attendees from AEC contractors, foreign and domestic libraries, and others involved in creating or communicating scientific and technical information. The meeting theme was "The Literature of Nuclear Science." Foreign representation came from Gmelin Institute in Germany, Euratom in Luxembourg, Atomic Energy of Canada Ltd., and the Canadian Research Council. Outside speakers included Bernard M. Fry and Dwight Gray of the National Science Foundation, Pauline Atherton from the American Institute of Physics, and William Hammond of Datatrol Corporation.

In addition to imparting a better understanding of the depository collection and the mechanics involved in its maintenance, the meeting also helped place the depository collections in proper perspective for DTI management with respect to their placement in the various libraries where they were housed. In some cases they were only a small part of a university or technical library collection. As reflected generally by the conference attendees, relatively little use was made of the collections by the public or industrial concerns. In most cases, principal users were university faculty or students.

A highlight of the meeting was banquet speaker Alvin Weinberg, Director of the Oak Ridge National Laboratory. A world-renowned nuclear physicist, Dr. Weinberg had been appointed to the President's Science

Advisory Committee and had been named Chairman of the Subcommittee on Science Information. His speech, based on ideas from his soon-to-be-published *Science, Government, and Information* report to the President, was a reflection of a growing national anxiety about the alleged disorder of information emanating from U.S. scientific research.

11.7 *THE "WEINBERG REPORT"*

Published in 1963, *Science, Government, and Information,* was a product of the President's Science Advisory Committee which outlined, as stated in the publication's subtitle, "The Responsibilities of the Technical Community and the Government in the Transfer of Information." Dr. Weinberg chaired the panel.[11]

A major thesis of the report was that transfer of information was an inseparable part of research and development. The report stated further that all those concerned with research and development should equate the responsibility for the transfer of information therefrom with that of the research and development itself.

Pointing out that the crisis, as far as the Government was concerned, was the emergence and sudden growth of report literature emanating from federal research projects, the report contrasted the manner of treatment of this class of information with that reported in journals and other "refereed" systems.

The report also cited the emergence of new processing and searching techniques that were based on concepts involving automated machinery. These new devices gave promise to documentalists and administrators who were working to find ways to solve the crisis of information handling, transfer, and retrieval.

The report summarized major recommendations grouped and addressed to (1) the technical community and (2) government agencies. To the technical community, the report recommended that

- It recognize that handling of technical information was a worthy and integral part of science.
- The individual author must accept more responsibility for subsequent retrieval of what was published.
- Techniques of handling information must be widely taught.
- The technical community must explore and exploit new switching methods.
- Uniformity and compatibility were desirable.

To Government Agencies, the report recommended that

- Each federal agency concerned with science and technology must accept its responsibility for information activities in fields that were relevant to its mission and must devote an appreciable fraction of its talent and other resources to support information activities.
- To carry out these broad responsibilities each agency should establish a highly placed focal point of responsibility for information activities that was part of the research and development arm (not of some administrative arm) of the agency.
- The entire network of Government information systems should be kept under surveillance by the Federal Council for Science and Technology.
- The various Government and non-Government systems must be articulated by means of [listed] information clearinghouses.
- Each agency must maintain its internal system in effective working order.
- Problems of scientific information should be given continued attention by the President's Science Advisory Committee (PSAC).

The impact of the "Weinberg Report" on the technical information community, and in particular on federal information organizations, was considerable. The great stir was caused mainly by the Panel's view that scientific information was or should be treated as an integral part of science. Concepts of cooperation, compatibility, and networking among federal agencies were not new. But in their context as Panel recommendations to the President (who had recently established an Office of Science and Technology in his office), they soon became the focus of a national effort toward information sharing and reducing duplication among federal agencies.

On this point, in May 1962, the Federal Council of Science and Technology agreed that each federal agency would establish "a high-level focal point of responsibility for all scientific information functions within their organization," and "that a new Committee on Scientific Information of the Federal Council, composed of these officials, would be established."[12] Initially referred to as COSI, this group became known more familiarly as COSATI, "Technical" having been added to the title in April 1963 to become the Committee on Scientific and Technical Information.

One very important and long-term consequence of the recommendations was the sudden emergence of scientific information and data centers that became a part of or allied with national laboratories, industrial groups, and other research institutions. As an example, the Department of Defense identified 110 information centers in 1963, of which 48 chose to call themselves specialized information centers.[13]

Whereas the AEC information program had considered technical libraries as the primary means for imparting information to the broad user community, the problem of communicating scientific and technical information was now multiplied by the numbers of new information and special data centers that mushroomed at federal and industrial research sites.*[14] Eventually the Technical Information Panel would appoint a subpanel on specialized information centers to assist in their integration, as appropriate, into the overall concerns of the AEC's technical information program.

11.8 *AN ATTEMPT TO ESTABLISH A MORE RESPONSIVE PANEL*

Having served the Commission continuously for more than a decade essentially unchanged in structure, the Technical Information Panel and its Chairman began to seek ways to improve its effectiveness Project-wide. The earlier establishment of committees to represent Panel interests more broadly was indicative of this concern.

The way the committee structure was being utilized was reflected in a letter from Edward J. Brunenkant, Director of the Division of Technical Information, to Thirty-fourth Panel Meeting attendees.[10] In his letter, Brunenkant stated that from previous years' experience, and from expressed interest of most panel members, he did not plan to assign particular agenda items to a Panel Committee for development of formal recommendations. Instead, he had grouped agenda items for possible Committee consideration. Although each item would be discussed before the full Panel, Committee Chairmen might wish to hold meetings in advance of the full Panel meeting in order to develop positions or to discuss certain items at greater length than probably would be possible at the formal meeting.

It was not until the Thirty-fifth Panel Meeting (December 1963), however, that Brunenkant proposed a plan that would, in effect, reduce the Panel to a steering committee comprised only of national laboratory

*As of March 25, 1963, the following groups were described as Information Centers by the Oak Ridge National Laboratory: Research Materials Information Center, Nuclear Data Department, Nuclear Safety Information Center, Accelerator Information Center, Charged Particle Information Center, Shielding Information Center, Internal Dose Estimation Group, Neutron Cross-Section Collection, Engineering Data Collection, and Isotopes Information Center.

representatives, augmented by seven specialized committees. The committees, meeting as frequently as required, could draw on a greater number of specialists and outside talent than was then feasible under the original Panel plan. According to Brunenkant, "It was thought that this arrangement would increase the number of participating specialists, increase the frequency of meetings, improve communications and the interchange of ideas, broaden the scope of activity coverage, and strengthen the network of cooperation."[13]

In the ensuing discussion, the Panel expressed apprehension that should the Panel be dissolved, communication among sites would be lost as well as the valuable status Panel membership provided the sites. The loss of personal contacts would be too great, and the ability for sites to communicate directly with the Director, DTI, about contractors' interests and views would be lost. The Chairman concluded that a steering committee should be appointed to be comprised of both site and off-site representatives. This group would receive and review reports from chairmen of ad hoc committees and recommend appropriate action or summarize and present their conclusions to the Director, DTI. Panel members were requested to suggest members of their staffs to serve on committees.

Committees suggested were Information Research, Information Systems, Libraries, Publications, Specialized Information Centers, Exhibit and Educational Services, Training, and Industrial Participation.

(See also Secs. 3.4–3.6.)

11.9 *THE INFORMATION SYSTEMS COMMITTEE ISSUES AN ACTION PAPER*

Machine systems, automation, new concepts of indexing, and microminiaturization of documents were typical of topics that were considered to be within the purview of special committees. At the Thirty-fourth Technical Information Panel meeting (September 1962), the following agenda items were assigned by the Chairman for the Information Systems Committee to present for Panel consideration.[10]

Permuted Title Indexes. Also known as KWIC (keyword in context) indexes. Several contractors were beginning to create and use such indexes. Organizations with the IBM 7090 system installed and the ability to use the Bell Laboratories software were in enviable situations because of the faster operations and overall improvements then being announced and available.

Creation of Magnetic Tape and Punched Card Format Versions of NSA. A suggestion that DTIE consider the distribution of punched card or magnetic tape versions of *NSA* and *ACR* for the use of contractors who might wish to use them in mechanized information retrieval systems was received. The Committee concluded that it was too premature to begin such a service but offered *Research and Development Abstracts (RDA)* for possible experimental use.

Research and Development Abstracts (RDA). This announcement publication, destined to have only a limited number of issuances, was manufactured by DTIE in a manner analogous to *NSA*. It appeared at irregular intervals and (although incorporating abstracts of AEC reports) cited report literature out of *NSA*'s scope. Because of its smaller size, it became an ideal announcement tool for experimentation.

The third issue of *RDA* was selected by DTIE staff for testing an experimental index that was prepared by capturing keywords (underlined terms appearing in titles and abstracts) that had been chosen at the time of indexing. The coded, underlined words, captured on punched paper tape, were later transformed into magnetic tape data for processing on the IBM 7090 equipment at the Oak Ridge Gaseous Diffusion Plant (ORGDP). Index terms could be arranged alphabetically as main headings; below each of them a short title of the abstracted and indexed item was given. Several experimental issues of *RDA* were created as described; these mechanically produced indexes had no intellectual involvement by the indexers other than the selection of underlined terms. For comparison, the more formal *NSA* style indexes and the automatically computer-generated indexes were bound together in the same issues.

Although the subject index was unsuitable for use in cumulating a long series of issuances or bulletins, the experiment nevertheless demonstrated that an effective, single-issue index could be satisfactorily created that was equal to and, in some respects, superior to the standardized subject heading type of printed index.

Use Preference: Microcards or Microfiche? DTIE planned to start production of micronegatives (microfiche) later in the year and to discontinue supplying full-size copy from microforms except as specially arranged. By supplying micronegatives, recipients could meet their own needs for hard copy by securing special enlarging and reproduction equipment for this purpose. (Document reproduction involving the use of opaque microcards and optical equipment, designed around reflected light, was considered generally to be unsatisfactory.) Additional vexing problems were related to lack of standardization, both in the size of the microform (AEC 3 by 5 in., NASA 5 by 8 in., and Thomas Register 4 by 6 in.) and the varying reduction ratios for each. A standard would eventually be published by COSATI that would reconcile these differences.

Center for Research in Scientific Communication. Panel Chairman Brunenkant stated his strong belief that a need existed for a center for research in scientific communication. The Committee concurred in the belief that the AEC should take a lead in promoting research in the area of science communication.

Selective Dissemination of Information (SDI). The Committee discussed an IBM proposal for an experiment in selective information dissemination (SDI). A requirement for the experiment was that the participating organization should possess an IBM 7090 computer. Involved would be the handling of 6000 items per month against 500 subject profiles for a one-year experimental period.

Documenting DTI Experience in Information Handling. Many Panel members believed that the valuable experience gained by DTI/DTIE in handling scientific and technical information should be recorded properly for the use of others newly entering the field. A collection of papers should be developed for editorial consideration.

Establishment of a Computer Programs Clearinghouse. The desirability of setting up a clearinghouse for computer programs was discussed at length. It was generally believed that much programming was being duplicated throughout the Project and, although some programs had been initiated (Project SHARE and efforts by AIChE and ANS), the matter needed further investigation.

Support of a Science Newspaper. According to the Committee: "The NSF has been studying a proposal to support the publication of a paper that would do for science what the Wall Street Journal does for business and finance. . . . There are many of us who believe that a science newspaper has a great potential, and that it could be a completely self-supporting commercial venture. The AEC should do whatever it can to encourage the publication of such a news medium."

Some of the subjects discussed at the Thirty-fourth Meeting were later hardened into projects for execution; some were not. Their presentation illustrates the breadth of topics under consideration in the early 1960s and the vitality of the Panel in dealing with cutting-edge, technical issues and questions that were rife during this period.

11.10 *CURRENT RESEARCH IN PROGRESS PLANS REVIEWED*

At the Thirty-Fourth Panel meeting (September 1962),[10] Members were invited to comment on the pilot issue of a publication created to cover current AEC research projects. This publication resulted from a Panel suggestion at the preceding meeting and was limited to projects sponsored by the Fuels Branch, Division of Reactor Development; 57 projects were incorporated.

A similar project was being developed for the Division of Biology and Medicine. A total of 109 project publication sheets, citing the Division of Biology and Medicine, had been obtained from the Science Information Exchange, Smithsonian Institution. Introduced as a pilot program, it was planned that a publication would be available for review by AEC contractor biology division directors late in 1962. A second issue in planning would contain in excess of 600 items. All information was being keypunched for machine retrieval by Division of Biology and Medicine staff.[15]
In responding to questions from the Panel, Chairman Brunenkant stated that he intended to discuss with other Program Divisions the production of similar publications covering research in progress.

On a separate topic, it was pointed out that research in progress information, covering multiagency interests, was routinely being compiled by the Science Information Exchange, Smithsonian Institution. It had been announced that this effort was being expanded and possibly would be established at another agency.

11.11 *SPECIAL INDEXING TECHNIQUE INTRODUCED FOR RADIOBIOLOGY BIBLIOGRAPHIES*

Two bibliographies on radiobiology were being prepared concurrently in two separate locations through the oversight and guidance of DTIE. One bibliography (TID-3097) was expected to contain more than 10,000 abstracts covering the literature on radiobiology from 1895 to 1957. The second (TID-3098), on the literature through 1960, was expected to contain upwards of 12,000 abstracts. The first bibliography was prepared under the guidance of Dr. Mary Lou Ingram, University of Rochester. The second was prepared by the Technical Literature Section of DTIE.

To manually index such monumental works by conventional means was considered too vast an undertaking. It was therefore decided to prepare separate KWIC indexes for each of these bibliographies, using the latest software adaptable for IBM 7090 machines. A single index volume, planned for both bibliographies, would be constructed by keypunching titles from both volumes separately. Prior to merging, titles would be reviewed, edited, and information included to allow permuted, computer-added cross references as required to index the topics. The construction of a cross-referenced KWIC index to multiple volumes was a highly original concept.[10]

11.12 *THIRD CUMULATIVE* NSA *INDEX PRODUCED*

In May 1962, a new five-year cumulative index to *NSA* was completed. Divided into four sections (personal author, corporate author, subject, and numerical), the total index comprised nine volumes. Nearly 115,000 scientific and technical reports and articles were represented in the index, which covered the years 1957 through 1961 (Volumes 11 through 15). The photomechanical system installed in 1959, utilizing the Recordak Listomatic Camera (see Sec. 10.12), was crucial to its successful completion. Indexes to nuclear science information abstracted since 1948 appeared in two previous multivolume indexes: Index to *NSA* Volumes 1–4 and Index to *NSA* Volumes 5–10.[15]

11.13 *IMPROVEMENTS IN* NSA *COVERAGE ACCOMPLISHED THROUGH CONTRACTS AND AGREEMENTS*

Because of the large number of journals reporting information relating to radiobiology, DTIE found it infeasible through its own resources to attempt comprehensiveness in this subject, particularly since many journals had averaged only one or two articles per year in this field. This condition was ameliorated when a contract was let with Henry H. Dix, Johns Hopkins University, in the latter part of 1962. Mr. Dix, also an abstractor for *Chemical Abstracts* and *Biological Abstracts,* agreed to regularly scan, select, and abstract articles from 232 journals covering biology and medicine. Similar contracts were later established as "cottage industry" enterprises with Oak Ridge housewives who had had working experience in the DTIE program. From time to time, contracts to abstract articles from specifically assigned journals were let with Miriam Guthrie, Julia Redford, Anne Ward, and Carol Oen—all local Oak Ridgers.

The American Institute of Physics and DTIE agreed on a procedure whereby copy of page proofs of *Physical Review* were sent to DTIE as soon as possible after proofreading. By using this advance copy, DTIE was able to abstract and index *Physical Review* articles for announcement in *NSA* about three weeks before the printed copy could be available to the public. This arrangement was eventually extended to *Physics of Fluids.*

DTIE also entered into an agreement with the Department of State whereby the State Department would procure Russian books in the field of nuclear energy for the Commission. A sum of money was deposited with the Department of State for such procurement by personnel stationed in the Moscow Embassy. This access to Russian book literature very early became known as the "Our man in Moscow" channel and for years was used as a means of procuring specially designated, commercially available, Russian books.[16]

11.14 *1961 PROGRAM HIGHLIGHTS*

Other highlights of the Technical Information Program for 1961 included

- Adding 15 new motion picture films to the Commission's library of films available for showing to professional and popular audiences.
- Adding a new multipurpose exhibit, "Your Stake in the Atom," to the nuclear energy demonstration units touring the nation.
- Making available to the public a total of 6200 new unclassified technical reports, setting a new record for any single year.
- Publishing six technical books, completing seven manuscripts, and signing contracts with four societies for the preparation and publication of a series of monographs.

The Commission's American Museum of Atomic Energy in Oak Ridge had its millionth visitor.

Each DTIE program for the years 1961 and 1962 (and partially for 1963) is summarized in "Program Summaries" for the stated years.[17] Prepared at the request of the DTIE Manager, these are excellent reference sources on descriptions of programs, activities, problems, plans, and staff effort to accomplish the various DTIE tasks during the stated periods.

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THE PULL TOWARD MECHANIZATION

CHAPTER 12

As computer systems began to be adopted in the early 1960s as a means of information processing, control, and dissemination, managers of information organizations found it almost impossible to keep abreast of the advice and warnings proffered by self-styled Information Age savants. National and international conferences on mechanization were very popular, and agendas were structured to alert the uninformed about new systems under development and ways to maximize use of the latest mechanical and electronic devices. Government information centers were ripe pickings for the "information troubadours" [as Division of Technical Information Extension (DTIE) Manager Robert Shannon called them] who went about banging their drums for grants and studies on how best to implement computerized systems in federal information programs.

"With science and technology emerging as important instruments of policy, the manner in which this nation fosters creative research and development and provides for its effective management is one of the major issues for executive and legislative decisions today." So states the Foreword to the *Status Report of Scientific and Technical Information in the Federal Government,* published by the Federal Council for Science and Technology (FCST).[1] Recording and communicating the results of this research in ways that would permit its being shared by government and industry without duplication and replication of announcement were central to the issue of "effective management."

Staff members of the Division of Technical Information (including DTIE) had become active Committee for Scientific and Technical Information (COSATI) participants through assignments to the many panels (see Sec. 11.7) that had been set up by the Federal Council for Science and Technology to locate ways to more effectively manage information emanating from the nation's research and development (R&D) programs. Monthly meetings of the various COSATI panels usually required DTIE participation in some of the groups. Meetings were almost always arranged in a Washington, D.C., agency office, which required monthly travel to be scheduled for the DTIE Manager or Deputy (Robert Shannon or William Vaden) or later by Irving Lebow.

Many COSATI assignments eventuated into important reports for Committee consideration that were largely the product of DTIE input and labor. Representative of COSATI documents produced by DTI and/or DTIE effort were reports covering a comprehensive review of the Federal Depository Library programs and their overlap among agencies, a primer on the cataloging issues related to data tagging of reports and other information items selected for automated systems, and the facilitating of the publication of federal microfiche standards.

How best to design a system that would take advantage of existing and ever-changing technology and still accomplish all the essential and varied abstracting and indexing programmatic responsibilities was a management dilemma in the 1960s. The number of abstracts announcing and describing U.S. research and development was doubling each five years. When considering how to accomplish this upward-spiraling workload, there were worries about introducing new or untried systems that might be capable of meeting increased production requirements but might also cause serious unrecoverable production lapses should long shakedown periods result. These concerns for the future, as always, had to be considered along with meager budgetary increases for accomplishing the job.

The DTIE management foresaw a need to restructure its operational functions to allow, where applicable, the introduction of new technologies and systems that might more rapidly enhance fulfillment of the Commission's technical information program objectives. In late 1966 an organizational realignment was effected that separated DTIE into three major segments: Science Communication, Composition Processes and Manufacturing, and Documentation and Systems Development. New Assistant Managers were named for each of these new organizational groupings.

Irving Lebow, a former U.S. Atomic Energy Commission (AEC) employee, returned to DTIE from the National Aeronautics and Space Administration (NASA) in 1966 to become Assistant Manager for Documentation and Systems Development. For a number of months Thomas Hughes occupied the office of Assistant Manager for Science Communication. Upon returning to DTI Headquarters in 1967 for reassignment as Chief of Exhibits Development Branch, he was replaced in this office by James D. Cape, formerly DTI Chief of Technical Books and Monographs

Branch. By November 1, 1967, the Assistant Managers named for these offices were James D. Cape, Science Communication; Robert C. Dreyer, Composition Processes and Manufacturing; and Irving Lebow, Systems Development.

Aside from researching ways to handle the problem of communicating nuclear science research results, DTIE had, in addition, the necessity to stay abreast of techniques that could assist in handling the flood of public inquiries about atomic energy. These questions originated primarily from schools and organizations that had visited AEC exhibits in science museums or had participated in AEC educational programs or other programs arranged by AEC traveling exhibits personnel. Packaged information, created around the most-often asked questions, usually was provided to information requesters. Copies of relevant booklets from the "Understanding the Atom" Series were usually included. By the end of 1964, 31 such booklets were printed or nearing publication.

To illustrate the growth of the nuclear science educational program, requests answered for educational literature during February 1964 are compared with those answered during the months of February 1960 to 1963.[2]

February 1960 - 1000	February 1963 - 3980
February 1961 - 2400	February 1964 - 5420
February 1962 - 2600	

For a 20-month period (January 1961 to August 1962), more than 1500 letter requests were received from foreign countries. Approximately 70 percent were from South and Central America. Most of the remainder were from the developing nations in Africa. Almost 20,000 copies of various educational materials were sent by the AEC to individuals and schools in foreign countries during the indicated period. Of the requests from individuals, 83 percent were from students, 8 percent from teachers, 1 percent from librarians, and 8 percent not identified. Because of the large number of requests that originated from Spanish-speaking countries, many of the brochures were translated into Spanish.[3]

Also, the numbers of reports (copies) distributed to depository libraries outside the United States since the beginning of the Atoms-for-Peace Program to the end of 1962 approached 4,000,000.[2]

The enthusiasm, energy, and optimism that characterized the opening of the new age of information were chilled suddenly, however, when, on November 22, 1963, President Kennedy was assassinated in Dallas, Texas. Lyndon Johnson, in assuming the Presidency, vowed a continuation of the Kennedy agenda.

12.1 EARLY COMPUTERIZATION EFFORTS

Because of heavy financial investments made by the AEC toward the establishment and running of the major computer sites within the Oak Ridge complex [Oak Ridge National Laboratory (ORNL), K-25, and Y-12], the AEC Controller for many years was reluctant to approve a computer of the size and capability necessary to accommodate DTIE's needs. Although DTIE was one of the Nation's largest processors of technical information, it was advised to obtain computer assistance from one of the local Oak Ridge sites.

Through assistance from the AEC Oak Ridge Operations Office, DTIE was able and fortunate to secure the excellent services of systems analysts and equipment located at the Oak Ridge Gaseous Diffusion Plant (ORGDP) Computing Technology Center. By means of purchase orders, projects were defined and services requested. The ORGDP staff were assigned by C. L. Allen, Manager, to oversee DTIE tasks, and through them DTIE's earliest information mechanization projects were designed and implemented.

This early mechanization effort provided the experience necessary to design and construct much of the DTIE system that ultimately was housed within DTIE's home environment. The ORGDP systems analysts Ed Kidd, Fred Hutton, Charles Price, Jack Owing, George Parker, and Merilyn (Barnhill) Wright were outstanding in designing software for DTIE projects to which they were assigned, either individually or as teams.

Data submitted to the ORGDP Computing Center (also known locally as the K-25 computer) were encoded initially by DTIE staff in the form of punched cards. As systems were improved, cards were replaced by punched paper tape, and following still later came magnetic tapes. Inputted data were created for the purpose of producing *NSA* indexes and bibliographic publications and for accomplishing various studies on automating information activities, including schemes for retrieving information from the processed and stored data.

An early experimental program involved the use of computers for selective dissemination of information (SDI). Cooperating in this program of matching information content of data on the Commission's research results with the expressed information needs and interests of the user community were staff at Argonne National Laboratory and Lawrence Radiation Laboratory. Initially, keywords used in retrieval for SDI experiments were obtained from subject indexing and titles by machine; later it was decided to use the descriptor indexing being supplied to Euratom by DTIE.

Arrangements were made for Argonne Laboratory staff to translate to magnetic tape, for their own and for Euratom's use, the descriptor data originated by DTIE.

The usefulness of Keyword in Context (KWIC) indexes was explored by various DTIE departments. Mention was made earlier of a successful KWIC index to the Radiobiology Bibliography volumes. In addition, the DTIE Reference Branch collected and published information on the many domestic and international conferences on nuclear science. A KWIC index to this early compendium of nuclear conferences facilitated quicker responses to inquiries about this class of information.

The software developed to accomplish these early DTIE ventures into handling and processing information by computers is described in a K-25 Computer Technology Center report.[4] Recorded in the report are the codes for IBM cards and punched paper tape and codes for storage along with character sets and descriptions of the procedures used for receiving, processing, correcting, and disseminating information in magnetic-tape formats.

Because of the increasing amount of activity between the Computing Technology Center staff at K-25 and persons involved with publishing *NSA* indexes at DTIE—as well as requests for help in designing special research projects—it soon became obvious that an office, organized and structured to handle these speciality areas within DTIE, had to be established.

On February 18, 1965, Joel S. O'Connor entered on duty as Computer Systems Administrator.[5] Until this point in time, DTIE had a group of specialists operating machinery for keypunching, verifying, sorting, and duplicating various kinds of information—report number indexes, accountability records for sensitive documents, data cards for the Listomatic Camera operations, and magnetic tapes for Euratom indexes. Superbly heading this group was Oscar A. Schultz.

By using this section of the Document Management Branch as its base, DTIE was able eventually to justify and obtain an "input device" that would accomplish many tape processing and correcting chores locally. In 1966 an IBM System 360/20 was approved by the AEC Controller for DTIE. Approval was contingent on its being used as a satellite machine that would connect with the ORGDP IBM System 360 then being installed, which would theoretically permit an electronic on-line transfer of data. To assist in the new computer's implementation into DTIE programs, Henry Horton was recruited as a transferee from Oak Ridge Operations Office, October 9, 1966, to head the Program and Systems Development Section, Computer Operations Branch.

(See also Secs. 13.7, 15.10, and 16.11.)

12.2 PLANS LAID FOR 1964 GENEVA CONFERENCE

Plans for the Third Geneva Conference were announced at the Thirty-Fifth Meeting of the Technical Information Panel.[6] Scheduled for September 1964, 750 papers had been selected as conference presentations, 350 of which would be presented orally. For this conference, commercial exhibits were excluded; only government science exhibits were planned. AEC's presentation included films and a four-volume prestige set of books to be given to each conference delegate. Prepared under the direction of DTI Headquarters and published by McGraw-Hill Book Co., Inc., were *Education and the Atom*, by Glenn T. Seaborg and Daniel M. Wilkes; *Nuclear Power U.S.A.*, by Walter H. Zinn, Frank K. Pittman, and John F. Hogerton; *Research, U.S.A.*, by Albert V. Crewe and Joseph J. Katz; and *Radioisotopes and Radiation*, by John H. Lawrence, Bernard Manowitz, and Richard S. Loeb.

The Foreword to the presentation volumes was provided by the White House with a dedication to the late President John F. Kennedy. In the Foreword, President Johnson stated: "We take ... satisfaction from the fact that development of nuclear energy continues to afford the basis for both a new kind and a new spirit of international cooperation in the exchange of scientific knowledge and the evolving of more universal goals for peaceful applications of such knowledge."[7]

The authors of *Education and the Atom,* in their comment on a need for new methods for dealing with the information explosion, stated: "... it seems to be time to apply the scientific method, insofar as possible, to research on the principles of communication of scientific information. Thus this area merits recognition as a promising field for inter-disciplinary research in our colleges and universities.... The problems are a challenge to scientists and to behavioral and communications experts. If the difficulties are prodigious, so are the potential rewards in the form of a more efficient and productive scientific and development apparatus."[7]

Bobbie Jean Colley, Chief, Editorial Section, Publishing Branch, was assigned to DTI Headquarters in early June 1963 to assist in the development of educational brochures for distribution at the Geneva Conference.[8] Several booklets were translated into French. Booklets prepared for the Geneva Conference were also reproduced for the 1964–1965 New York World's Fair, where about a half million booklets were distributed in connection with the AEC's exhibit. "Peace Through Understanding" was the theme of the Fair.

12.3 *PRINTING PLANT CHANGED TO "DEPARTMENTAL" STATUS*

To provide management with publishing relief and flexibility, on October 18, 1963, the Joint Committee on Printing (JCP) changed the designation of the DTIE printing plant from "field" to "departmental." In writing to the AEC Chairman, Committee Chairman Carl Hayden pointed out that, from a very thorough analysis and evaluation of the justification supplied, the JCP approved the DTIE's request with the proviso that no work be sent from AEC Headquarters, Germantown, Maryland, for production by or through the Oak Ridge plant.[9]

Earlier in July 1963 the printing plant had received and installed a piece of equipment that considerably elevated DTIE's publishing capability and permitted its departmental printing status to be functionally realized. A "perfect binder," capable of collating book-type publications and applying printed soft covers in a single operation, was placed operationally on line. Neat, permanently bound books were produced by the hundreds of thousands in the succeeding decades through the use of this equipment, which was purchased in April 1963, according to invoice, for $39,500.

12.4 *DTIE PRODUCTION OF ABSTRACTS—1963*

Excluding work involved in abstracting materials for *Engineering Materials List (EML)* and the weapon data abstracting program, DTIE abstractors for the year 1963 were abstracting and indexing at an annual rate that exceeded 40,000 informative abstracts, an increase of some 20 percent over the previous year. Informational materials processsed included technical reports, journal articles, books, patents, and translations acquired from U.S. and international sources. U.S. research reports were obtained from the AEC and its contractors, other government agencies and their contractors, universities, and industrial and independent research organizations.

For the month of October 1963 (typical), abstract production figures were depicted as follows: [10]

- Published literature, 3110 (1559 author abstracts provided).
- AEC and contractor report literature, 877 (431 author abstracts provided).

- Non-AEC reports, 429 (215 author abstracts provided).
- Classified report literature, 210 (98 author abstracts provided).

In addition to creating abstracts where no abstracts had been provided by the authors or publishers, DTIE abstractors also indexed all acquisitioned materials in two dimensions. Besides indexing all items according to approved AEC subject headings for DTI print publications, the identical information was indexed according to Euratom Thesaurus rules for assigning descriptors for use in the new Euratom system. All descriptors were keypunched to allow magnetic-tape preparation for Euratom use and for DTI experimentation with SDI.

12.5 *MICROCARDS ARE REPLACED BY MICROFICHE*

Photographically miniaturized documents (microcards) were both hated and desired by librarians and users. On the positive side, they could be produced much more economically, shipment was cheaper and easier, much less space was required for the miniaturized product, and there was a permanency that cheap, printed, sulfite-paper documents could not match. Had this production option not existed, it is likely that thousands of reports could not have been announced and made available to researchers. At the end of 1961, the Microcard Corporation, contractor to the AEC, was easily accomplishing its annual production goal of two and a half million microcards at the DTIE site.

A problem associated with microcards, however, was the continuing need for text enlargement for casual, single-page reproduction and the less-often requirement to obtain a full-size paper copy for circulation. For routine microcard reading, the Microcard Corporation had constructed excellent reader–enlargers, but equipment produced for paper-text enlargements from microcards never proved to be satisfactory. Because reproducing from microcards involved enlarging on the basis of reflected light (the card was opaque), paper-text enlargers were slow, complicated to use, and never popular.

Enlargers for reading and for paper text based on using the negative would obviate many of these difficulties. The micronegative (microfiche) had, in fact, been considered (see Sec. 5.2). Although popular in Europe as microfiche, its use in the United States had not yet been enthusiastically adopted, mainly because of problems associated with volume card printing (negative to negative), potential damage to the master negative during production, lack of automated equipment for volume production, uncertain longevity guarantees, and higher cost of the final product. Although the Diazo process was economically competitive with microcards and was being used by some governmental organizations to create microfiche, it had not been adopted by the AEC because of its poor reputation for product longevity and difficulties in maintaining adequate quality control. The need for improved paper enlargement capability, however, was an unremitting force for seeking an alternative to microcards.

A DTIE instruction folder distributed in April 1963, entitled "Reproduction Resources of Microphotography," provides information on a new document miniaturization program then under development. This new program was, in fact, a plan for the introduction of "micronegatives" for customers desiring an option to microcards.

In response to a DTIE request for the creation of a micronegative product, the Microcard Corporation proposed a system that involved using fine-grain safety film that could be automatically exposed when placed in contact with the master. A newly developed vacuum-based printer gave great promise in minimizing damage to the original negative. A film reversal process would be used to develop the film as a duplicate negative, which avoided the customary requirement to generate an intermediate transparency (needed to produce "production" negative prints). A special continuous processor would be used to automatically develop, reverse, surface-harden, and dry the negatives. Upon completion of processing, individual micronegatives would be automatically cut from the roll film, ready for use for individual viewing or for use as a medium to produce enlarged prints from a reader–printer.

In August 1962 DTIE surveyed recipients of microcards to determine overall user preference for kinds of microforms: roll film, microcards, or micronegatives. A number of Project sites were furnished samples of the new proposed product for evaluation. The return showed a positive desire for micronegatives. On the basis of these responses, DTIE began to offer, at requesters' options, either micronegatives or microcards.

Many AEC customers were also customers for NASA documents. For some months NASA had offered its documents only in miniaturized formats, reproduced as microfiche by the Diazo process. With the gradual emergence of "micronegative" products from two of the largest producers of R&D reports, manufacturers of reproduction and enlargement equipment began to accommodate the new products, now becoming more generally called microfiche. The varying product sizes then being distributed, however, produced an insistence from manufacturers and users alike on product standardization: in reduction ratio, frame size, spacing between frames, and overall card dimension.

The April 1963 DTIE "Monthly Report of Operations"[11] reported that the production of micronegatives (microfiche) had begun during the month through a modification of the Microcard Corporation contract. Although microcards were still the primary production medium, more than 70 recipients had indicated a preference for micronegatives over microcards.

The Minutes of the Thirty-Fifth Meeting of the Technical Information Panel (December 1963)[6] in summarizing advances in document miniaturization, stated that, when the matter was considered two years earlier, it was not apparent that micronegatives had substantial advantages over microcards. No one had evaluated their effect on the total program. Because of printing limitations imposed on certain research reports, it had not been possible to distribute full-size copies to all who wanted them; therefore about two-thirds of the reports were being distributed in microform.

Although NASA had pioneered in dissemination of microfiched research reports, production was accomplished by the Diazo process and copies were distributed in 5- by 8-in. formats. The AEC program, which was based on duplicate photographic negatives, created 3- by 5-in. units. Libraries acquiring both AEC and NASA documents could not tolerate such widely differing product variances for long.

In 1963, after AEC's microfiche program began, standardization of microfiche reduction ratio and formats was agreed to by AEC and NASA; later, the agreement extended to the Office of Technical Services and the Department of Defense. The agreement with NASA permitted standardization of microfiche to allow both agencies to view and reproduce with the same type of equipment: reduction ratio (18:1), frame size (16 by 23 mm), and space between frames (0.5 mm).

A standard was eventually published (see Sec. 13.8) by the Office of Science and Technology as *Federal Microfiche Standards* (PB 167 630).[12] This publication, a product of COSATI, established a microfiche size of approximately 4 by 6 in. with a reduction ratio of 20:1. Except for a change in the reduction ratio, which was adopted within a few years of the initial publication (increased to 24:1), the standard remained essentially the universal standard. Both DTI Headquarters and DTIE Oak Ridge provided leadership in advancing the microfiche standard toward publication. Irving Lebow represented DTIE in the preparation of the document; Edward J. Brunenkant, Director of DTI, signed the Foreword on behalf of COSATI.

With an industry standard now available, DTIE signed a three-year contract with the Microcard Corporation on September 21, 1964, stipulating that no opaque microcards would be manufactured; henceforth only micronegatives would be prepared.[13] Thus the program that, as of January 1962, had celebrated the occasion of producing more than 20 million microcards for the AEC had now been terminated.

In 1966 the cost to the AEC to produce a typical microfiche master was $1.15. This figure was based on preparing a master copy containing 60 pages, including front matter and titling. Each duplicate (microfiche) was priced at 8 cents.[14] The microfiche contractor's cost to produce 200 copies of a 60-page report for distribution by DTIE would thus be $17.15.

In February 1967 the National Cash Register Company (NCR) acquired the Microcard Corporation. Under the new company name, the microfiche program continued under essentially the same structure and with the same personnel. Director for the local operation was Richard Lenoir, assisted by Production Manager Sam Carden. Administrative Manager and Accountant for the new NCR operation was Shirley Hembree.

NCR lost the contract to Microsurance Corporation in 1971.

(For additional information on the document miniaturization program, see Secs. 5.2, 5.6, and the section following.)

12.6 *SYSTEM TO PRODUCE "EYE-LEGIBLE COPY" FROM MICRONEGATIVES*

The DTIE had long been interested in creating a system that would provide document requesters with "eye-legible" hard copy, produced by using the on-site master microfiche negative when print copy was unavailable. Much desired was a process that would create enlargements on a production basis of three to four thousand pages per day. By using the master negative, labor costs and the destructive practice of disassembling and reassembling master copies for manual copying would be eliminated.[14] The ultimate goal was to advertise a service for DTIE users that could be a satisfactory alternative to printed copy.

The earlier referenced contract with the Microcard Corporation specified that the contractor should explore ways for producing eye-legible hard copy, using the microfiche master for production of "blow-back" copy, as Project needs dictated. The Microcard Corporation's response was to bring on line a machine that had recently been developed which could process and enlarge copy to half-page size (two pages per 8- by 11-in. sheet) using the master negative as the resource document. Known as the Microcard Step-and-Repeat Enlarger, it was a production device capable of producing, during an eight-hour working day, as many as 7500 pages of original report pages (3750 frames from the original master negative). The enlarger, which held 500 feet of 8½-in. paper, was capable of making from 1 to 500 prints per individual frame. The machine could be programmed to stop at any frame or omit frames.

The DTIE thus was provided the capability to reproduce, at will, any filmed document in its files. The implementation of the "eye-legible" program created a breakthrough for those organizations desiring to limit their storehouse of printed materials and still retain the option of having access to materials of readable print size when needed. The installation of this equipment added significantly to the range of media options available for report literature from DTIE.

At the time of start-up of the new enlarged copy service, the contractor was able to create in excess of 3000 8½- by 11-in. pages per day from the installed equipment. No longer would DTIE staff find it necessary to remove from the archives the single original master document to have it copied by means of the Photostat or electrostatic process.

12.7 *RETRIEVAL TESTS ON ELECTRONICALLY STORED* NSA *SUBJECT INDEXES*

An announcement in the July 1964 Monthly Report of Operations[15] reported on a test that had been successfully conducted in searching *NSA* subject index information. Questions had been taken from three sources: (1) A register of past questions searched by the DTIE Technical Literature Section, (2) queries from ORNL scientists and coordinated by Francois Kertesz, and (3) physicists cooperating with Pauline Atherton in an American Institute of Physics (AIP) project. Specific test questions had been chosen to represent various subject areas.

The test, hypothesized in a paper[16] by the DTIE Deputy Manager, considered the possibilities of using the keypunched subject heading and modifier index information then being created to process the *NSA* subject indexes for the Listomatic Camera operations. The possibility of such a retrieval program had earlier been suggested by Mrs. Atherton of AIP, who had arranged modifiers in alphabetic order and then cross-referenced them to their main headings, which produced a simple form of double-entry type of indexing.

The report pointed out that the intellectual indexing effort and keypunching of the information had been completed beginning with *NSA* Volume 11 and could be used for electronic retrieval. *NSA*-indexed information created thereafter could be cumulated to form a dynamic database.

The software for the creation of this retrieval program was developed by the ORGDP computer staff, principally by Fred Hutton. The retrieval program "RESPO*NSA*" (named by Hutton) was a very successful project and remained DTIE's primary search system until the early 1970s. By then a fully installed RECON at ORNL on behalf of DTI required Boolean search strategies for searching assigned descriptors.

12.8 *INTRODUCTION OF FLEXOWRITERS TO FURTHER MECHANIZATION OF ANNOUNCEMENT INFORMATION*

Since the start of *NSA* and its classified counterpart journal, *Abstracts of Classified Reports (ACR),* descriptive cataloging was considered a responsibility of professionals who were trained to select, disallow, or approve the various components of information necessary (data elements) to index and adequately describe these publications. These elements (title, authors' names, affiliations, corporate associations, date of publication, etc.) were written on printed forms in standardized formats, and the prepared forms, along with the abstract, were given to clerk-typists to compose and prepare copy for distributing to the various internal production components of DTIE, including abstract journal preparation. A separate set was given to punch-card operators for the preparation of report number indexes and duplication check files. Still another set of forms was supplied compositors for the preparation of subject index entries.

A workload, doubling each five years* without concomitant increases in a workforce, required DTIE management to seek improved production techniques that would (1) minimize duplicate keyboarding and (2) improve speed of throughput. An additional hoped-for by-product was cataloging and indexing information keyboarded and properly coded for use as electronic database files.

In late 1964 a plan was suggested to the Director, DTI, whereby specialized machines produced by the Friden Corporation could be introduced into DTIE's system to ease the problem of data entry for the cataloging, abstracting, and indexing processes. The proposed system would allow several objectives to be accomplished in parallel with DTI's efforts to mechanize technical information procedures. The suggested plan

*The Commission's Annual Report to Congress for 1965 graphically illustrates that in 1960 approximately 25,000 nuclear research items were announced in *NSA*; in 1965, this number had climbed to 50,000.

(subsequently adopted and implemented) is described in an informal "Note to the Files," by DTIE's Deputy Manager dated February 26, 1965. The objectives, issues considered, and primary hurdles that had to be overcome in implementing a proposed punched paper-tape input system were outlined.[17]

The Note reported that, during a visit to Washington Headquarters in early December 1964, it was suggested to Edward J. Brunenkant, DTI Director, that Flexowriters or related equipment be used to capture data at the time materials were cataloged. A single keyboarding at this stage could provide (1) the forms required to process the various items entering the cataloging system, (2) the descriptive cataloging portion (in repro copy form) of the abstract ultimately to be used in *NSA* and *ACR*, and (3) all descriptive information except keywords for the Euratom/SDI projects. Underlying this concept was a realization of a positive requirement to capture these data for needs other than just for DTI's programs (for example, requests for tapes were pending from the ORNL Information Centers, Ames Laboratory, NASA, and others). In addition, DTIE was supplying Euratom, Argonne National Laboratory, and University of California Radiation Laboratory with complete sets of keypunched *NSA* indexes. The Clearinghouse [Clearinghouse for Federal Scientific and Technical Information (CFSTI)] was also receiving keypunched cards of AEC R&D report literature.

Permission was received from the Director to proceed with a pilot experiment using makeshift equipment borrowed from the Reference and Publishing Branches. Planning assumptions should be based on a single keyboarding at the descriptive cataloging stage that should allow the following to be accomplished: *NSA* "header" information; Euratom and SDI needs (exclusive of keywords); requirements for "reports received" list; and listings for Headquarters Library, other AEC libraries, CFSTI, central cataloging, and forms for processing. In addition, the Director stipulated that all the preceding should be compatible with eventual computerization and photocomposition.

A series of meetings was held to determine the best approach. Individuals active in the study were William Vaden, Alden Greene, Donald Davis, Irene Keller, and Robert Kelly (DTIE) and Abraham Lebowitz (DTI Headquarters). Attending on two occasions were Ed Kidd and Fred Hutton, Union Carbide Central Data Processing.

Problems requiring earliest consideration were (1) the investigation of the types and quantities of material cataloged, (2) the requirement for a simple code structure that would be discrete for each of the elements cataloged and yet be easily identified by the computer, (3) the requirement for a simple method to apply the code structure with a minimum of involvement by the cataloger, (4) the retention of the essential elements of the *NSA* style, (5) the obtaining of a typographical output consistent with *NSA* (IBM proportional spacing, 10-point, boldface), (6) the manufacturing of a code which would appear punched at the pertinent points of cataloging (and hence identifiable by the computer) but which would drop out when the created tape produced the repro copy, and (7) the recommendation of a keyboard and coding system that would minimize the operator's problems at the time of keyboarding and yet maximize the number of useful keyboard characters required to input the diverse kinds of materials cataloged by DTIE.

In reviewing equipment for adoption, ordinary Electronic Accounting Machine (EAM) keypunching equipment was excluded because a separate keyboarding would still be necessary to create the forms, there would be no hard copy generated for *NSA*, and the number of characters available was too limited. Tape typewriters seemed most practical because forms could be created at the time of composition, a by-product tape could be fed to a computer properly encoded, and hard copy could be created of adequate quality for *NSA*. This requirement to create proportionally spaced text of a typeface matching *NSA* abstracts eliminated all but Friden equipment for consideration.

A Friden systems engineer was called for consultation. In reviewing the problems described, it became apparent that all principal matters could be resolved by using the Friden Model SPG Recorder/Reproducer, which contained special coding features. A programmatic tape, which was developed by the Friden systems engineer for prompting operators during descriptive cataloging, would allow items to be continuously entered and yet be discretely identified.

Briefly described, the designed keyboard provided operators with the capability to enter alphabet characters in upper and lower case, full-size numerals, subscript numerals (superscripts were obtainable by use of a stop code and ratchet), and punctuation symbols. All Greek characters appearing in titles would be spelled out. The keyboard selected was essentially consistent with other DTIE composing keyboards, which thereby lessened the training problem when shifting personnel to new equipment.

A detailed evaluation of information materials to be descriptively cataloged was also made. Technical information items received by DTIE varied greatly with that received by other government agencies. In addition to all types of R&D reports, DTIE was also interested in journal articles, patents, Engineering Materials List (EML) package information, books, conference preprints, translations, and conference proceedings.

Each kind of information had elements that required separate identification tags and were not always alike in their different literature forms (for example, the elements selected for report literature could range as high as 15; for journals, 9; and for patents, 5). Even within these groupings some of these elements could be expected to be omitted at any given time. It was therefore obvious that a very flexible coding structure was necessary to accommodate the wide range of elements to be captured.

Later approval was given by the DTI Director (in 1965) to procure six Flexowriters. A totally new plan was devised for processing abstracts and related indexes in house. A new descriptive cataloging manual was prepared, citing "delimiters" for each class of literature along with rules for

their use in coding information intended for DTIE cataloging operations. At the time of the publication of the second draft of the Descriptive Cataloging Manual, 34 separate delimiter codes had been identified for all the literature classes then being incorporated into *NSA*. Classes of literature were categorized as Reports and Individual Conference Papers, Published Literature, Patents, Translations, Unnumbered Conference Papers, Books and Theses, and EMLs.

For the creation of the control tapes for the separate literature classes, data elements that were in common with each class had to be determined. (Operators processing patents, requiring only 10 data elements, should not be forced to contend with all remaining nonrelevant codes; similarly for journal articles requiring 13, etc.) The solution to this problem was the creation of a matrix to predetermine which delimiting cataloging codes would be used for each class of literature.* Thus the supervisor each day predetermined which machines would be processing patents, journal articles, books, reports, etc., and control tapes for each machine would be installed accordingly. (See Fig. 12.1.)

An additional machine was subsequently added to the processing stream to permit an accelerated throughput.[14] Beginning with *NSA* Number 1, Volume 21 (1967), all abstracting and indexing was accomplished by the new system.

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*The "matrix" concept, created for the programmatic Friden Flexowriter, along with the specified data elements for the various literature types, was also adopted for the later installed Digital Equipment Corporation system, designed for direct online keyboarding of data. The manner of inputting data via the Flexowriter system, described in the DTIE Descriptive Cataloging Manual and its revisions, was adopted with modifications in the INIS system. Vestiges of this early concept continue even today in the INIS, Energy Technology Data Exchange, and Office of Scientific and Technical Information information processing activities.

Fig. 12.1 Pictured are Friden Programmatic Flexowriters installed at TIC for encoding descriptive cataloging information on punched paper tape (1965). Initiation of this system allowed the Center to become positioned for total automated processing of technical information through the use of computers. Operators are Robert Johnson (foreground) and Gwen Aird.

To move in this direction would, however, require a completely new printing method for the creation of the personal author, corporate author, and report number indexes. Under the proposal, these index items could be processed automatically from paper to magnetic tapes by associating the index terms with the publication titles and alphabetizing them for each issue. Earlier objections to using the IBM printer because of its all-capitals print characters were now essentially removed. A newly offered IBM print train provided 120 characters in upper- and lower-case letters along with subscript and superscript numbers. The punched-card method of preparing indexes via the Listomatic Camera system could now be phased out.

12.9 *COMPUTER INDEX ON NEUTRON DATA* (CINDA)

CINDA, originally developed at Research and Development Associates (RDA) and expanded into a computer-based system at Columbia University, was transferred to DTIE in 1965. *CINDA* had grown out of card files on neutron data information maintained by Professor Herbert Goldstein and his colleagues at RDA.

The steady increases in amounts of data to be gathered and reported created extra demands on the shared University's computer. There was also the drain on Professor Goldstein's time, and he could no longer devote the energy necessary for *CINDA's* full development. It therefore became necessary to relocate *CINDA* in an environment more hospitable to growth and to secure needed improvements.

When responsibility for *CINDA* was moved to DTIE, the ORGDP Computing Technology Center was requested to provide the necessary programming and computer assistance to revise and process *CINDA's* programs and to produce the print materials necessary for publication.

During the Thirty-Seventh Panel Meeting, January 1966,[14] Lawrence Whitehead, the DTIE representative who was principally responsible for the U.S. program, reported on the construction of the index. Whitehead disclosed that *CINDA* indexing was being done by a network of contributors called readers. There were 37 readers throughout the world, 12 being located in the United States and Canada. The *CINDA* readers entered their data by using 80-column index forms. The index forms were divided into various fields that could be ordered by the computer. These fields included the element symbol, its mass number, the particular neutron cross section or related parameter, the energy range of the incident neutron, the journal or report reference, the type of data and the type of reference (journal, report, preprint, etc.), the laboratory at which the work originated, and a remarks section in which comments on experimental conditions, equipment used, actual values, etc., could be added. The *CINDA* master library was published annually and supplemented quarterly with updates.

At the time of Whitehead's report, the *CINDA* file contained 32,000 records with the number increasing by about 5,000 records each year. Two *CINDA* Centers were fully operational. The U.S. Center, located at DTIE, was responsible for the U.S. and Canadian work. The European Center, located at Saclay, France, was responsible for the European, Oriental, and Latin American work. Periodically, the U.S. and European Centers exchanged updating tapes so that master libraries of the two Centers could become essentially duplicates.

As an international experimental cooperative project, *CINDA* was interesting in a number of ways: It was computer-based, it was a cooperative effort among scientists who were citizens of a mix of friendly and unfriendly countries, and its sponsorship was shared among its national entities. For DTIE it was especially unique because it provided an opportunity—perhaps the first for an information center—to combine information gathering and processing efforts associated with *NSA* (a bibliographic activity) in parallel with work involving a completely separate publication (a data-reporting activity). The same body of information was reviewed for both objectives. In this regard, both *CINDA* and *NSA* shared simultaneously in the DTIE effort with little discernible additional cost.

Regarding progress made during DTIE's oversight of *CINDA*, Whitehead later reported[18] that agreement was reached to rewrite the *CINDA* software completely. Because the software had evolved over the years into a conglomerate of ad hoc program modifications, a rewriting was necessary to speed Central Processing Unit (CPU) processing, to add automatic updating and exchange elements, and to increase the information content of the *CINDA* entries. The inclusion of information relative to the availability of evaluated data was a significant improvement. Each *CINDA* entry specified whether the data were theoretical, experimental, tabulated, compiled, evaluated, graphed, or whether no data were given. *CINDA* was thus a forerunner of numerical data projects.

The major reprogramming effort had been completed by the beginning of 1972, and the international *CINDA* information exchange was fully operational. Compilations were being published annually by the International Atomic Energy Agency, and *CINDA* was becoming a showpiece of international cooperation.

In Whitehead's personal note, he concludes by stating, "In March 1974 I attended a meeting of the U.S. Neutron Cross Section Advisory Group (NCSAG), which consisted of senior research scientists and program managers and which supposedly advised the AEC in such matters. The Division of Research representative tried to convince the NCSAG that *CINDA* activities should be returned to his Division's sponsorship and should be relocated to the National Nuclear Data Center at Brookhaven National Laboratory. . . . The NCSAG voted to endorse OSTI as the U.S. *CINDA* center. Over the objections of the NCSAG and the *CINDA* Steering Group and through lack of interest and support by DTIE's superiors in the Division of Technical Information *CINDA* was taken away from OSTI." Thus was brought to an abrupt end what, for a decade, had been a very successful information center project that combined numerical data gathering and bibliographic processing information that simultaneously supplied the needs of two international publications: *NSA* and *CINDA*.

12.10 *SURVEY TEAM APPOINTED TO ANALYZE DTIE FUNCTIONS*

Since the establishment of the Office of Assistant Director of Systems Development, questions were asked from time to time, primarily from

Headquarters, about the progress and speed of DTIE's mechanization efforts. In early 1966 the Director, DTI, requested that a survey of DTIE be carried out that would provide information covering eight tasks that would

- Detail policymaking responsibilities as distributed between DTI and DTIE, especially as they related to translations, educational services, *NSA* scope, and mechanization.
- Identify, quantify, and comment on services performed by DTIE for DTI and Headquarters program divisions (i.e., publishing, indexing, and exhibits).
- Review organization pattern of DTIE, commenting particularly on distribution of like or related functions.

- Recommend guidelines or procedures for communication in policy matters between DTI and DTIE, and within DTIE, where such recommendation appeared desirable.
- Review possibility and desirability of increased participation by Headquarters Library in services provided to and by DTIE.
- Comment on opportunities for professional growth of DTIE staff at various levels.
- Examine procedures for review and evaluation of DTIE products and services.
- Compare the advantages and disadvantages of [the then] present scheduling system of cumulating *NSA* indexes versus a proposed new system.

As stated in the Introduction to the completed study,[19] the survey was motivated in part by a desire of DTI staff to understand better the activities of DTIE. It was also motivated by a presumed need on the part of DTI Headquarters to obtain information that would assist in making decisions about automating internal information processing activities and on international cooperation.

A four-man team was named by the Director to carry out the survey. Two members of the team representing DTI Headquarters' Office were Thomas Hughes and Abraham Lebowitz. Representing DTIE was William Vaden. Appointed to serve as an "impartial outsider" was Ben-Ami Lipetz, a consultant on information management. The survey was conducted during the period February 23 to March 25, 1966.

In reporting on the survey, the team was unanimous in its comments and recommendations. Pinpointing what was considered the most serious problem, the report stated: "There is a glaring lack of common viewpoint between the management of DTI and the management of DTIE. It is apparent to management in both locations that this lack exists, and it is distressing and frustrating to supervisory personnel from the top down in both locations to try to carry on their interdependent work in the absence of a common viewpoint. . . . It is not a problem of different primary objectives. . . . It is not a problem of disloyalty. The problem, in our opinion, is one of providing for orderly, nondisruptive shifts in program emphasis in an organization (DTIE) which already has heavy and intricately interconnected program commitments. It is also our opinion that a fully satisfactory solution of this problem will require modification of present patterns of thought and action at both DTI and DTIE. These modifications extend into such areas of management responsibility as policy making, program review, organization, communications, and staffing—the subjects of individual survey tasks."

Aside from elucidating in detail the tasks carried out by DTIE, the survey report also provided a necessary focus for across-the-table discussions of the Director's concerns with all principal staff present, the outcome of which was a better and more sympathetic understanding of the efforts of all sides (DTI Headquarters and DTIE Oak Ridge) involved in the overall DTI program effort.

12.11 *MOVEMENT TOWARD AN IAEA INTERNATIONAL NUCLEAR INFORMATION SYSTEM*

As the concept of standardized input became better understood, it was apparent to some that centralized information systems could be established to function on behalf of contributing partners from which various services and products could be distributed to the decentralized constituency. A mission-oriented area such as nuclear science became a focal point for such a systems development in the late 1960s. The IAEA, through the encouragement of the United States, brought together two consultants during 1966 to formulate a plan that would establish an International Nuclear Information System (INIS) under IAEA's aegis to be located at Vienna.

With the aid of consultants from the U.S.S.R. (Lev L. Issaev) and the United States (Raymond K. Wakerling), a generalized plan for an INIS was outlined. The resultant paper then became a working document for a group, consisting of representatives of 16 member states and 4 international organizations, that met at the Agency from December 12 to 14, 1966. From this meeting there was general agreement that the Agency should play a leading role in the development of a system to become known as INIS.

In making its report[20] the Working Group stated that it welcomed the initiative of the Agency and accepted in principle the concept of INIS and the need for the Agency to become active in its development. Recommendations from the Working Group were to

- Invite national and regional organizations to submit agreed input information for the Agency's use and for distribution in the INIS network.
- Consider how the Agency might begin.
- Discuss with the Government of the United States and the governments of other member states on ways to have *NSA* as an international journal within the framework of INIS and under the auspices of the Agency.

- Make outputs (microfiches, magnetic tapes, lists, etc.) available on a gradually expanding basis.
- Establish mechanisms to develop collaboration and coordination with information services in neighboring fields.
- Gradually expand its limited clearinghouse functions (starting January 1967).
- Establish mechanisms for training individuals in the preparation of input.
- Continue the evolutionary and development phase of INIS by allocating minimum additional funds and staff for 1968.
- Acquire the services of groups of outside experts for periods of appropriate duration to assist the Secretariat in specifying the functions of INIS.
- Establish mechanisms (e.g., a Committee) for a continuing review of INIS by the major participants.
- Prepare a report on the question of organizing the Agency's service in such a way as to ensure continuity of staff and experience.
- Reaffirm, subject to further review, the principles of charging for special requested INIS services.
- Ensure that the information activities of the Agency are reviewed in relation to INIS.

In an attempt to understand the overall effect of an INIS operation vis à vis the *NSA* operation, a Panel task force was appointed by the DTI Director. In its report at the Thirty-Ninth Meeting,[21] two alternatives were offered by the Task Force for consideration in the planning for U.S. submission of nuclear science information to a hypothetical INIS:

- Leave the present system generally intact with DTIE being centrally responsible for defining the scope of coverage, obtaining and scanning the literature, and producing abstracts and indexes in machine form.

• Begin gradually to decentralize scanning, cataloging, and indexing of nuclear information published in the United States. Use the national laboratories and perhaps the technical societies for that work. Retain within DTIE the responsibility for defining the scope of nuclear science for the U.S. system, performing cataloging and indexing of materials best done centrally, and monitoring the indexing of supporting organizations.

Because of apprehensions related to total decentralization without reliable oversight guarantees, the Task Force in its report stated that the first alternative was the overwhelming preference of its members. During the formative period of INIS, U.S.–INIS operations were conducted initially within this framework. Later, as real-time computer operations became more efficient and dependable, decentralization—by contracting with outside organizations—became a necessary component in the DTI plan for providing U.S. input to INIS.

(See also Secs. 13.6 and 14.1.)

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TWO DECADES OF PROGRESS (1947–1967)

CHAPTER 13

Under the 1954 Atomic Energy Act, the goals of the Division of Technical Information Extension (DTIE) after two decades of service to the Atomic Energy Commission (AEC) were designed around a program[1] that

- Provided generalized technical information services to the AEC, its contractors, and other government agencies working in the field of nuclear science.
- Enlarged the fund of knowledge and provided an information interchange program between the United States and other nations and with technical organizations and societies working in the area of nuclear science.
- Ensured efficient and prompt dissemination of information about nuclear science to the general public.
- Fostered better understanding of nuclear science and its potential among industrial organizations, schools, and the general public through education.

13.1 *DTIE'S FIRST TWENTY YEARS— A PAUSE TO REFLECT*

In approaching its twentieth anniversary year as the Commission's principal technical information program office, DTIE had become an institution much respected throughout the world for its wide-ranging activities involving the recording, publishing, announcing, and disseminating of results on atomic energy research. Within the AEC and among its sister agencies in the federal sector, DTIE was a well-established resource, both for knowledge about the literature on nuclear science and as the principal access point for the informational materials themselves. It was well known by AEC program offices and Project sites as a dependable service organization for carrying out the Commission's requirements of the Atomic Energy Act to properly control and disseminate Project information.

Through representation by the Technical Information Panel, scientists, researchers, librarians, and managers from the various AEC Project Sites provided broad and varied viewpoints for consideration and possible integration into the evolving AEC information program. AEC contractors and Project Offices, in turn, were recipients of information on the most recently issued nuclear science research information worldwide. Concurrent with the announcement in *Nuclear Science Abstracts (NSA)* and *Abstracts of Classified Reports (ACR)* of research and development (R&D) reports, AEC constituents were provided with the documents automatically without cost. Since the beginning of the declassification program in 1946, almost a half-million unclassified or declassified documents had been made available to the scientific and industrial public through the Depository Library Program or for sale through the Clearinghouse for Federal Scientific and Technical Information.[2] The DTIE was also the primary Commission channel for the exchange of nuclear science information with foreign nations and institutions. The Bilateral Exchange Program (coordinated with the Division of International Affairs), the Atoms-for-Peace libraries, and *NSA* were all useful components of the exchange mechanism. *NSA* had become the preeminent international announcement publication on which many nations of the world engaged in nuclear science research depended.

The DTIE had successfully assisted U.S. industry in obtaining access to nuclear science information of possible or potential relevance. The AEC, through its industrial participation program, continued to cooperate and communicate with leaders of industry associations having nuclear science interests.

During the years of weapons testing, DTIE had been the primary focus for both classified and unclassified publication, dissemination, and announcement of information associated with this national defense program. In this program assignment, DTIE assisted other U.S. federal agencies through its coordination role of publishing, disseminating, and indexing reports (preliminary and final) for all involved agencies and their contractors.

Because of its role in servicing requests for information elicited by the AEC Traveling Exhibits and Museum Programs, DTIE was becoming a popular and dependable source of specially designed scientific information on unclassified atomic energy research for students and educators.

The DTIE had been a leader, not a follower, in searching for efficient and economical methods for servicing the technical information program. Although management initially chose cold-type composition as a means of ensuring physical protection of information being processed, this process had proved to be the most economically feasible publishing medium for all publications. To refine and expand this process, DTIE had encouraged manufacturers to incorporate features on their composing machines that would facilitate a better use of DTIE's talented composition staff. Examples of such improvements were the development of typewriter keyboards that supplied subscript and superscript numbers, demountable typebar attachments for all signs and symbols needed for scientific composition, and machines with different (but matching) typefaces in italic and varying sizes.

The Commission's publication, *NSA*, was one of the first major announcement publications to use automated electronic devices to create indexes for each published issue.* After the successful development of the system to cumulate subject indexes to its abstract journals (with the introduction of the Listomatic Camera), DTIE no longer was required to print and distribute the millions of catalog cards previously required for managing the R&D report collections of scores of libraries. The labor and funds invested by AEC Project and Depository libraries to maintain these card catalogs could now be reapplied to other expanding program needs.

Through its experimentation with document miniaturization, DTIE helped prove the efficacy of microfiche as a suitable report dissemination medium. Associated with this technology was the development of step-and-repeat enlargers to provide efficient and economical blow-back (enlarged) copy for any DTIE microformed document.

The DTIE had pioneered in the development of new techniques to automate the mailing of educational literature packets through the use of clear plastic envelopes (a commonplace practice used decades later by commercial publishers and booksellers).

Now, with the advent of the computer, DTIE was far in advance of most information organizations in looking critically at ways information was being described for the information searcher. As a consequence, new methods of cataloging were undergoing review which would ultimately require the adoption of new concepts of information labeling. (See Figs. 13.1 to 13.6.)

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*In the early 1950s, IBM electronic accounting equipment (EAM) was used to sort, alphabetize, list, and print personal author, corporate author, and numerical indexes for *NSA*.

Fig. 13.1 In 1965, Edwin C. Schulte retired after serving almost 18 years as Chief of the Printing Section. In observance of the occasion, a special letter from Chairman Glenn T. Seaborg was presented by DTI Director Edward J. Brunenkant. Penned at the bottom of Seaborg's letter is a note which reads: "P.S. I remember with particular satisfaction the fine and rapid job that was done in printing the report of my visit to the U.S.S.R."

13.2 *1967 DTIE PROGRAM STATUS*

In beginning the New Year (1967), DTIE had a personnel strength of 231 regular employees and additional part-time and temporary employees to bring the employment total to 248. Work was under way for major capital improvements to the DTIE building. Included in the improvements were the addition of a 10,000-square-foot combination warehouse and loading dock. Internal construction involved the building of a new lobby, space suitable for housing a computer, an enlarged lunch room and assembly area, and the creation of additional office space and restroom facilities. Total contract cost of the improvement was $175,000.[3]

During the period November 30 to December 1, 1967, the Oak Ridge Associated Universities (ORAU), the Oak Ridge National Laboratory (ORNL), and DTIE cosponsored a two-day symposium for engineering

Fig. 13.2 Reports undergoing review for pertinency to the General Physics section of *NSA* (1966). Reviewers are Lee M. Thompson, Section Chief, and John H. Mitchell (right).

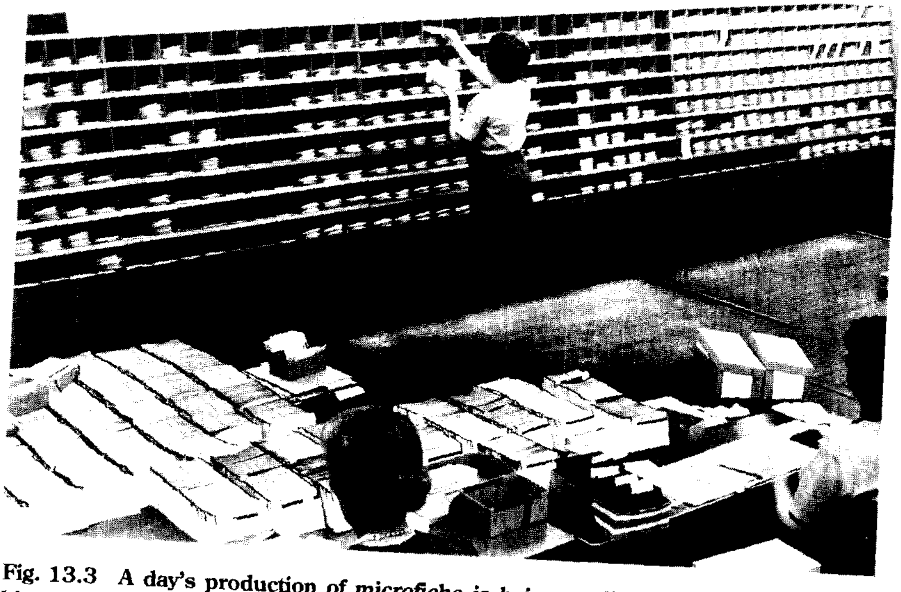

Fig. 13.3 A day's production of microfiche is being readied for customers. Each bin represents one address. Mailings occurred no less than once each week and more often when bins became filled (1966).

Fig. 13.4 A view of the press area of the Printing Branch. One "eight-up" and two "four-up" presses, plus numerous smaller offset machines, provided local printing capability. Additional printing was obtained under contract commercially and through the Government Printing Office, e.g., to publish and market *NSA*.

faculty members representing universities throughout the United States. The purpose of the meeting was to review and discuss the actual and potential services of the specialized information centers as resources for providing scientific information and data to universities in their teaching and research activities. Approximately 50 representatives and deans of engineering faculties attended.

The description of DTIE's program activities at the 1967 year end, as related to the engineering symposium, provides an effective historical review of AEC's technical information program on DTIE's twentieth anniversary year. Summarized accounts of DTIE's program, as geared to those symposium topics,[2] have been used as an information base for much of this chapter, supplemented with briefing data distilled from a presentation made to the International Nuclear Information System (INIS) Study Team in March 1968. The latter had been requested by the International Atomic Energy Agency (IAEA) Secretariat for the purpose of introducing INIS Team Members to what was then the largest nuclear science information system, i.e., DTIE.[4]

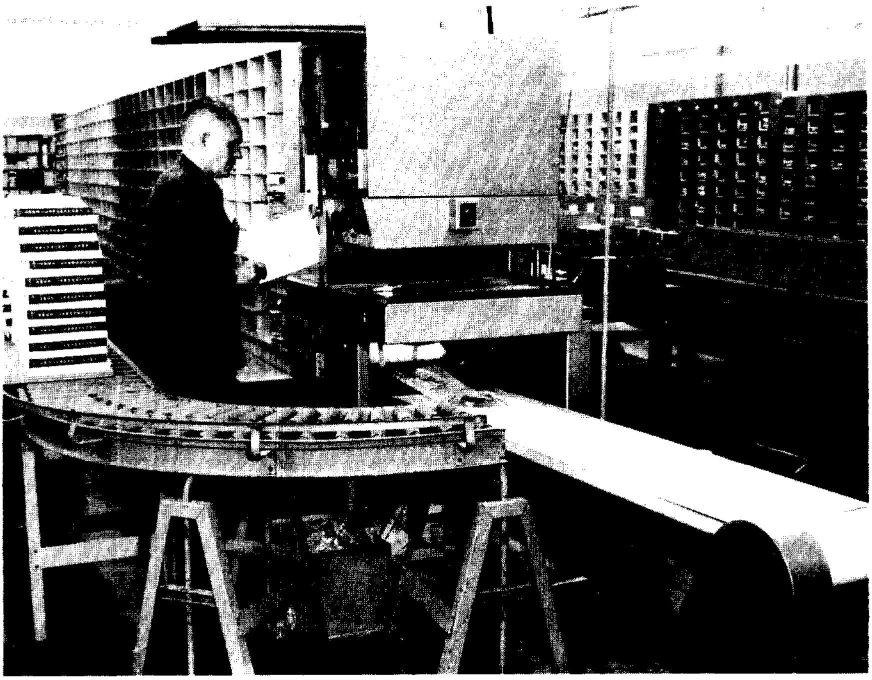

Fig. 13.5 A production run of printed reports is being readied for mailing (1963). Bins in background represent various classes and addresses of customers to whom technical information materials will be distributed. Herman A. Watkins, Distribution Section Chief, demonstrates manner of packaging *NSA* for mailing, using equipment to seal copies in plastic envelopes.

13.3 NSA *RESTRUCTURED: SECTION EDITORS APPOINTED*

To "enlarge the fund" of technical information, as required by the Atomic Energy Act, the AEC began early to acquire information that was judged to be within its defined scope of nuclear science. Such informational materials included books, patents, journals, reports, conference proceedings, and translations. For a number of years the annual cumulative total was relatively small (for example, until 1956 the number of items added annually to DTIE's database was fewer than 10,000, the average being slightly more than 6,000.

During the ensuing decade, *NSA* had experienced phenomenal growth, the numbers of abstracts doubling each five years. *NSA* had also acquired sufficient prestige as now to be considered among the world's most important abstracting and secondary announcement services. With the

Fig. 13.6 An afternoon's outgoing mail (1966). To facilitate the mailing of tons of documents through the postal system, outgoing mail was prebagged according to state or region.

inauguration of a new computer system for data tagging and storage of information, *NSA* had been positioned to take the climb through the next decade. The ability of DTIE's new system in 1967 to process and record the 47,055 abstracted and indexed items for that year appeared to be adequate proof that the correct course for the future had been charted.

To oversee *NSA*, various management specialties were being called on to direct the many different aspects of its production and coordinate the interaction with other DTIE information program activities. Managing Editor was John W. Norris, assisted by Donald D. Davis. Production Manager was David E. Bost.

A reorganization of the Science and Technology Branch was effected to more clearly delineate the scientific and editorial responsibilities involving *NSA*'s production. Within the new organization, accountability for the various scientific and technical divisions of *NSA* was more sharply drawn, and new Section Chiefs were appointed to monitor the separate disciplines. The sections and their respective heads were Everett J. Hoffman, Chemistry; Robert C. Kelly, Engineering and Earth Sciences; Lee M. Thompson, General Physics; Charles E. Stuber, High Energy Physics; Hugh E. Voress, Life Sciences; Lawrence T. Whitehead, Nuclear Data; and James M. Jacobs, Reactor Technology (combined with Metals and Ceramics).

Abstractors listed in the *NSA Five-Year Cumulative Index* (volumes 16 to 20), published in 1967, were F. S. Armstrong (Atomic Energy of Canada Ltd.), William E. Bost, Mary M. Brown, Jane G. Buchanan, D. Lamar Cason, Bennie G. Di Bona, Helen G. Donald, James R. Dulaney, Wells L. Green, Bernard O. Griggs, Harry G. Grisham, Mary C. Grissom, Miriam P. Guthrie, Fernando Hamilton, Phyllis C. Hansen, Thomas F. Heagerty, Carolyn D. Houston, Rose V. Jermain, Sidney F. Lanier, Betty L. McDowell, William D. Matheny, John H. Mitchell, Dora H. Moneyhun, Luther Norene, Carol Oen, Jean F. Peckham, Henry D. Raleigh, Mona H. Raridon, Julia S. Redford, Ned W. Rizzardi, Francis L. Sachs, Lila B. Smith, Polly C. Summers, Anne G. Ward, Helen L. Ward, David C. West, Milton O. Whitson, and Juanita Wilson.

To be selected for an abstracting and indexing position, *NSA* specialists were required to have training in one of the basic sciences. In addition, the majority of abstractors had foreign language competence in Russian, German, or French to facilitate translating and indexing literature from those countries.

Also listed in the 1967 *NSA Cumulative Index* Introduction were Robert E. Upchurch, Subject Heading Specialist; J. Paul Meredith, Descriptive Cataloging Specialist; Joel S. O'Connor, Computer Index Coordinator; Clara L. Fox, Corporate Author Specialist; Mary H. Newman, Reports Evaluator; and Brainard L. Patton, Scheduling and Publishing Coordinator.

(Additional information on *NSA* and the indexing program is included in Secs. 13.4 to 13.6 and in Secs. 3.8, 4.10, 4.13, 6.4, 6.7, 9.12, 9.13, 10.11, 11.5, 11.13, 12.8, 16.9, 16.13, 17.5, and 18.4.)

13.4 *ACQUISITIONS PROGRAM FOR* NSA

Exchanged informational materials (journal articles, conference proceedings, books, and reports) provided the major portion of non-AEC information reported in *NSA*. The program operated basically by DTIE's offering an *NSA* subscription for an equivalent piece of scientific or technical literature considered to be in *NSA*'s scope of interest. The more esoteric and difficult-to-obtain foreign journals reported in *NSA* were acquired on an exchange basis. A report of foreign exchange agreements as of June 30, 1968, showed that DTIE had a total of 316 foreign exchange agreements in 44 countries.[5] (See Fig. 13.7.)

Through agreements between the AEC and various organizations, *NSA* was able to increase continuously its annual flow of nuclear science information from foreign sources. In acknowledging domestic and foreign organizations that had provided materials for inclusion in the Third

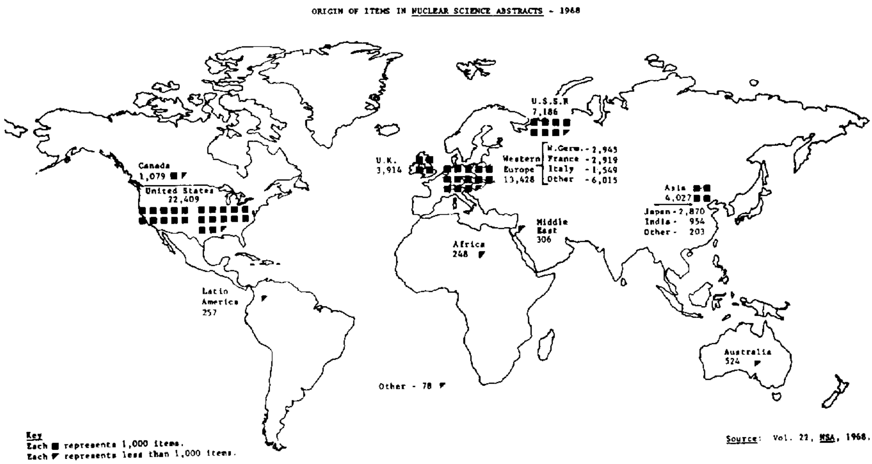

Fig. 13.7 Country-of-origin of items announced in Vol. 22, *NSA* (1968).

Five-Year Cumulative Index, the exchange listing included the American Institute of Physics; Atomic Energy of Canada Limited; Atomic Energy Research Establishment, United Kingdom; Aktiebolaget Atomenergi, Sweden; European Atomic Energy Community (Euratom); Gmelin Institute; International Atomic Energy Agency; Japan Atomic Energy Bureau, Japan Atomic Energy Research Institute; The Netherlands Patent Office; and Reactor Centrum Nederland.

In 1967 approximately 2000 journals were reviewed regularly for items to include in the *NSA* database. More than 1000 additional journals were cited that were not regularly scanned. Of an estimated half a million journal articles scanned during the year, less than one in ten was selected.

13.5 *PROCESSING FLOW FOR ABSTRACTING, INDEXING, AND CATALOGING*

When a report was cleared and recorded as a "holding," it was submitted to a scientific evaluation group for the determination of its value for the DTI collection. At this stage it might be selected (if of limited value) for internal AEC "Title Listing Only," or if considered worthy of announcement, it was forwarded for *NSA* processing, if unclassified. Supplemental Project distribution was arranged either for reprinting or for microfiching. If classified, it was routed to a separate group for classified control, dissemination, and announcement in *ACR*. If totally out of scope, it was forwarded to an AEC Project activity that might possibly have an interest in the reported project.

Announcing incoming journal and book literature was less complicated. A record was maintained for each journal issue received, and then the entire journal was forwarded to a scientific evaluator. Here the journal articles were separated, and articles determined to be in scope were sent individually to the appropriate abstracting and indexing desks that covered the different scientific specialities. If a newly received book was a compilation of different scientific topics, the evaluator forwarded the book to the appropriate *NSA* editors covering the topics for processing.

If an author abstract was available, it was very likely selected for inclusion in *NSA*. Light editing, in accordance with *NSA* styling, most likely occurred at the Section Editor review stage. If an abstract did not accompany the article, an abstract was prepared. The appropriate *NSA* or *ACR* (if classified) categories were assigned, and indexing was accomplished in accordance with DTIE rules for assigning subject headings and modifiers. In addition, all *NSA* items required descriptor indexing for the Euratom agreement, in compliance with the Euratom Thesaurus rules.

Descriptive cataloging that followed was the next important step in processing information for the newly designed computer system. Friden Flexowriters (see Sec. 12.8), which produced punched paper tape, were used to encode data at this stage. Models installed were "programmatic" [i.e., a means was provided to control (or delimit) the data elements to match the class of literature being cataloged]. The Composition Section used IBM Executive Typewriters to compose the abstracts. Demountable typebars were available on these machines to produce special signs and symbols. Both Flexowriters and IBM typewriters had matching typefaces. Friden Flexowriters were also used for cataloging data and *NSA* subject indexing, and the information, captured on punched paper tape, was later converted to magnetic tape.

For the kinds of literature items selected for *NSA* (reports, journal articles, patents, drawings, books, etc.), 34 data tags were required to produce the varieties of bibliographic citations possible from these literature classes. These data elements were coded or "tagged" to allow the computer to manipulate the collected data to create printed indexes, establish a database, and produce magnetic tapes for sharing.

Since all main headings and their corresponding codes had been stored to form a part of the processing system (approximately 13,000 headings and 37,000 cross references), only the code numbers for the headings and modifier lines specified by the indexer were entered at this stage. The computer was able to pull the appropriate headings automatically and thus produce, from the stored subject heading authority, consistent terminology.

For the main *NSA* subject divisions, subtopics had also been selected. So that abstracts could be arranged according to their topical order for the individual issues, category codes were assigned both to *NSA* sections and subsections. In so doing the computer could arrange abstracts according to 290 separate topics on nuclear science. A request to the ORGDP Computing Technology Center produced a generalized output program (GENOUT) that allowed still further subdividing of these topics by specifying certain coded cataloging elements. GENOUT was frequently used for statistical analyses of stored database materials as well as topically arranged information for the creation of bibliographies.

13.6 *FINAL* NSA *ASSEMBLY AND PRINTING DESCRIBED*

Once cataloging was completed, the punched (coded) paper tapes were converted to magnetic tapes, and printouts were reviewed for errors. The hard-copy by-product of the Flexowriter process provided material for creating the DTIE *Weekly Accession List*. At a later stage, a replication of the hard-copy citation became associated with the separately composed abstract for ultimate printing in *NSA*.

After a two-week collection period, an issue of *NSA* was declared ready for printing. One copy of each bibliographic citation was retained in an interim file for the editor's use in reviewing *NSA*'s category arrangement, and these items formed the arrangement pattern for the printed issue. Temporary serial numbers had been earlier assigned to each item processed, and now they were cross-referenced to serially numbered abstracts. Entries for the four indexes, already residing on computer tape, were identified by their serial numbers. At this stage an equivalence table (serial numbers to abstract numbers) was prepared, and all indexed information was transformed by computer into indexed information that conformed to the categorized *NSA* issue.

While the abstract section was being made up into pages (manual merging of citations with abstracts according to specified topical arrangement), the computer printed out proof sheets of the final index. Following this stage and final corrections, made-up index pages complete with page numbers and running heads were made available for printing. Copies of these indexes on magnetic tape were retained for later cumulative indexes.

By 1967 a specially designed 120-character IBM print train that provided the alphabet in upper and lower case was installed on the printers. With this new printing capability, approximately 95 percent of the characters and symbols ordinarily needed for *NSA*'s indexes and bibliographic citations could be produced. Indexes to all remaining volumes of *NSA* were composed and published from computer-printed pages. In order to improve the overall quality of *NSA* as a subscription journal offered by the Superintendent of Documents, planning began in 1967 for the creation of tapes to drive the computer-associated Linotron—a new concept in photocomposition then undergoing shakedown at the Government Printing Office (GPO). Toward accomplishing this goal, DTIE designed a grid of 256 characters that allowed type selections in both Roman and italic typefaces. More than sufficient for the indexes, the designing of this new grid opened a pathway for a fully composed *NSA* abstract section as well as an index section, both made available through the marriage of computers and photocomposition devices.

The system generally described (incorporating the 120-character print train) proved to be extremely successful and adaptable. Until well into the days of the Department of Energy (DOE), it was still in use in the preparation of announcement journals, bulletins, and special bibliographies.

13.7 *SYSTEMS IMPROVEMENTS: INSTALLATION OF IBM SYSTEM 360, MODEL 20*

Besides having received world acclaim for its comprehensiveness in the field of nuclear science, *NSA* was also applauded for its capability to publish subject indexes to individual issues. As previously described, until 1967 in-issue indexes were being accomplished by special photographic techniques involving a Listomatic Camera that used 80-column IBM Electronic Accounting Machine (EAM) cards.

Major computer service to DTIE continued to be supplied by the Oak Ridge Gaseous Diffusion Plant (ORGDP) Computing Technology Center. Because of DTIE's increasing dependence on computerized systems to accomplish its work and the corresponding increases in data transfer between DTIE and ORGDP, in late 1967 the AEC Controller approved a DTIE request to procure and install an IBM 360/Model 20 computer. Justification was based on a plan whereby the small IBM machine would function as a satellite to the ORGDP IBM 360/System 50/65 configuration. The primary jobs to be accomplished at the DTIE installation were to convert the coded paper tapes to magnetic tapes and to print announcement journal indexes in the local environment.

For a number of years the IBM Model 20 installation at DTIE was referred to euphemistically as the "DTIE Input System." This labeling apparently mitigated Headquarters' apprehensions about a misreading of the justification for DTIE's computer procurement. Nonetheless, although small and possessing only the basic processing and printing capability, the installed system permitted data entry and correcting routines locally. The time required to manually deliver and check DTIE data undergoing processing by a computer center 18 miles away could now be redirected to more important local matters.

In addition to the IBM Model 20 central processing unit, the DTIE installation consisted of two dual tape drives, one disk drive, a printer, and a paper-tape to magnetic-tape converter.

(See also Secs. 12.1, 15.10, and 16.11.)

13.8 *HANDLING DOCUMENT REQUESTS AND AUTOMATIC DISTRIBUTION*

Aside from documents distributed through DTIE's automatic distribution system, requests for additional documents from DTIE were averaging 70,000 annually. These requests resulted from individual requests and were in addition to the program related to servicing the AEC Depository Libraries, which, in 1967, amounted to 98 domestic libraries and 61 in international agencies and foreign countries. A small IBM 1050 computer had been installed to provide a more efficient means for locating the approximately 350,000 report titles on hand, which facilitated more rapid responses to requests for information on R&D report literature. The computer, which was used only for systems improvements, was not considered in the complement of equipment related to information handling or processing.

Early in the AEC, one of the most important tasks in the information program was to ensure an appropriate dissemination and control of research results emanating from the AEC contractor community and other agencies working in the field of nuclear science. Out of this effort came the standard distribution system in use (with variations) for more than four decades. By 1967 some 25 categories were described in the publication TID-4500, *USAEC Standard Distribution for Unclassified Scientific and Technical Reports.* All R&D reports were distributed within the AEC contractor family according to these guidelines, which were maintained and distributed by DTIE to Project Sites, Headquarters, and Field Offices.

Because DTIE was the recognized AEC center for information control and dissemination, all kinds of information, solicited and unsolicited, were continuously received: progress reports, reports on new research, drafted reports, preprints of journal articles, reports from exchange arrangements (foreign and domestic), and both classified and unclassified documents. In this array were many duplicated reports or partial reports. Some reports were duplicates from both prime contractors and subcontractors; some were extra copies of reports from Project offices and contractor sites; and some were reports submitted because of purging of office files.

Statistical checks for many years showed that approximately 10 percent of all documents received by DTIE were duplicates. Before any work on new receipts could be done, a duplication check was made. In 1967 the duplication check was accomplished by reading report numbers of daily receipts punched into cards against DTIE's continuously updated Report Holdings List, recorded in the IBM 1050 computer system. Prior to this time, a visual comparison of numbers of filed reports was accomplished as an adjunct job of the descriptive cataloging process.

13.9 *PRINTING AND PUBLISHING TASKS SIMPLIFIED THROUGH MECHANIZATION*

Early in the AEC's information program, it was considered important to handle centrally at DTIE the larger AEC contractors' printing overburdens and to provide for the printing needs of smaller contractors that had no publishing capability. Through careful equipment acquisitions, DTIE possessed a relatively modern printing establishment that was capable of providing a large portion of AEC's printing needs. Nevertheless, by 1967 about half of DTIE's printing load was accomplished by commercial printing organizations through GPO contracts.

A commercial book program had been active within DTI since the beginning days of the AEC—the National Nuclear Energy Series being the most prominent nationally and internationally. In 1967 approximately a dozen titles were in the production or planning stage slated for the commercial market. Oversight for the book program resided in DTI Headquarters; editing and processing the manuscript through its various steps to the publishers were accomplished in DTIE. More than 350 volumes, listed in the January 1968 edition of USAEC Division of Technical Information *Technical Books and Monographs,* bore the AEC publishing program imprint. In addition, four "Technical Progress Reviews" were shown as being published quarterly.[6]

As earlier reported, by the end of 1967, plans were being initiated by the Superintendent of Documents to tie DTIE announcement journal publication into one of the world's fastest composing systems—the GPO Linotron. This piece of electronic equipment was being developed for agencies having the type of publications represented by *NSA*. Data coded by means of Flexowriters allowed DTIE to process text sufficient for computer interpretation and to accommodate most of the typographical coding needs of the Linotron.

Other newly installed composition devices, developed by IBM, were new magnetic-tape composing machines (Selectrics) that had been delivered in June 1967. These machines promised greater simplification of galley copy preparation for AEC's prestige publications. The new composing system was described in *Technical Information Bulletin,* No. 15, as a means for composing copy relatively fast in a variety of type styles and sizes. The magnetic-tape system permitted page width, format, and typefaces to be altered, if necessary, when the reproducible copy was being generated. Furthermore, corrections and changes could be made to previously prepared tapes by merging correction tapes with original tapes during generation of final copy.

As the changeover was occurring from indexes created from photographed EAM cards to computer-stored and -manipulated data, the third *NSA* Cumulative Index was being published. Comprising indexed information for *NSA* volumes 16 to 20 (1961–1966), the index, published in 19 separate books, totaled 11,847 pages.[2]

(See also Secs. 2.6, 5.3, and 15.11.)

13.10 *EDUCATIONAL ASSISTANCE PROMOTED AS A PUBLIC PROGRAM*

Nuclear science educational literature was provided by the AEC through DTIE to various strata of laymen: elementary grade through college students as well as to the general public. Packets of literature for specific educational levels (e.g., elementary teachers or high-school science students) were also made available free of charge. To assist classes in nuclear science, DTI supported a traveling high school lecture/demonstration program designed to present orally and graphically the story of nuclear energy and its peaceful uses. Two foreign traveling exhibits also were employed in similar ways.

As a consequence of these activities, DTIE estimated that 250,000 requests were received for free educational literature on nuclear science during the year. To handle this volume and provide requesters with informative statements on the many subjects pertaining to atomic energy, DTI Headquarters developed the "Understanding the Atom" series of booklets. The number of titles in this series now totaled 44, of which 21 were available in foreign languages. Total distribution since the series was inaugurated in 1961 had reached 5,100,000 copies. Modern packaging and mailing techniques were installed to facilitate more rapid handling.[2]

Now maintaining stocks of almost 10,000 film prints, the AEC's film libraries loaned popular- and professional-level films that were viewed by an estimated 3,872,000 persons in high schools, institutions of higher learning, industrial organizations, scientific and engineering groups, and other community groups. The AEC was estimating an additional viewer audience of 22 million persons in 1967 by means of television via educational and commercial channels.[2]

During 1967 the AEC opened a new technical information activity at 1717 H Street, in Washington, D.C. As a one-stop information center, the new office reflected a Commission effort to participate in the President's program of improving service to the public from its federal offices.[2]

Industry was also urged to register with the Science Information Exchange (SIE) of the Smithsonian Institution. The SIE was a national registry of research in progress and was one of the first institutions to provide a computerized system for recording and indexing a large database.[2] DTI was active in coordinating the Commission's participation with SIE by providing the records of relevant AEC current research.

In August 1966 the AEC and the National Aeronautics and Space Administration (NASA) began a joint program of issuing a series of technical summaries oriented toward business and industry which described processes and techniques developed at federal laboratory sites. Known as "AEC–NASA Tech Briefs," they were distributed both by AEC and NASA and were available for sale to the public from the Clearinghouse for Federal Scientific and Technical Information (CFSTI).[7]

(See also Secs. 5.7, 7.11, 9.3, 11.4, 16.8, 17.1, and 18.6.)

13.11 *NEW TRY FOR MORE EFFECTIVE PANEL ASSIGNMENTS*

The Thirty-Eighth meeting of the Technical Information Panel (January 1967) was a jointly held meeting at ORNL with AEC-sponsored information centers.

Announced in the Minutes to the Thirty-Eighth Meeting (January 1967)[8] was the news that all standing Panel committees were discontinued and were to be replaced with task forces that would deal with specifically assigned problems. In so doing, chairmen of the named task forces would be able to secure the help, advice, and assistance from any AEC resource available to them.

At the Thirty-Ninth Panel Meeting, Washington, D.C. (October 1967),[9] chairmen of the various task forces reported on their assignments. Six task forces had been appointed:

Recruitment and Training, Chairman, C. G. Stevenson
Information Research Support, Chairman, Raymond K. Wakerling
Publications, Chairman, John Martens
Domestic Inputs to INIS, Chairman, Max Linn
Information Centers, Chairman, Chris Keim
Panel Organization and Internal Communication, Chairman, Dennis Puleston

Upon completion of the task force reports, Panel Chairman Edward J. Brunenkant stated that the task force idea appeared to be working well and that it would continue for the immediate future. A further elaboration on this plan appeared in *Technical Information Bulletin,* No. 15,[10] which reported a communication from the DTI Director (Brunenkant) in which he indicated that, although task force reports would not be discussed at panel meetings in their entirety, they would be distributed. Panel members would then be at liberty to comment upon them either by direct contact with the Panel Chairman, or with the Task Force Chairman, or by raising topics for discussion at future panel meetings.

It was Brunenkant's belief that such a change would enable the Panel to gain full benefit of the task force idea while conserving time at meetings for those issues which would most likely be of interest and concern to a majority of the membership.

(For additional information on Technical Information Panel operations, see Secs. 3.4 to 3.6 and 5.1.)

13.12 *ORAU LIBRARY ASSISTANCE DISCONTINUED*

For a number of years, the ORAU library was supported by DTI to act as a repository for obscure journals, foreign patents, non-AEC conference papers, and other difficult-to-find materials abstracted in *NSA*. As such, it had also been considered an additional resource for use in referring public requests for information. Financial support by DTI was averaging $60,000 annually. The costs of journal bindings and their housing and maintenance continued to increase, whereas use of these publications by both the public and DTIE continued to decline. With the total information program suffering financial strain, the Director determined that there could be no further financial support for the ORAU library function effective January 1, 1967. In closing off this financial assistance, all scientific and technical journals scanned for *NSA* were retained by DTIE for disposition subsequent to *NSA* processing.

Whereas in DTIE's earlier years, there was an effort to provide "backup" hard copy for all abstracted and announced items, no longer would this be possible for journal articles. The cost of binding journals, providing suitable storage and filing space, plus assignment of staff to maintain the collection, all proved to be beyond DTIE's capabilities. As a result, copies of journals were now discarded once abstracting and indexing were completed.

13.13 *REPORTING AND DISSEMINATING TECHNICAL INFORMATION: AEC MANUAL CHAPTER 3201*

Headquarters' Offices, Field Offices, and Project Sites (contractors) were continuously provided information and advice from DTI on appropriate ways to report completed research. AEC Manual Chapter 3201 provided detailed instructions on ways to report officially the completion of research projects in fulfillment of contractors' responsibilities. The usual reporting medium was an R&D report or a preprint of an article prepared for journal publication. It could also be a conference presentation or, occasionally, a book or a chapter in a book. Also provided in the Manual Chapter were instructions on ways to secure printing (internally and commercially) as well as information on how to price reports and appropriately arrange to disseminate research results.

Reported in the DTI Director's Activity Digest for July 1967 was an account of a briefing by the Director to Commissioner Gerald Tape on background and philosophy of proposed AEC Manual Chapter 3201, "Reporting and Disseminating Technical Information," particularly as it related to new instructions for reporting research in progress.

Also completed in June 1967 was a new Appendix to Chapter 3201. Included were new reporting recommendations taken from the *Guidelines to Format Standards for Scientific and Technical Reports Prepared by and for the Federal Government*, a publication issued by the Committee on Scientific and Technical Information (COSATI). Also included in the Manual Chapter Appendix were changes made to reflect a new requirement for contractors to purchase microfiche from the DTIE contractor rather than rely on the past practice of receiving them free and automatically as authorized by the AEC's standard distribution lists.[11]

13.14 *A PUSH TOWARD MAGNETIC TAPE STANDARDIZATION*

Concurrent with efforts toward in-house standardization of descriptive cataloging were nudges by Headquarters toward planning for a magnetic tape product that could be advertised as an available by-product of DTIE cataloging and indexing. At the Thirty-Eighth Panel Meeting (January 1967),[8] the DTI Director announced plans for setting up a task force to review requests for magnetic tapes. Requests for magnetic tapes resulted from efforts by various governmental and nongovernmental interests to obtain or share electronic information products for the creation of databases as their information centers became computerized. For general information on this topic, Panel Members were provided copies of *Interim Guidelines for International Use of U.S. Federally Owned Machine-Stored Indexes,* produced by the COSATI Panel on International Information Activities.

Magnetic tapes were also provided to interested Panel Members for internal purposes on request; they were also prepared to accomplish GPO publication of *NSA* indexes by the Linotron system. Several draft efforts were necessary before an officially described DTIE magnetic tape format was published. When on March 1, 1971, *Nuclear Science Abstracts Entry and Keyword File Formats for Magnetic Tape Dissemination* (TID-4581) finally became available, a special note explained that the magnetic tape formats described were designed primarily for internal AEC use and as input for information programs that were still in developmental or testing stages. Although the formats were considered temporary in design, it was also pointed out that plans were under way to process data on computer equipment capable of closer adherence to magnetic tape standards for information interchange under development by COSATI and the American National Standards Institute.[12]

13.15 *JOURNAL PRODUCTION SECTION ABOLISHED*

During 1967 all indexes, formerly prepared by the Listomatic Camera in conjunction with EAM punched cards, were henceforth planned for production by computer techniques. The Journal Production Section had been established to facilitate bringing together the various aspects of index production. The special 120-character print train, specially ordered to provide upper and lower case, plus other special characters (such as inferior and superior numbers), created an adequate typeface for photo-offset copy reproduction. With the computer now capable of printing out the index pages sequenced for printing, the Journal Production Section of the Graphics Arts Branch—especially organized to process indexes by Listomatic Camera techniques—was abolished. Brainard Patton, former Section Chief, was reassigned to the Educational Services Section as Education Officer.[13]

13.16 *INIS PLANNING: 1967*

One of the key recommendations of the December 1966 Working Group on INIS was that "the Agency ... discuss with the Government of the United States and the Governments of other Member States to have Nuclear Science Abstracts as an international journal published in the United States within the framework of INIS and under the auspices of the Agency." To consider this issue, as well as other Working Group recommendations, a Study Group was assembled in Vienna, September 18–21, 1967. Mixed reaction to this proposal was reported by participating Study Group members.[14]

The representative from the Soviet Union held the view that the Agency should concentrate its efforts on elaborating the INIS project along the lines fundamentally agreed upon by all participants at the December 1966 Working Group meeting. He strongly objected to a proposal that *NSA* should be actively assisted by the INIS program.

The U.S. participant indicated that a need for *NSA* might continue longer among the developing nations rather than within the United States because of a U.S. plan for a national computerized network. For that reason, it was the U.S. view that the Agency should play a positive role in the creation of an abstracting journal as part of the INIS program. He, however, did not rule out the possibility of some type of mutual cooperation in the preparation of an abstract journal, "preferable through a multilateral arrangement but in any case by means of bilateral arrangements."

The representative from the United Kingdom believed that, by having *NSA* produced under the aegis of the IAEA, a number of advantages would accrue to members: a printed abstract journal would be continued, experience in international cooperation and the economics involved would be gained, transfer of the U.S. burden to the international community would be accomplished, and input to the system could be expanded by drawing on other member countries.

The Study Group also believed that it was important for the INIS system to include abstracts (preferably in the form of a printed and indexed abstract journal). In this regard, the United Kingdom was reluctant to switch to keyword indexing until it became convinced that such a system would meet all user needs, including the production of printed subject indexes.

In other respects, the Study Group reiterated its support for INIS and looked forward to its next developmental stage, which was the elaboration of a "first reference design." The Group felt that a detailed description of a total system should be obtained as soon as possible—a target date for beginning such a study to be set for January 1, 1968.

Another important plane of INIS's development—consonant with the recommendation of the Working Group on INIS that the Agency acquire services of outside experts—related to the recommendations of the Working Party on Descriptive Cataloging that met in Vienna, August 14–25, 1967. Hired as consultants to the IAEA for this task were Miss Marian Gosset, Atomic Energy Research Establishment Librarian, United Kingdom, Chairman; Mr. A. Nystrom, Sweden; and Mr. Abraham I. Lebowitz, AEC, U.S.A. Liebowitz, also a librarian, was a member of DTI Headquarters staff and was assigned to the DTI Assistant Director for Systems Development, John Sherrod.

The revised draft dated November 14, 1967, "incorporating proposed United States changes," was used as the basis for the INIS Study Team's deliberations March 4–June 14, 1968. DTIE's experience in coding special characters found in scientific text, its published magnetic tape "standard," and the *DTIE Descriptive Cataloging Guide* (TID-4577, Rev. 2) were all rich informational resources for the working party to draw on. Of historical interest is the fact that one of the sections of the INIS cataloging rules that is still in use today—the use of bibliographic levels (analytical, monographic, and collective)—was a recommendation of the Working Party on Descriptive Cataloging.[15]

(See also Secs. 12.11 and 14.1.)

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INTERNATIONAL INFORMATION SHARING EMPHASIZED

CHAPTER 14

In its report to Congress for the Year 1968,[1] the Commission stated that the Atomic Energy Commission (AEC) was taking a leading part in the development of systems to support the principle of "long-term international cooperation in the sharing of nuclear information, with participating nations bearing a fair portion of the responsibilities and costs."

One such system, which was to have immense international impact, was the International Nuclear Information System (INIS) being developed under the auspices of the International Atomic Energy Agency (IAEA) located in Vienna, Austria. In 1968, an IAEA study team, which included representation from the United States, completed a four-month study that outlined the main features of the system, estimated its costs, described the needed equipment, and specified the products and services that could be obtained from the system on behalf of the IAEA membership.

14.1 *THE INIS PROGRAM DESIGNED*

In reporting on the proposed international nuclear information system, the 1968 Commission Report announced that, as proposed, each country would survey its own national scientific literature, identify items falling within the subject scope of the system, and supply bibliographic descriptions, abstracts, and subject indexing terms to the IAEA. The IAEA would assume the responsibility of merging the received data and providing magnetic tape copies of complete files to each member state desiring the information in this medium. The IAEA would also supply a printed secondary announcement periodical that categorized all of the items reported to the system and, on request, provide micronegative copies of report literature and abstracts.[2]

The International Nuclear Information System (INIS) that was formulated and ultimately recommended by the INIS Study Team, fitted essentially the system as described in the Commission report. The members of the Study Team who designed the recommended system had been assembled by the IAEA Secretariat under contract "to develop the first reference design for INIS."

The INIS Study Team was comprised basically of seven members who were stationed at IAEA Headquarters for the period March 4 to June 14, 1968. The Chairman, Herbert Coblans, was a former Director of the UNESCO Library and was appointed by the United Kingdom. Appointed from the USSR were Lev L. Isaev, Committee for the Utilization of Atomic Energy, and I. V. Tikhonov, Central Research Institute for Scientific Information and Economic Studies in Nuclear Energy. From the Federal Republic of Germany came Gerhard Wenske, Zentralstelle fuer Atomkernenergie Dokumentation, and from Euratom, Loll Rolling. Representing the IAEA was Giampaolo Del Bigio. The U.S. representative was William M. Vaden, DTIE Deputy Manager. For one month, May 13 to June 14, Charles Gottschalk, DTI Headquarters, served as an INIS consultant to take the lead in revising proposed recommended INIS rules for data entry.

Beyond the general objective of facilitating the coordination, standardization, and integration of existing information activities into the planned system, the Study Team was requested to provide specific recommended actions to be taken and procedures to be followed with respect to designing the system. In this design, the Consultants should:

- Recommend solutions for the following problems: What types of indexes should be included in the printed announcement list? What would be the optimum processing period, bearing in mind that on the one hand the information must be made available as soon as possible and, on the other hand, the computer processing of the material should not conflict with other Agency data processing activities? In the event that abstracts were available in machine-readable form, what additional equipment might be required to process and store the material? What might be the feasibility of producing a completely computerized abstract journal? What would be the recommended medium for the exchange of information and for the storage of this information at the Agency?
- Ensure consistency of data to be entered into the system.
- Ensure effective communication with participants.
- Coordinate the operation of INIS with the production of *NSA* and other abstracting journals in the nuclear field.

• Ensure the maximum of compatibility between data processing equipment used by the participants, recommending, if necessary, the enhancement of the Agency's computer facility through procurement of additional equipment and software.

• Provide a comprehensive financial plan, covering the possible benefits and the financial implications of the system (on both a short-term and long-term basis), complete with yearly budgets, implementation schedule, and staffing chart showing manpower requirements and required qualifications.

It became quickly apparent to the group that the INIS scope of work, planned as it was for a computerized system, was much in need of specialists to recommend equipment, software, and personnel adequate to accomplish the estimated INIS workloads. A computer subgroup was thus hurriedly requisitioned and formed. This group, working in sessions ranging between two to four weeks, consisted of four members: E. Barraclough, Computing Laboratory, Claremont Tower, United Kingdom; K. Isoda, Japan Atomic Energy Research Institute (JAERI), Japan; E. Tschernoster, Data Processing Centre and Research Institute for Medical Electronics and Modelling, Czechoslovakia; and James A. Gillcrist, Oak Ridge National Laboratory, representing the United States. Del Bigio, Team Member from the IAEA, also headed the INIS computing activity. By working with the computer subgroup, he was able to facilitate the group's findings and recommendations for the Study Team's deliberations.

Although all Team members agreed that abstracts were needed for the system, there was also agreement that IAEA should not (nor could it at this early stage) take over *NSA*. Consequently, only the creation of a printed *INIS List of References* (later to be renamed *INIS Atomindex*), received approval by all members. *INIS Atomindex* was to be supplied in two formats: a printed list (for countries lacking computers) and, for countries capable of using them, magnetic tapes containing the semimonthly cumulated entries identical to those arranged for printing. Ninety-nine categories, broken down by broad user interest, received group agreement for initiating *INIS Atomindex*. For those members desiring abstracts, sets of abstracts corresponding to *Atomindex* could be produced in the form of microfiche from abstract texts supplied by input centers.

Approximately one-fourth of the collected information was in the form of nonconventional literature (reports). To guarantee access to this information, an INIS Clearinghouse was deemed necessary to provide original text in the form of microfiche for all such documents.

A considerable amount of anxiety was expressed by Team members about the lack of standardization of rules related to bibliographic input and control of data being transmitted and processed. INIS was the first international effort designed to centrally merge data from a large decentralized group, and the magnitude of this pioneering exercise was especially daunting. The amount of nuclear science information analyzed for communicating to the planned decentralized system was estimated at 100,000 items annually worldwide. From this number, an estimated 60,000 to 70,000 indexed items would finally be selected and processed.

INIS was therefore compelled to incorporate workable standards, authorities, codes, and guidelines where none existed and to appropriate, to the extent possible, others' "standards." Experiences gained by DTIE in the production and publication of *NSA* and Euratom's efforts in establishing a retrieval system were useful in laying out the minimum requirements for decentralized data entry. Recommended cataloging authorities that had their origins at DTIE were the List of Serials, Corporate Authors, and Report Number Prefixes. These were later standardized to fit INIS's rules and enlarged to incorporate other INIS members' information materials.

The finally selected INIS subject scope closely paralleled *NSA*'s. The United States preferred a scope that limited information on tracer studies and application of radiation sources to new methods only. The U.S. recommendation was not accepted, however. The Russian representatives, in particular, desired no limitations of scope.

More complicated was the selection of a means to index the INIS collected and merged data. The system used by DTIE to create *NSA* was developed principally for printing semimonthly indexed issues of information covering a two-week announcement period. In DTIE's operation, the computer was used to assist in those production areas where practicable. INIS, on the other hand, was to be designed toward a completely computerized system, the ultimate goal of which was to create magnetic tapes for member states desiring them and, from which, a title-only printed byproduct *INIS Atomindex* would be produced.

Three well-known and widely used indexing methods were considered by the Study Team: hierarchical classification (UDC), *NSA* subject headings, and coordinate indexing using standard descriptors (i.e., the Euratom Thesaurus).[3] The Universal Decimal Classification (UDC) system was not recommended by the Team because INIS would require prompt and efficient updating (expansion) of terminology and, with UDC, such expansion could not be locally controlled; special indexing training in UDC would also be required by all participants; and decentralized assignment of unique UDC numerical codes could create errors difficult to discover and resolve.

In considering the indexing scheme used for *NSA*, it was acknowledged by the Team that the subject indexing method gave high precision in retrieval. However, the *NSA* method also required an excellent knowledge of the English language (particularly to develop appropriate modifier lines) and a good knowledge of the category system to allow appropriate cross-referencing. Added to these *NSA* complications were difficulties in designing a retrieval system that was not related directly to a printed publication, namely *NSA*. The remaining choice, therefore, was coordinate indexing (descriptors designed especially for the nuclear field). The problem of creating a suitable printed index to *INIS Atomindex* remained to be worked out.

A highly developed thesaurus of keywords had already been created and was in use by Euratom (with the help of DTIE). All of *NSA* since the initiation of the Euratom agreement had been indexed by DTIE, using terminology obtained from the Euratom Thesaurus. (In addition, subject headings were concurrently applied at DTIE for *NSA*.) The INIS Study Team visited Euratom at Brussels to review whether, or to what extent, the Euratom Thesaurus should be elaborated to obtain its adoption by INIS.

The possibility of using Euratom as a central control office for maintenance of the Thesaurus (if it were to be adopted) did not receive complete Study Team consensus, and the matter was left for later resolution as to how the INIS Thesaurus might be developed. The agreed alternative was to allow INIS to create its own thesaurus by starting with a subset of the Euratom Thesaurus terminology and adding terms of its own in conformance with its subject scope.

Of significance in the final recommendations was the fact that the recommended computer for INIS (an IBM System 360/30) paralleled certain features of the newly installed IBM System 360 equipment at DTIE (360/20) and at Oak Ridge Gaseous Diffusion Plant (ORGDP) (360/50), both of which were used to process *NSA* indexes and create data tapes for distribution. This recommendation for INIS was also consonant with the objective of ensuring a maximum of compatibility between participants' data processing equipment. DTIE, at time of start-up, was expected to supply approximately half or more of the information to be collected and processed by INIS. The IBM 120-character print train, especially designed for DTIE's printed index needs, was also recommended for INIS and was subsequently acquired.

In response to the Secretariat's request, cost estimates were provided for the total program as outlined by the Study Team. Staffing, equipment, training, and supplies were included.

A Panel Meeting of Experts from 16 member countries, plus observers, reviewed the Study Team's report on October 22, 1968, at IAEA Headquarters in Vienna.[4] The Study Team's recommendations were accepted, and a presentation to the IAEA Board of Governors in early 1969 resulted in INIS becoming a functional program of the IAEA that began operation in 1970. (Twenty years later the INIS program was still viable and operationally healthy.)

The first output products, the printed *INIS Atomindex* bibliographic announcement publication and associated computer tapes, were issued in April 1970. INIS' start-up was limited in scope to reactor technology and engineering, however, until the system's basic elements could be put into place and to allow communication channels between INIS and its membership to become fully established.

(See also Secs. 15.3 and 15.9.)

14.2 NSA *QUARTERLY INDEXES DISCONTINUED*

Beginning with the Third Quarter *NSA* Index (Volume 22, 1968), DTI Headquarters recommended that publication of quarterly indexes be suspended. This decision was not expected to cause serious hardship, inasmuch as *NSA* indexes were also being made available on magnetic tape.

The decision to discontinue quarterly publication of indexes resulted from a situation whereby a continuing rise in numbers of abstracts available for announcement was in conflict with an annual limit of *NSA* printed pages set by the Bureau of the Budget (18,000 pages for 1968). Thus, by discontinuing quarterly indexes, increased coverage became a tradeoff for a loss in total printed index pages. (Volume 22 included 53,507 abstracts as compared to 47,055 for Volume 21.)[4]

14.3 *EXCHANGE AGREEMENT BETWEEN USAEC AND USSR ANNOUNCED*

On July 29, 1968, AEC Commissioner Gerald F. Tape and the First Deputy Chief of the USSR State Committee for the Utilization of Atomic Energy signed a new agreement in Moscow. A part of the agreement called for a reciprocal exchange of unclassified scientific information (books, monographs, preprints, and doctoral dissertations) on current work in a number of nuclear science related fields.

The agreement stipulated that each party provide the other on a monthly basis ten new documents (two copies each) within the agreed fields. To more fully exploit the agreement, the IAEA and its members were also made beneficiaries of the exchange by each party agreeing to transmit exchanged information to the IEA library (i.e., the INIS Clearinghouse), as well.[5]

14.4 *DECISION MADE TO REDUCE FREE DISTRIBUTION OF USAEC DOCUMENTS ABROAD*

Evidence obtained both directly and indirectly indicated that many AEC depository libraries, domestic and foreign, were lax in maintaining the AEC report collections and in providing services to the public. Faced with continuing tight budgetary conditions, DTI management made the decision to curtail the number of depositories in foreign countries and institutions.

On May 17, 1968, foreign embassies were informed by the Department of State of an intended reduction of free distribution of AEC documents.[6] The Airgram announced that, effective July 1, a reduction would occur in the numbers of organizations receiving free distribution of its reports. Only one institution per country or international organization would be recognized for free service in the future. In such cases where more than one institution per country was then receiving free USAEC reports, the appropriate Government or international organization was requested to select, not later than June 22, 1968, the single center designated to receive free report distributions. In continuing to supply the designated center with micronegative (microfiche) copies of unclassified USAEC reports, the country was provided with a means to use these copies to supply quickly, and at reasonable cost, either duplicate micronegatives or eye-legible hard copies to all other requesters in the country.

The announcement pointed out that the USAEC would continue to cooperate with regional and international document centers. In this regard, the USAEC had been informed that the International Atomic Energy Agency in Vienna, the National Lending Library in the United Kingdom, and the Federal Clearinghouse for Science and Technology in the United States had all announced their readiness to provide document services that included access to unclassified USAEC reports.

(See also Secs. 7.3 and 15.7.)

14.5 *PLANS REVEALED FOR COMBINED DTIE/MUSEUM/CONVENTION CENTER*

A long-held dream of Edward J. Brunenkant, DTI's Director, for a combined DTIE/museum/convention center at Oak Ridge began to show possible fulfillment in early 1968. According to the January 1968 DTI Activity Digest, parcels of Oak Ridge government-owned land had been reserved as a potential building site for such a complex.[7] It was believed that the land would be suitable for new quarters for both an expanded museum and for DTIE operations. It would also provide space for a conference and education facility, including an auditorium, classrooms, and a lecture area.

It was further reported that opposition to the name change of the planned facility had developed in the Oak Ridge community. In considering these concerns, the DTI Director met with the governing board of the Oak Ridge Chamber of Commerce and heard their objections to the proposed name: Oak Ridge Hall of Science–American Museum of Atomic Energy. It was the view of Oak Ridgers that the proposed name had minimal touristic appeal. The Director also discussed with the Board some implications of the change (i.e., DTI's long-range goal of a joint program which, with Community support, would have a broader scope than was implied in the word "museum").

(See also Sec. 15.7.)

14.6 *REASSIGNMENTS, TRANSITIONS, AND RECOGNITIONS (1968)*

The Commission approved the appointment of Charles W. Pelzer to the position of Deputy Director, DTI. Until a successor was named, Pelzer continued to serve as Assistant Director for Exhibits.[8]

Joel O'Connor, DTIE's first Computer Operations Branch Chief, resigned July 1, 1968. Dr. O'Connor accepted a position to work in basic research in marine biology at Brookhaven National Laboratory. Replacing O'Connor was Fred E. Marsh, who transferred from AEC Controller's Office, Headquarters. Effective date of transfer was June 28, 1968.[9]

Nathaniel Johnson, an illustrator in DTIE's Graphics Arts Branch, won three honorable mentions at an exhibit of artwork at the Eighth Technical Seminar and International Art Exhibit, held at Huntsville, Alabama. His entries were originals of artwork for DTI publications and for the Oak Ridge 25th anniversary commemorative coin which he assisted in designing.[10]

In May 1968, DTI Headquarters was being readied for a move from its 47th Street location in Bethesda to the Phillips Building, also located in Bethesda.[11]

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NEW PROGRAM OBLIGATIONS: REGULATORY AND INTERNATIONAL

CHAPTER 15

In entering the year 1969, the Atomic Energy Commission (AEC) began to experience new patterns and varieties of change. A plateau had been reached in nuclear power plant construction, and new plant orders remained low. The Federal Government's program for controlling and managing the uranium enrichment process was being studied for possible transfer to the private sector. It was a year in which the rosy promises of atomic energy were both praised and criticized—a year in which nuclear power growth was slowed down by public apprehension, construction delays, and difficulties in plant equipment manufacturing capacity.[1]

Concern about the regulatory process in licensing nuclear reactors intensified in 1969. An AEC internal review group reported results of a year-long study on ways to improve the regulatory process for nuclear reactors. And an Atomic Safety and Licensing Appeal Board was established to review initial decisions in certain licensing proceedings.[2]

A newly elected President assumed office in 1969. As one of his earliest acts, on January 28, 1969, President Nixon requested Dr. Seaborg to continue as Commission Chairman. With this nomination, unanimously confirmed by the Senate, Dr. Seaborg would hold the AEC chairmanship longer than any other individual.[3]

It was also in 1969 (July 20) that United States astronauts Neil Armstrong and Edwin Aldrin landed on the moon, opening up to a dazzled public new scientific and technological marvels. Assisting the National Aeronautics and Space Administration (NASA) in this feat were the AEC's "SNAP" devices used for providing heat and power for space experimentation.

15.1 *NUCLEAR POWER SAFETY ISSUES ADDRESSED*

Regarding public concerns about commercializing nuclear energy, the Commission's Report for 1969 announced that, even though the safety record of the nuclear power industry was outstanding and operating experience was marked by the control of effluents generally well below prescribed safety standards, apprehension about the possibility of long-term effects of radioactive releases from nuclear power plants continued. There was growing public concern over atmospheric and terrestrial pollution in general.[1]

In attempts to allay these concerns, the Commission began public meetings to assist in creating a better public understanding of the power reactor safety issue. The first public meeting was held at the University of Vermont on September 11, 1969. Besides seminars given by the AEC at the University, additional public meetings were held at Brattleboro and Bennington. A new AEC booklet, *Nuclear Power and the Environment,* had been designed as part of this educational effort, and more than 4,000 copies were handed out at the several Vermont meetings. This pattern of public interaction was to be repeated many times in the future, especially within areas where commercial reactors were planned.

At the Forty-Second Technical Information Panel (November 1969), AEC plans for public education on environmental matters were considered. In discussing AEC's response to increasing public concern about reactor siting, a representative from the Division of Reactor Development explained: "Nuclear power is not being singled out; rather, people are becoming more concerned about all environmental matters. Are standards for release of radioactive effluents adequate? Should States be permitted to establish standards more rigorous than AEC standards? If nuclear reactors are so safe, why do we need the insurance provisions of the Price-Anderson Act? Isn't there a conflict of interest in having the AEC control both development and regulation? These are among the key questions being raised publicly. . . . A large public education effort is needed to assure public acceptance of nuclear power in order to meet electric power needs."[4]

In line with AEC policy of making information available to the public and to ensure the best access to information concerning problems associated with the environment, the Division of Technical Information Extension (DTIE) supported the AEC regulatory staff in 1968 to assure public availability of informational materials concerned with and in support of applications for construction and licensing of power and production reactors. Announced in *NSA*, this information was provided to those libraries maintaining collections of AEC materials. It was also made available for sale from the National Technical Information Service. More than 3,500 information items associated with 131 reactors had been announced and distributed by the end of 1970.[1]

15.2 *PUBLICATIONS DIRECTED TOWARD IMPROVED PUBLIC UNDERSTANDING OF NUCLEAR SCIENCE*

Progress continued to be made in the development and strengthening of methods for disseminating information about nuclear science to diverse domestic audiences. Specialized booklets, designed for use by various age levels, had been successfully used as an economical means for responding to large numbers of inquiries on scientific subjects directed to the AEC by students and teachers. Many of the booklets were adopted as curricula materials, supplementing other instructional aids.[3]

In 1969, three new booklets were added to the AEC's "Understanding the Atom" series that had been designed primarily for the secondary school level. This addition brought the total for this series to 53 titles. Since beginning the series in 1963, 10 million copies had been printed. A special ceremony to observe the production of the 10-millionth booklet was held in Oak Ridge early in 1970, at which time a special plaque was presented to DTI Director Edward J. Brunenkant, who had initiated the series. Several titles had been translated into foreign languages, and seven had been printed in Braille and distributed through the American Printing House for the Blind, Louisville, Kentucky.

In addition to the "Understanding the Atom" booklets, the AEC provided other free materials for primary and secondary school students and educators, including guides for experiments, student and teacher handbooks, films, charts, illustrative drawings, and other teacher aids. Assembled packets of educational materials were also made available to high school teachers in four specific areas of instruction: general science, biology, chemistry, and physics.[5]

Work was now beginning on a new series, "The World of the Atom," under the supervision of J. William Young, DTI Headquarters. The purpose of this series was to offer instruction on nuclear energy primarily to elementary school science classes.

It was also announced in the 1969 Commission's Report that approximately 15,000 Boy Scouts had qualified for the Atomic Energy Merit Badge. To achieve this special badge, each applicant had to prove his ability to explain the intricacies of a nuclear reactor. Introduced by Boy Scouts of America in the mid 1960s, the Atomic Energy Merit Badge program was coordinated by Robert G. Le Compte, DTI Headquarters. Information about the badge was incorporated in a booklet printed by DTIE and provided on request to tens of thousands inquiring Scouts.[1]

To the "Understanding the Atom" and "World of the Atom" series of booklets, in 1970 was added another educational innovation, aimed at the elementary and junior high school level. Artistically designed posters were now being made available to augment science teachers' resource materials. In 1970, two had been completed and 60,000 copies of each were distributed to schools over the United States. The first mailing "Fission" resulted in 12,000 congratulatory responses from science teachers for the DTI effort. Five or six posters per year were being planned for the publications program.

(See also Secs. 5.7, 7.11, 9.3, 10.1, 11.4, 13.10, and 18.6.)

15.3 *INIS PROGRESS AND OTHER INTERNATIONAL DEVELOPMENTS (1969)*

The United States (through DTI) was providing considerable support toward implementing the International Nuclear Information System (INIS) program as had been recently adopted by the International Atomic Energy Agency (IAEA) Board of Governors. Donald D. Davis and William M. Vaden from DTIE and Gloria Smith from Lawrence Radiation Laboratory represented the United States at a meeting in Harwell, England, May 21–23, 1969, to which were invited representatives of the United Kingdom Atomic Energy Authority, INIS, and Euratom. The meeting's purpose was to discuss INIS' implementation, particularly as regards decentralized responsibility for keyword (descriptor) indexing.

It was recommended by meeting attendees that development of the INIS and Euratom thesauri should, as far as possible, be identical; there should be frequent contact (at least monthly) between INIS and Euratom for updating requirements; and indexing and thesaurus development for INIS should be subject to strict central control by the Agency; and decisions on any questions of thesaurus updating and maintenance should be made by a nominated individual and not by group meetings.[6]

To assist the INIS staff in the development of bibliographic standards and authorities to be used by member countries, Margaret L. Pflueger, Assistant Chief, DTIE Technical Services Branch, departed the United States on September 1, 1969, for a six-month assignment in Vienna. A librarian, Pflueger had been involved with the AEC's technical information program almost from the time it was established.[7]

In the event the INIS effort was unsuccessful, DTI Headquarters, as a backstop, continued its efforts toward establishing bilateral agreements with friendly, industrialized nations. Concurrent with the INIS development, Memoranda of Understanding had been drafted for agreements between AEC and the United Kingdom, Canada, Australia, Japan, and the Scandinavian countries. In these agreements, each party agreed to scan the literature published in its country and to furnish the other party in the agreement with English-language abstracts and keyword indexes of documentation within an agreed subject scope.

15.4 *FOURTH GENEVA CONFERENCE ANNOUNCED*

The United Nations Scientific Advisory Committee suggested September 6–16, 1971, as the dates for the Fourth Conference on the Peaceful Uses of Atomic Energy. The Committee also recommended that the number of accredited delegates be limited to a number between 1000 and 1200—about one-third fewer than the number attending the 1964 Conference. At the Forty-Second Panel Meeting (November 1969),[4] the United States' planning for the Fourth Geneva Conference was reviewed by Charles Pelzer, DTI Deputy Director. The theme, "Benefits for Mankind from the Peaceful Uses of Atomic Energy," had been selected to allow inclusion of policy makers, planners, and economists, as well as scientists and technologists.

The United Nations Advisory Committee met again in Vienna in April 1970 to consider final Conference plans.[8] It was recommended that Dr. I. I. Rabi from the United States again be named Conference President; that the total numbers of papers be set at 500, of which 300 would be oral; and that the exhibits should be national. The IAEA was given responsibility for publishing the proceedings, which were expected to fill 12 volumes. Approximately 70 papers were estimated for U.S. presentation from a delegation of about 90 persons.

In reporting on informational materials planned for the Conference, the DTI Activity Report for July–September 1970 announced that the AEC intended to present Conference delegates and VIP visitors to Geneva with a 33⅓ rpm commemorative recording. The Report, in describing the special presentation album, stated that a panorama of atomic science and history in sound would be covered. In addition, the record would include voices of people whose discoveries during the previous 75 years created the atomic age. NBC Enterprises had been approached to produce the album that would be accompanied by an illustrated booklet written in the Conference's four official languages.

15.5 *CHARLES PELZER NAMED NEW IAEA SCIENTIFIC AND TECHNICAL INFORMATION DIRECTOR*

In 1969, it was learned that John Woolston, Director of the IAEA Division of Scientific and Technical Information, Vienna, planned to return to

Canada at the end of the year for a new assignment. Persons representing U.S. interests were naturally concerned that the INIS office should be occupied and managed by an individual of prominence in the international information community who would be capable of nurturing the INIS program through its critical formative period.[9] When the Deputy Director, AEC Division of Technical Information, disclosed his interest in the position, U.S. support was prompt and effective. Charles W. Pelzer's application was favorably received by the IAEA, and an AEC Announcement, dated July 6, 1970, reported his appointment to the office of IAEA Director of the Division of Scientific and Technical Information, effective July 1, 1970.

The announcement stated that, in succeeding John Woolston, Pelzer would direct IAEA programs for the collection and dissemination of scientific and technical information. In performing the duties of this office, he would operate INIS in cooperation with Member States; provide overall direction for the Agency's computer service, its Library, and its bibliographic and scientific reference services; organize scientific conferences, symposia, and seminars; coordinate and guide the Agency's scientific and technical information publishing program; and maintain liaison with Member States and encourage the exchange of scientific information on the peaceful uses of nuclear science.

Pelzer had been Deputy Director of DTI since 1968, having held other positions with the AEC dating back to its establishment.

15.6 *INAUGURATION OF DTI'S ONLINE RETRIEVAL SYSTEM: RECON*

In the Fall of 1968, DTI Director Edward J. Brunenkant had indicated his desire that additional effort be applied by DTIE toward the creation of an effective retrieval system that could be developed in parallel with Euratom's system. Brunenkant, in a memorandum to DTIE Manager Robert Shannon indicated that, while the database would change with time, planners should assume that the retrieval system would handle scientific and technical information, legislative material, and current research in progress information. The system should also be designed with sufficient flexibility to handle most kinds of input, an exception being organic chemical structures. Output displays should show, at users' options, bibliographic information, keywords, and abstracts.

The assignment to install an information retrieval system adequate to handle long-term AEC program interests was relayed by the DTIE

Manager to the DTIE Deputy Manager for execution. A progress report by William Vaden on this effort[10] at the Forty-Second Technical Information Panel Meeting (November 1969), is a historical record of DTI's earliest efforts to create and install an AEC-wide online information retrieval system. Technical problems and side issues, such as service contracts and access to suitable hardware, were also early matters of concern to DTI and the Panel and are so noted in this brief record.

At the previous year's Panel Meeting in Bethesda, Maryland (November 1968), a demonstration of a direct-access experiment was given by Data Corporation. A cathode-ray tube (CRT) device, hooked up to access a remote, but small, data collection provided impressive amounts of retrieved information when queried. DTIE staff were very much interested in the system (called Data Central) because of the simplicity of the database construction and program commands. The Data Central system took all input and digested the language into principal file words (key terms) which in turn became the file to be searched as an inverted file. Although the search was conducted using uncontrolled language (therefore creating the possibility of considerable retrieval noise), DTIE staff were pleased to consider that, by employing this type of system, AEC could have the possibility of creating, almost immediately, an online search capability with little or no change in DTIE's operating procedures.*

Data Corporation had been asked to come to Oak Ridge to demonstrate the system's capabilities. As a result of that demonstration, DTIE requested Carbide's Computer Technology Center (CTC) to initiate a study that would review the possibility of employing Data Central in either one of two ways:

- Rent the computer system (including programs) and store and access data either at Dayton, Ohio (location of the system), or Washington, D.C., or
- Purchase the Data Central program and install the system at the Carbide CTC and use government-owned computers at Oak Ridge.

It was further stipulated that updates to the master file should occur normally (i.e., each two weeks) and that, in order to understand better the economic implications of file growth, costs should be extended over a three-year period. Six terminals, to be placed at the major user sites, were configured in the plan.

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*Although descriptors were applied to all abstracts under the U.S./Euratom agreement, DTIE was still compelled to produce *NSA* in the traditional manner, which required the use of subject headings and modifier lines.

Upon completion of the study, DTIE staff were astonished at the final cost estimates projected for the three-year period. Whereas rental costs and costs associated with usual online interrogation were within manageable limits, costs for file updatings far exceeded planning limits. There would not be enough money remaining to purchase the program, let alone modify it and run it.

Earlier in 1968, DTIE worked on a program with CTC that was dubbed "RANSAC." Showing considerable promise, it used a weighted-term approach with Euratom keywords to index the database. A major change-out of computer equipment (from IBM 7090 to IBM System 360) absorbed all available staff effort at the Oak Ridge Gaseous Diffusion Plant (ORGDP), and work on RANSAC was temporarily suspended. Also reviewed by DTIE staff was a retrieval system being tested at Stanford, and the experiences of Pauline Atherton, Robert Freeman, and others, known to be working in this field, were investigated. Finally, however, it was decided to approach NASA to review what many considered to be the most successful direct-access system in the United States, capable of operating on large technical information files.

NASA's RECON II differed from Data Central in two significant ways. It required a structured thesaurus or dictionary for framing queries, and inverted files were not all grouped into one gigantic file that required reworking each time an updating occurred. It was an outgrowth of an earlier RECON I, developed by Bunker-Ramo, an operating program developed by Lockheed Aircraft Corporation.

In discussing RECON II with Van Wente of NASA, DTIE staff learned that, since the operating program was government-owned, there would be no need for AEC to reinvest in this portion of the system. NASA, in effect, encouraged DTIE to build on what had already been developed and paid for at government expense. Some modification of the database would, of course, be required, because of thesaurus differences and the fact that descriptive cataloging elements were tagged differently.

Following RECON II demonstrations and discussions with NASA staff, DTI made the decision to contact Lockheed Aircraft Corporation and begin negotiations for a contract to modify the AEC database and to create an online, direct-access system that had search characteristics of the NASA system. Principal contact at Lockheed was Dr. Roger Summit, Head of the Lockheed Palo Alto Research Laboratory.

No major problems emerged from the Lockheed discussions, and a contract was let to the Lockheed Research Laboratory for a period of nine months, beginning June 15, 1969, and extending through March 31, 1970. Funds applied to the project were under $60,000.

In preparing a database for the experiment, it was agreed that DTIE would supply descriptive cataloging and keyword tape files for 24 issues of Volume 22, *NSA*, constituting approximately 50,000 citations and keyword records (40,000,000 characters). There would also be one update of 12 issues of Volume 23.

It was also agreed that the contractor would develop programs to load the AEC data files into a computer housed at Palo Alto in a format compatible with the RECON retrieval software. Ultimately, the file, as well as programs, would be transferred to the Carbide CTC at Oak Ridge. One remote terminal would be stationed at Oak Ridge, and it was also agreed that there should be a provision for two additional terminals. Operation of the system would be limited to three days per work week at two hours' terminal time per day. Plans were to have a 2400-baud line from Oak Ridge to Palo Alto ready by Christmas to link a Computer Communications Incorporated (CCI) controller that was loaned to DTIE by NASA. Query testing was scheduled for early January 1970.

Upon creation of the basic AEC RECON program and after the initial shakedown (which included program debugging and a smoothing out of communications), it soon became apparent that AEC RECON held the greatest promise of an online information retrieval system for the AEC technical information program and should be permanently secured, hopefully at Oak Ridge. The nine search parameters taken from the *NSA* database gave a powerful online search capability. These were descriptors, personal authors, corporate source code, *NSA* category code, journal source CODEN, author affiliation country code, report number prefix, contract number prefix, and patent country code.

The first terminal, installed at DTIE, was hooked directly to the computer (and database), located at Palo Alto, California. Terminals were added late in 1970 at Lawrence Radiation Laboratory (Berkeley), Bettis Atomic Power Laboratory (Pittsburgh), and the AEC Library (Germantown) to further test the capabilities and response of the RECON system at times when multiple consoles were online. (See Fig. 15.1.)

During the early testing days of AEC RECON, the European Space Research Organization (ESRO) became interested in conducting an experiment to demonstrate the feasibility of a worldwide information retrieval system. ESRO was already operating a sophisticated computerized service similar to RECON for its European customers. The proposed experiment would involve connecting with and interrogating databases that were transatlantic.

An AEC Announcement, dated August 1, 1970,[11] proudly reported the demonstrated feasibility of a worldwide information retrieval system that tied a computer base of AEC information in the United States to terminals on the other side of the world. The experiment, prompted through interest of the head of ESRO in the AEC RECON system, was one of the earliest (if not the first) to illustrate the feasibility of accessing large databases, intercontinentally, by means of electronic communication.

Under the heading, "AEC Experiment Establishes Computer Link Between California and Paris," the announcement explained how the experiment was conducted using a special information retrieval system known as AEC RECON at the Lockheed Palo Alto Research Laboratory. Dr. Roger Summit was quoted as saying, "This event has tremendous significance. It demonstrates that time and distance no longer need to limit the availability of the world's information. . . . It is now technically possible for anyone with a telephone to have access to information the world over."

Although AEC RECON showed great promise for future development, a problem remained that related to establishing it in a permanent home. It was now uncertain that the ORGDP Center at Oak Ridge could be used because of security regulations that highly restricted its access. With the

Fig. 15.1 Dr. Roger Summit (left), Head, Lockheed Palo Alto Research Laboratory, reviews the recently installed AEC RECON retrieval system at TIC with Robert Shannon, Manager (1970).

new computer system (IBM System 360) now installed, the Center was becoming so rapidly saturated with work that its management felt that it would be unwise to consider ORGDP as an eligible RECON site.

Because DTIE was required to request computer service locally as directed by the AEC Controller, Oak Ridge Operations Office (ORO) was asked to initiate procurement of space on a computer, somewhere within the AEC community, that would be hospitable to the RECON programs under development—a system that would require maintenance of databases ultimately requiring a considerable amount of storage capability.

Some few weeks later, DTIE received a response from ORO stating that space had been located within the Oak Ridge National Laboratory (ORNL) IBM/360 computer system and that RECON could be moved from Lockheed to ORNL upon the expiration of the Lockheed contract. RECON's next phase involved its being moved permanently to this new site for total reprogramming. An additional investment in equipment (primarily for data storage) was also foreseen if RECON was ultimately to be developed into one of the nation's major online information retrieval systems.

In December 1970 the data store, programs, and documentation were moved from Palo Alto to ORNL, where continued development and testing of RECON were accomplished on the IBM System/360 Model 75 computer.[12]

(See also Secs. 16.3, 16.6, and 18.2.)

15.7 *SEVERE 1969 BUDGET CUTS CAUSE MODIFICATIONS IN TECHNICAL INFORMATION OPERATIONS*

Early in 1969, the Bureau of the Budget (BOB) recommended a half-million dollar reduction to DTI's 6.7 million FY 1970 budget. An appeal by the Commission reduced the amount of the projected cut to $300,000; even so, the reduction necessitated the cancellation of certain information center projects.[13]

DTI also provided detailed answers to a series of Joint Committee on Atomic Energy (JCAE) questions in preparation for authorization hearings on the FY 1970 budget. The questions dealt with such matters as activities of the Advisory Committee on Technical Information and the Technical Information Panel, domestic and overseas distribution practices, costs for processing and publication of *NSA*, and duplicative publication of scientific information. Subsequently, the Committee raised additional questions about foreign distribution of documents, particularly to

Poland and Yugoslavia; how DTI coordinated its dissemination of research and development reports with program divisions; and whether the Division could justify its support of duplicative publications on AEC-sponsored research.

The JCAE action resulted in a recommended $1,000,000 DTI budget cut for FY 1970. In addition to the elimination of certain specified foreign exhibits, funds for Offices of Industrial Cooperation were eliminated, and a decision was made to cease free distribution of microfiche to AEC contractors and depository libraries.

A letter dated August 5, 1969, from Edward J. Brunenkant, DTI Director, to recipients of AEC microfiche explained that, because of substantial cuts in budget allocations for FY 1970, AEC no longer would supply free microfiche copies of its reports. The letter stated that arrangements had been made whereby the National Cash Register Company (DTIE microfiche contractor) would supply microfiche at special prices.[14]

In the first month after AEC discontinued free distribution of microfiche of AEC reports, 55 of the 99 former domestic depositories elected to purchase microfiche from DTI's microfiche contractor in order to maintain currency of files.[15] (Additional information on dissemination of information to AEC Depositories may be found in Secs. 7.3 and 14.4.)

Budget stringencies and President Nixon's request to limit federal construction also resulted in a drastic cut in DTI's hopes for long-range building plans at Oak Ridge. Instead of requesting $13,000,000 for a science information complex (see Sec. 14.5), DTI's plans were modified to seek a $2.5 million facility, which would house only the American Museum of Atomic Energy.[15]

A Joint Committee on Printing (JCP) survey team met at DTIE on June 9 to identify the amount of Federal printing done in authorized printing plants that might be procured from commercial sources. The team concluded that a minimum of 65 percent of DTIE printing could be secured commercially. Plans for establishing a GPO Regional Printing Procurement Office were revealed. Region 4 was identified for Tennessee, and DTIE was informed that outside procurement of printing should be started within six to twelve months.

15.8 *HEADQUARTERS LIBRARY TRANSFERRED*

Another DTI program modification in August 1969 resulted in the termination of a DTIE/Headquarters Library relationship that had its connections[16] in Manhattan Engineer District days.

The Assistant General Manager for Administration, John V. Vinciguerra, announced on August 1, 1969,[16] that the functions and operation of the AEC Headquarters Library at the Germantown and Bethesda offices were being transferred from the Division of Technical Information to the Division of Headquarters Services. The Law Library was not affected in the transfer.

In the transfer action Lee F. Parman, AEC Librarian, was transferred to a newly established position of Assistant to the Director for Library and Information Services, Division of Technical Information. As part of the transfer, twenty-two persons were transferred to the Division of Headquarters Services.

The effect of the transfer was to remove further from DTIE an easy communication medium involving one of the important professional groups associated with the AEC's technical information program: the AEC library community.

15.9 *DTIE ASSISTS IN IMPROVING EURATOM THESAURUS FOR INDEXERS*

The Euratom Thesaurus, under consideration by INIS as the essential tool for adoption by indexers, was inconvenient and inefficient for indexers to use. Every indexing term permitted by the system was displayed in the Thesaurus, and for each term that was not a keyword, the related terms were displayed one hierarchical step above that term. The terms that were one hierarchical step below any given term could be found by going to another authority, the Inverted Dictionary. Terminology charts (Part II of the Thesaurus) showed complex term relationships but not the same relationships found in the Thesaurus.

In the spring of 1969, Dean Bernard Fry and Mr. Miles Libbey of the Indiana University Graduate Library School, aware of DTIE's interest in improving the keyword indexing tools, proposed to help make improvements to the Euratom Thesaurus. They proposed to start with the Thesaurus and, by using computer programs, trace out and display, in some meaningful manner, the hierarchical structure already there.

A contract was agreed upon, and starting with the May 1969 version of the Thesaurus, they produced a display of each term in its alphabetic sequence, followed by a list of each step upward until a keyword was reached and a display of each step downward until a forbidden term or the most specific index term was reached. The initial printout produced by computer was reviewed at DTIE and changes in the hierarchical linkages were recommended and subsequently made.[17]

Later, as changes were incorporated, the resultant output tape was forwarded to Lawrence Radiation Laboratory, where a page-formatting program, developed by Dr. Joanne Herr, was used as the basis for producing reproduction copy for printing.

The printed thesaurus, *Euratom Thesaurus, May 1969, Hierarchically Structured and Modified by the AEC Division of Technical Information Extension* (TID-25439), was subsequently used by a task force appointed by INIS to produce the initial thesaurus drafts used in creating the INIS Thesaurus.

15.10 *NEW DTIE DATA ENTRY SYSTEM PLANNED*

In April 1968, the DTI Director requested that abstracts be added to the information database being computerized. To accomplish this new assignment, DTIE management would be required to more than double the amount of computerized information to be processed and stored. The fact that the Friden Flexowriter data entry system had been installed to accommodate data entry only for indexing and descriptive cataloging was just one major problem to be resolved in carrying out this order. A greater problem related to the Flexowriters, themselves. They were well-worn, having been in constant use since their introduction, and were now considerably aged. In addition, because regular factory production of these specially designed machines had ceased, they could not now be replaced. To compose complicated text as represented in abstracts accurately and efficiently, new data entry equipment would have to be considered, necessitating many system changes. Chief among these needs were devices that would allow the introduction of a much larger character set to accommodate scientific and technical text.

The numerous processing steps required for processing information into a computer database pointed up the inefficiencies of the present system. All cataloged data on tape were hand carried daily to the Computer Technology Center located 18 miles away from DTIE. (The electronic flow of data through the wired connection between the two computers was much too slow.) At critical stages in the production cycle, additional trips were necessary to accommodate corrections and changes. Because of these inefficient and awkward input processing requirements, many times corrections could not be made because of rigid publication schedules that could not be violated. Similar correction and processing steps were repeated for subject index data (almost half of the total data entered) as well as for quarterly, semiannual, and annual index cumulations.

On July 22, 1968, a formal plan was presented to DTIE management which, if adopted, promised many operational improvements. The plan would create a system, realistic in terms of DTIE's budget planning, that would allow modular growth for the future. The designation "information input system" would be retained for the comfort of those required to approve a plan that should not be construed as a large computer complex under development for DTIE. The plan also envisioned the retention of the current system for running in parallel to the one to be developed, thus ensuring no significant production loss during installation.

As described in Report TID-4151, which provides details on the planning of the proposed system,[18] ". . . a multi-CPU, on-line, time-sharing system, was projected." Three data streams (abstracts, subject indexing, and descriptive cataloging) were considered for the new system, each stream requiring approximately eight online, CRT keyboard terminals. The proposed system would be expandable beyond the then current 120-character limitation to allow the introduction of 1,700 individual characters. In order to avoid costly research and to encourage computer manufacturer competition, off-the-shelf conventional equipment and low-cost CRTs with keyboard terminals were proposed.

The uniqueness of the proposed system consisted in the fact that operators could enter and correct information from remote stations (i.e., at various locations in the DTIE building as work would flow from one process stage to another) by means of CRTs and specially designed keyboards. The data entry operator could view the material, make corrections on the spot or, later after proofreading, call back the complete item and revise the information as necessary. Thus the complexity and time-consuming aspects of editing and correcting paper-tape-encoded information could be eliminated.

Since the implementation of the proposed system depended on proper staffing and budgeting of equipment—as well as an orderly phasing in—a three-year planning approach was recommended. Each data stream would be implemented separately and would serve as a building block for the one following. Equipment would be added each year to accommodate each new data stream. The DTIE staff considered both single and multiple CPU approaches for achieving its objectives.

In a memorandum dated January 9, 1969, Brunenkant to Shannon, the proposed system was approved, and Irving Lebow, Fred E. Marsh, Jr., and Henry Horton, designers of the plan, immediately began to secure assistance of Oak Ridge Operations Office's procurement staff.

Fourteen computer vendors were contacted. Six proposals were returned to DTIE, and, upon close review, two companies appeared to satisfy DTIE's requirements. A selection committee, comprised of representatives from DTIE, Oak Ridge Operations Office, and Union Carbide Nuclear Corporation, was appointed to review the two vendors' proposals.

The Committee consensus was that equipment offered by Digital Equipment Corporation (DEC) came closest to meeting DTIE's requirements. Thus the FY 1969 equipment increment was procured from DEC and consisted of one KA10 Processor, one PDP-8 Computer (4K memory), 4 VT02 Terminals, plus controllers, teleprinters, and cables—for a total of $167,042. For FY 1970, the plan called for additional memory capability, disk packs, and additional inputting terminals for a total of $189,000.

The DEC PDP-8 and PDP-10 computers were delivered on July 8, 1969.

Installation began on July 10; on July 24, equipment was powered-up. Three software specialists from Digital Equipment Corporation reported on July 28. Their primary efforts initially were directed toward systems programming and designing of software for inputting, storing, and publishing bibliographic information (including abstracts) in an interactive real-time, time-sharing environment.[19]

Interfacing of the PDP-8 with the PDP-10 had the following purpose: The PDP-8, acting as a controller for the CRT graphic terminals, had the ability to poll and share the system for up to eight CRT graphic terminals, allowing font changes needed for scientific text to be created without adding processing loads to the PDP-10. The CRTs had the capability to define and plot character sets graphically, a characteristic that enabled the system to display any character called from a very large number of character sets.

In terms of created data, except for planned abstracts, the products of the two data entry systems (current and planned) were to be identical. Thus the use of a matrix to define the types of information being processed, data tags (delimiters), the use of DTIE's cataloging rules and authorities were unchanged for the older system and for the one under development. The newer system offered enormous improvements, however.[20] As examples:

- The newer system was tutorial: The operator would stipulate the type of literature to be processed, and the system would display each information tag permitted for the data to be keyboarded. The operator then made the determination to skip unneeded tags and enter the appropriate data for the others.
- Special characters could be selected and entered into the system without special coding by the compositor; the video terminal displayed the requested character for confirmation.

- Data could be corrected at time of initial input or could be called back later for correction upon review of a printout marked by proofreaders.
- The system performed an automatic check for duplications at time of entry. Upon entry all papers written by an author would be displayed for comparison by the operator; the operator could abort the item being entered if a duplicate were identified. (Approximately 10% of all information entered was estimated to be duplicated material.)
- When conference literature was entered, the system would display, if a paper from the same conference had been previously entered, the full title, location, and date of the conference. The operator would therefore not be required to rekey this information.
- Similarly, at the operator's direction, any preceding data could be repeated. Thus, when abstracting multiple articles from a single journal, the journal title was keyboarded only for the first article; thus, not only were additional key strokes eliminated but also time for proofchecking of titles was reduced as well.
- Checks could be made visually to ensure that all data were entered correctly.

With the development of the new bibliographic system, all data entry operations were gradually absorbed into the computer operation. As processes were simplified, all of DTIE's information activities eventually became computer-dependent. In 1970, plans were being laid to restructure this new part of the DTIE organization that was rapidly becoming the pulse-beat for all data processing involving input and output products. By 1971, the DTIE Programs and Systems Development Branch was established to manage the newly developed system and for future planning.

(See also Sections 12.1, 13.7, and 16.11.)

15.11 *BOOK AND MONOGRAPH PROGRAM SHOWS DECLINE*

At the Forty-Third meeting of the Technical Information Panel (December 1970), Joseph G. Gratton, DTI Assistant Director for Publications, summarized the status of the overall publications program.[21] Because of the declining AEC budget, Gratton reported that, for the previous two years, not one technical book or monograph had been placed under contract to a publisher. Because of tight financial squeezes, all books and monographs had been funded by program divisions rather than by the

Division of Technical Information. Nevertheless, a large number of manuscripts were in the publishing pipeline, and in calendar year 1970, fifteen new books were published, leaving an equal number in various stages of processing.

In contrast to the book and monograph program, symposia publishing was very active. The number of new titles was being limited to six each year, however, because of DTIE's printing budget limitations. Criteria for selecting candidate manuscripts for the Symposium Series were the following: Publication must be of interest to a broad section of the nuclear community; it must support an AEC program; no other interest in publishing the proceedings existed; and sponsor agreed to editing, styling, and publishing by DTIE. The Symposium Series was one of DTI's most successful publication projects, and the symposia selection committee turned down an average of three manuscript proposals for each one accepted.

The "Critical Review" Series, begun in 1968, was originated primarily to continue the stalled Biology and Medicine Critical Review Series. Planned to be short (100 to 150 pages per book), subjects were chosen to review thoroughly a narrow area of nuclear science. Four titles had been completed and several more were in process. Headquarters' Program Offices provided committee representatives to select titles. Authors were provided honoraria up to $3000 for any review selected, subject to funding from the sponsoring Headquarters program division.

Through contraction and elimination, the journal program (also known as Quarterly Technical Progress Reviews) was now reduced to three titles: *Reactor Technology, Nuclear Safety,* and *Isotopes & Radiation Technology,* each averaging a circulation of about 3000, of which approximately 1200 were free for AEC program offices and researchers.

(Discussions of the publications program are also found in Secs. 2.6, 5.3, and 13.10.)

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THE OLD ORDER CHANGES

CHAPTER 16

After ten years of service as Chairman, Glenn T. Seaborg retired from the U.S. Atomic Energy Commission (AEC) effective August 16, 1971. The following day, James R. Schlesinger assumed responsibilities as Chairman of an organization that was seeing its twenty-fifth year draw to a close. At the end of the year, General Manager Robert Hollingsworth announced the retirement of Sam Sapirie as Manager of Oak Ridge Operations Office. Having served in that office for more than two decades, Sapirie was replaced by Robert J. Hart, former Deputy Manager of Richland Operations Office.

A radically different organizational structure for the AEC, which was announced at year's end, reflected a new direction that the AEC began to travel. After three more years, the demise of the AEC as a federal establishment was complete.

In the Introduction to its Annual Report to Congress for 1971, the Commission stated: "Technological progress will continue to be a major objective of the AEC in the years ahead, but the AEC's role as a regulatory overseer of the industry in the areas of quality of product and public safety will now be of increasing importance. This change was a result of the development of a mature, self-sustaining nuclear industry... . As nuclear technology progresses, the AEC's paramount concern will continue to be toward ensuring environmental and public safety in any nuclear-associated activity."[1]

Another significant event reported in the Annual Report was a Federal Court of Appeals' "landmark decision concerning the Calvert Cliffs, Md., nuclear powerplant and the AEC regulations for implementing the National Environmental Policy Act of 1969 (NEPA)." This decision, which directed the AEC to revise, in several respects, its rules on consideration of nonradiological environmental matters in facility licensing, affected more than one hundred nuclear power reactors then in operation, under construction, or under review in the licensing process.

The Administration's dictum to federal agencies to review their committees, boards, and panels with an eye toward a reduction of their numbers resulted in the AEC's Technical Information Panel being disbanded, as was also the Advisory Committee on Technical Information. The next group assembled to review the AEC's information program was called "Meeting of Contractor Representatives, Field Office Technical Information Officers, Program Division Representatives and Office of Information Staff."[2] In the face of impending changes, however, the importance of the Division of Technical Information's (DTIE's) program on an international level continued to be highly regarded. On August 26, 1971, Ambassadors T. Keith Glennan and Dwight J. Porter visited DTIE to review its relationship with the International Atomic Energy Agency's (IAEA's) International Nuclear Information System (INIS) program under development and to receive a RECON demonstration. Ambassadors Glennan and Porter were, respectively, U.S. Ambassador to the IAEA and U.S. Resident Representative to the IAEA. They were accompanied by Robert W. Kent, Bureau of International Organization Affairs, Department of State, and Abraham S. Friedman, AEC Division of International Affairs.[3]

16.1 *SCOPE OF AEC'S R&D PROGRAMS EXPANDS BEYOND NUCLEAR*

During the 1960s, the Commission assisted the National Aeronautics and Space Administration (NASA), under the Systems for Nuclear Auxiliary Power (SNAP) program, in the production of radioisotope-powered and reactor-powered electrical-generating units for space vehicles.

"Applied technology" projects, initially associated primarily with research on deep underground explosions, were directed by the AEC in the 1970s toward environmental research, energy storage and transmission systems, synthetic fuels, and nonnuclear energy.

Through leadership of the new President, applied technology was intensified, and the AEC was authorized by Congress on August 11, 1971, to "undertake research and development projects geared to providing a variety of alternatives for meeting the Nation's energy needs." As a result of this renewed interest in energy projects at the Executive level, the Commission's industrial contractors and national laboratories became involved in research areas related to superconducting power transmission systems, energy storage, solar energy, geothermal resources, and coal gasification.[4]

In response to a White House request, a series of magnetic tapes was prepared by DTIE covering *Nuclear Science Abstracts (NSA)* abstracted items related to "energy" from *NSA* Volumes 21 to 24. Generated by STATGEN software, these lists constituted one of the earliest major indications of interest in non-nuclear aspects of DTIE's database.[5]

16.2 *AEC OPERATION FUNCTIONS RESTRUCTURED: TIC ESTABLISHED*

On the matter of reorganization, the 1971 Commission's Report to Con-

gress pointed to significant changes that had been made in the AEC's regulatory organization during the year. The purpose of the changes was to expedite reactor licensing functions, especially in the area of the expanded environmental reviews resulting from the Calvert Cliffs decision. The position of Deputy Director of Regulation for Reactor Licensing had been established. Approximately 30 technical employees from various other AEC organizational components had been temporarily assigned to the regulatory staff to help with the expanded reactor licensing work load.[1]

On December 7, 1971, a Headquarters announcement reported a reorganizing of AEC operating functions. According to the announcement, the reorganization (the first in ten years) was designed "to pull together various related programs which previously had been scattered."

In laying out the new structure, which was to become immediately effective, the announcement contained this additional statement: "In addition to the announced changes, a new Office of Information Services has been created and will report directly to the Commission, the General Manager, and the Director of Regulation. It will encompass the functions of the Divisions of Public Information, Technical Information, and some activities of the former Division of Plans and Reports. Mr. John A. Harris, presently the Director of the Division of Public Information, will be the new Director of this Office."[6]

On January 3, 1972, Technical Information Announcement 72-1 advised all staff that effective immediately a change in name had been approved for DTIE. Henceforth the new designation was Technical Information Center (TIC).

As shown in the April 1972 organization chart, the new Office of Information Services (OIS) was structured as follows:

Director, John A. Harris; Deputy Director for Programs, Edwin E. Stokely; Assistant to the Director, Robert W. Newlin; Assistant Director for Public Information, Joseph J. Fouchard; Assistant Director for Educational Services, Edwin E. Stokely; Assistant Director for Technical Information, Edward J. Brunenkant. Listed under the Assistant Director for Technical Information was the newly named Technical Information Center which listed as Manager, Robert L. Shannon, and as Deputy, William M. Vaden.

Both Harris and Stokely, whose professional background experiences were solely in public information, were former Oak Ridgers. As former public information officers associated with Oak Ridge Operations Office, they had become well acquainted with the primary programs of TIC.

16.3 *RECON FEATURED AT "NUCLEAR USA" GENEVA IV EXHIBIT*

Although Dr. Seaborg had retired as Chairman of the AEC, he had been requested to serve as Conference President to the Fourth United Nations Conference on the Peaceful Uses of Atomic Energy, held in Geneva, Switzerland. Some 4000 persons attended the conference, which was held September 6–16, 1971. Of the attendees, 2054 were delegates from 74 participating nations and 9 international organizations. Whereas the 1955, 1958, and 1964 conferences emphasized the promise of nuclear technologies, the 1971 conference (and last) dealt with these technologies as realities that created everyday problems requiring continuing surveillance and resolution.

The U.S. presentation, named "Nuclear USA," contained topical exhibits that demonstrated the competence of the United States in nuclear science and technology. It also included a technical information center that featured, according to the Annual Report: "one of the most intriguing demonstrations at the Palais—visitors were invited to address bibliographic inquiries to computerized data banks located in Oak Ridge, Tennessee... . Answers from the computers were displayed on a TV-like monitor within seconds. The communication with the Oak Ridge computer was usually via satellite. More than 14,000 persons visited "Nuclear USA" during the 11 days of the conference."[1]

John W. Norris, DTIE Science and Technology Branch Chief, was the RECON demonstrator and literature searcher for the Nuclear USA presentation. Having ably guided *NSA*'s processing for a number of years as Branch Chief, Norris was very familiar both with RECON's database content and the system he was assisting in implementing for the AEC. Dr. Al Brooks and staff at Oak Ridge National Laboratory (ORNL) proved their unexcelled professional competence in assuring computer readiness for the transcontinental demonstration.

Three hundred and seventy-five books on nuclear science and technology were displayed at the U.S. exhibit, mostly provided gratis by U.S. publishers. A catalog, printed by DTIE, was prepared as a give-away to describe the collection. A flyer describing RECON had also been printed to provide instructions for accessing and searching the database, along with information about equipment employed.[5]

16.4 *PROGRAM ESTABLISHED TO EASE PUBLIC ACCESS TO REGULATORY INFORMATION*

In January 1971 Edward Brunenkant and Thomas Hughes (DTI) and Irving Lebow (DTIE) met with staff of the Advisory Committee on Reactor Safeguards (ACRS) to explore how to meet ACRS's need in allowing public access to dockets of safety analysis reports, license applications for nuclear power plants, and related information.

To assist the ACRS, TIC created a new series of publications entitled *FIND: Fiche Index for Nuclear Dockets. FINDs* were comprised of chronological lists of items within a given project that had been microfiched and announced in *NSA*. Within the published *FIND*, a title listing (index) was given of the items available within a published docket. Alongside the listed titles was given the grid number for locating the item within the microfiche. *FINDs* were made publicly available for sale from the National Technical Information Service.

The new service was described[1] as a system involving the use of microfiche to store and retrieve case files of applications to construct and operate nuclear power plants together with required safety analysis reports and other supporting material. By using microfiche, storage requirements were reduced to approximately one percent of that required for full-sized pages. Portability of documents was thus increased significantly—an important factor where it was necessary to provide data at hearings and meetings throughout the United States. *FIND,* the printed index, had been created to quickly and accurately locate information in the case files.

16.5 *DECLASSIFICATION OF AEC DOCUMENTS INTENSIFIED*

A comprehensive declassification review program was initiated during 1971 to locate AEC documents that contained markings that no longer warranted a classification status. At year's end, all AEC offices and contractor installations were being visited by classification teams to review stored classified documents.[1]

Since the declassification program began in 1946, more than a million documents had been declassified. By 1972, as a result of AEC declassification efforts, only a limited number of programs remained classified in any significant way.

According to the Commission's Report to Congress for 1972,[7] the programs remaining classified included the separation of fissionable isotopes (enrichment process), the weapons program, and the naval nuclear propulsion program. Almost all other programs were either completely unclassified or nearly so. Information concerning production reactors, space propulsion, space power, and controlled thermonuclear reactor research were reported to be almost completely unclassified. Programs for basic scientific research; medical, biological, and agricultural applications; civilian power; and research reactors were all completely unclassified.

16.6 *MEETING OF INFORMATION PROGRAM REPRESENTATIVES CALLED*

No longer a meeting of the Technical Information Panel, a technical information meeting was nevertheless called and held at AEC Bethesda Offices, April 11–12, 1972, to provide an opportunity for AEC management to outline the program of the newly established OIS. Eighty-six persons representing AEC program divisions, field offices, contractors, and OIS staff were present for the two-day sessions. Edward J. Brunenkant, who presided, welcomed the attendees and introduced Edwin E. Stokely, Deputy Director for Programs.

Stokely, noting that all information activities were now merged into one office, explained that OIS had been given a mandate to examine all programs with the aim of improving their effectiveness, increasing efficiency, and reducing costs or staff. In this regard, changes had been initiated to deemphasize certain exhibit activities and lecture–demonstration programs for high schools. Locating ways to reduce costs in the production of *NSA* was another objective. To attain this targeted goal, consideration was being given to procuring services from such organizations as the American Institute of Physics. Financing sources also had to be found for the Technical Progress Reviews if they were to be continued. A committee had been established to study TIC activities to determine whether all of the present functions were necessary.

Also reported by OIS Management during the meeting was the intent to study ways to raise additional revenue from AEC technical information products and services. When the December 1971 budget cut was effected, OIS was asked to produce as much revenue as possible from these sources.

Program oversight for AEC RECON was now moved to Headquarters in the care of Thomas Hughes. Matters relating to the database and day-to-day technical matters continued to be the responsibility of TIC. OIS had not yet begun to charge for RECON service, although the revenue-producing committee was free to review this possibility. RECON line cost was $0.55 per month/mile, which was a cost to the user in addition to hook-up charges and equipment costs.

16.7 *COMPUTER SOFTWARE EXCHANGE CENTER ESTABLISHED AT ARGONNE*

At the 1972 technical information meeting, Joseph G. Gratton, OIS Science Services Branch Chief, reported that a computer software exchange center had been established at Argonne National Laboratory (ANL). Named director of the ANL Code Center was Dr. Margaret Butler. In its new responsibility, the Code Center would collect and update abstracts of AEC computer programs and forward them to TIC at Oak Ridge for printing and distribution.

Program divisions were responsible for depositing materials in the ANL Center for exchange and for advising the Center as to whether packages could be made generally available. When availability was denied, restrictions for reasons other than security required a statement in writing. Where reciprocal arrangements had been made with the European Nuclear Energy Agency (ENEA) (Paris), foreign distribution was authorized via the Code Center. [ENEA in 1972 was reorganized under NEA (Nuclear Energy Agency).]

16.8 *AEC FILM LIBRARY PROGRAM CENTRALIZED AT TECHNICAL INFORMATION CENTER*

As part of the OIS's plan to increase efficiency and reduce costs, all AEC film libraries in the continental United States were centralized in TIC in the summer of 1972.[8]

In support of its information and education program, the AEC, through its Public Information Offices, had maintained ten motion-picture libraries from which qualified borrowers throughout the United States and Canada could obtain 16-mm sound-track films. These films were produced primarily to explain to the lay public the various aspects of atomic energy.

More than 10,000 prints of 232 active film titles were centralized at TIC; these films were obtained from film centers at AEC Offices located in Richland, Washington; Berkeley, California; Albuquerque, New Mexico; Idaho Falls, Idaho; Grand Junction, Colorado; Argonne, Illinois; Oak Ridge, Tennessee; New York, N.Y.; Washington, D.C.; and Aiken, South Carolina.[9]

In its new responsibility, TIC assembled, printed, and distributed a new combined film catalog. To reduce backlogged requests, a new computer film booking program was completed and debugged in September 1972. Guidelines were also prepared for keying request data directly from requesters' letters to the film librarian.[10]

For the consolidation of film stocks and for the management of the request activity (involving warehousing, stocking, cleaning, and repairing films; handling requests; booking; and mailing), a contract was let with Microsurance Corporation. An estimated 60,000 mailings were projected for 1972.[11]

(See also Secs. 5.7, 7.11, 9.3, 11.4, 17.1, and 18.6.)

16.9 NUCLEAR SCIENCE ABSTRACTS *AND* INIS ATOMINDEX *DRAW CLOSER*

The March 1972 issue of "INIS Newsletter" reported that the IAEA's Board of Governors had recommended that INIS expand to a full subject scope during 1972; this would allow contributions on a voluntary basis for the year. Beginning 1973, however, it was stated that the expansion would be mandatory for all INIS participants.[12]

During the year *NSA* subject categories, established to group abstracts, were revised to become more compatible with categories used by INIS. The INIS thesaurus had received its final revision and now had become the authority for *NSA* descriptor indexing, starting with *NSA* Volume 26, No. 7. It was announced that new approaches to subject indexing, compatible for both systems, were being investigated for *INIS Atomindex* and *NSA*.

In recognition of the decision to broaden INIS to full scope, TIC began to provide twice monthly input tapes to INIS in 1972.[13]

In anticipation of an *NSA* system oriented toward more direct input from outside vendors, it was reported in 1972 that the American Institute of Physics had provided test tapes to conform to a program written to format the data to fit TIC's data entry requirements.[14]

16.10 *BRUNENKANT REPLACES PELZER AS IAEA INFORMATION DIRECTOR*

Through an AEC Headquarters announcement, TIC employees were advised in July 1972 of further important OIS staffing changes.[15] OIS Director John A. Harris reported that Edward J. Brunenkant had accepted a position with the IAEA in Vienna as Director, Division of Scientific and Technical Information. The reporting date for his new assignment was August 14.

It was also announced that Charles Pelzer, who had been on assignment with the IAEA as Director, Division of Scientific and Technical Information, for the previous two years, would be returning to the OIS. In his new AEC assignment, he would be appointed Assistant Director for Educational Services.

Staff were also informed that Edwin E. Stokely, who had been serving as both Deputy Director for Programs and Assistant Director for Educational Services, would continue as Deputy Director for Programs. Stokely would also assume the duties of Assistant Director for Technical Information.

16.11 *TIC DATA ENTRY SYSTEM ADVANCES TOWARD MATURITY*

Effective December 21, 1971, DTIE's Programs and Systems Development Branch was established. Noboru Kawakami, former Digital Equipment Corporation (DEC) employee in charge of software development for the online data entry system, applied for and was selected to fill the position of chief of this new branch.

By midyear 1972 a plan was initiated to convert completely all remaining electronic accounting machine (EAM) operations to computer operations by the end of the year. Included were three remaining sizable tasks for conversion: the mailing address and distribution system, the system that established reports availability, and the mechanics involving the creation of indexes to certain classified publications. In addition, systems applications involving distribution of microfiche, engineering drawings requests, and sales accounts were undergoing design review for computerization.

The remaining terminals for the descriptive cataloging portion of the input system were installed and functioning. The TIC system now comprised two DEC PDP-8 computers tied to a PDP-10. Each of the PDP-8's performed as a controller for eight video terminals. These 16 terminals were used as data-entry devices for indexes (descriptors), subject indexing for *NSA*, descriptive cataloging, and designing new programs and debugging the system. The PDP-10 performed edit checks on data entered, verified the data against stored authority files, and produced magnetic tapes as outputs.

Other data-entry machinery included Typagraph keyboards (used for the newly designed film library operation, printing plant, and document control) and four Teletypes. Total devices tied to the DEC PDP-8/10 amounted to 27 remote terminals.[16,17] (See Fig. 16.1.)

Issues 8 and 9 of *NSA* Volume 27 (1973) were produced from descriptive cataloging data entered entirely under the new online, time-sharing system. These data were merged with indexing data obtained from the Flexowriter system. Beginning with *NSA* Issue 10 (1973), all data were processed with the new system.[18]

(See also Secs. 12.1, 13.7, and 15.10.)

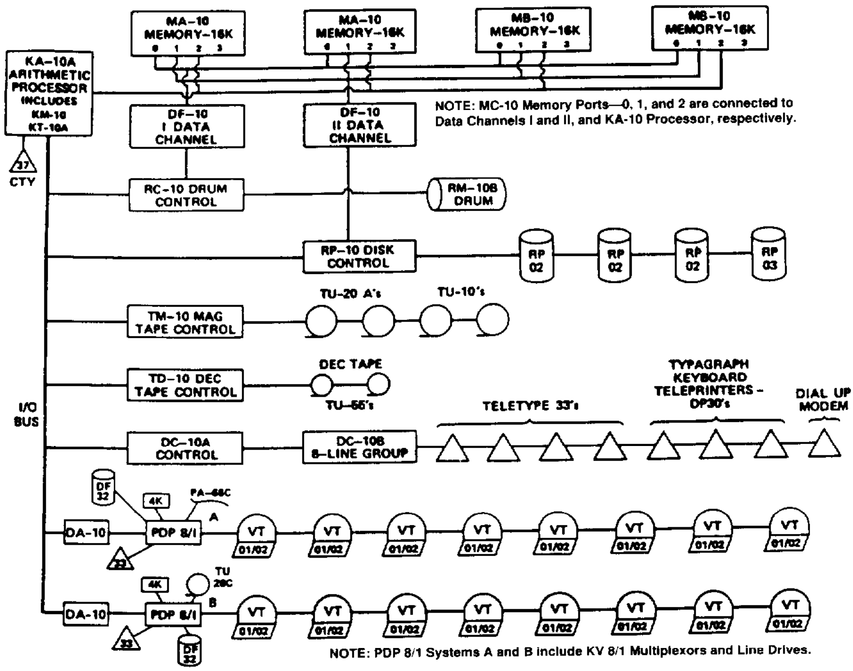

Fig. 16.1 A schematic of TIC's time-sharing graphics system as developed in the early 1970s for online data entry of scientific and technical text.

16.12 *REDIRECTION OF TECHNICAL INFORMATION PROGRAM: 1973*

At the behest of OIS Headquarters, TIC prepared an informal discussion paper in late 1971 for general OIS/TIC program review purposes. Requested were ideas on ways to allow an expansion of scope beyond nuclear (and the concomitant increase in work loads) without additional staff.

Ideas offered in the TIC paper,[19] if implemented, would require a considerable internal systems overhaul. One suggestion involved altering internal bibliographic processing programs to allow one-time indexing for both printed abstract journals and Euratom keywording to be accomplished from a single thesaurus. The system as proposed would associate selected subject index terms with augmented titles, arranged automatically by computer. Another proposal related to developing internal computer programs that would extract from magnetic tapes an estimated 20,000 INIS items annually as direct input to the DTIE database. The inclusion of INIS materials would also allow the trimming of these INIS foreign serials from TIC foreign publications listings, as well as expensive subscriptions, as represented by the INIS input. Still another idea considered the use of the private sector to procure additional information needs, such as SPIN (American Institute of Physics tape), INSPEC (Information Services in Physics, Electronics, and Computers), and others as standardized inputs could be arranged.

During early August 1972, Edwin E. Stokely, Deputy Director for Programs, OIS, visited TIC to discuss organizational changes and to formalize a redirection of certain TIC program activities. (Under the new organizational structure, the newly named Technical Information Center reported to Stokely.) A memorandum from Stokely, summarizing these discussions, provided an outline of a plan that had the effect of sharply modifying TIC's future program operations. Included in the memorandum's recommendations were a number of earlier mentioned areas of possible change.[20]

Stokely's memorandum advised TIC to proceed as rapidly as possible to work out solutions to any technical problems that might prevent the use of inputs directly from American Institute of Physics and INIS arriving via the magnetic-tape medium. (Implementation date given was July 1, 1973.)

To further reduce cost of input to *NSA*, his memorandum stated that it would be necessary to simplify the method of subject indexing to eliminate the modifiers and to construct the index from data available on INIS tapes (descriptors, title, categories, etc.). In addition, TIC was advised that, in the design of the new plan, consideration should be given to INIS' needs. Quoting Stokely: "TIC should determine as quickly as possible what changes in this respect are desirable and offer reasonable prospects of adoption by INIS, so that timely recommendations can be made to IAEA."

Another goal was for the data entry system to be enlarged sufficiently to allow TIC to proceed as rapidly as possible toward the goal of preparing its entire database in machine-readable form, including abstracts.

The TIC was advised further to prepare to publish *NSA* in two volumes per year with semiannual cumulations covering each volume as the only cumulations, and consolidate TID-5001 *(NSA Subject Headings)* and the INIS thesaurus to form a single, dual-purpose list of descriptors and headings.

Finally, ***Engineering Materials List (EML)*** should be phased out as early as possible.

16.13 *FINAL* NSA *FIVE-YEAR CUMULATIVE INDEX PRINTED*

For more than two decades, *NSA* laid claim to being the primary access to the world's information on peaceful uses of atomic energy. Since 1948 scientists, researchers, and librarians subscribing to *NSA* had received faithfully each two weeks the latest announced research for scanning. And, in addition to the indexed regular issues, cumulative indexes had been published quarterly, semiannually, annually, and quinquennially for the major part of this twenty-year period. In later years, mechanization improvements and automated techniques had permitted rapid accumulations of the various indexes (subject, report number, personal authors, and corporate authors). However, with the rapid growth of literature, the amount of print created by the five-year cumulative indexes caused the TIC Manager to seek alternative ways of making available cumulative indexes—due upon completion of Volume 25 (1971). (The cumulative indexes to *NSA* Volumes 16–20 required 11 books set double column in small print for the final published format.)

NSA Volumes 21 to 25 (1967–1971) totaled 253,609 abstracts. Even with existing new photocomposition techniques then accessible, which permitted greater compaction of text, the size of the cumulative index would be so great as to require special funding beyond that available (or likely to be made available by the cost-cutting administration) for its production.

Another reason voiced against its publication was that most potential purchasers of the index would be libraries, and access to the indexed information could now be obtained in two ways: For DOE offices and contractors, direct online access could be negotiated via RECON; for non-federal users, magnetic tapes containing the indexed information were available for exploitation in ways best suited for local use.

The strongest argument favoring printing the five-year index was that a great number of *NSA* users could not qualify either as a RECON subscriber or as a user of the magnetic tapes. Additionally, a number of foreign contributors to *NSA* did not have available the technology to use non-print media. Foreign institutions and governmental organizations

that regularly and faithfully supplied their governments' nuclear science literature to *NSA* were the following:

Aktiebolaget Atomenergi (Sweden)
Atomic Energy of Canada Limited
Australian Atomic Energy Commission
Danish Atomic Energy Commission
Finnish Atomic Energy Commission
French Atomic Energy Commission
Institutt for Atomenergi (Norway)
Japan Atomic Energy Bureau—Atomic Energy Research Institute
United Kingdom Atomic Energy Authority
Zentralstelle fuer Atomkernenergie—Dokumentation (West Germany)

Numerous organizations, societies, and publishers, both foreign and domestic, also supplied *NSA* with advance page-proof copy of their publications in support of *NSA* comprehensiveness.

The TIC management, sympathetic and convinced of the need for yet another printed five-year cumulation, began to search for ways to seek publication assistance. A Request for Bids Proposal was issued in early 1973 to solicit the services of a qualified organization to print, distribute, and commercially market the five-year *NSA* cumulative index covering the period 1967–1971.

In a resulting agreement with Xerox University Microfilms, TIC agreed to supply Xerox University Microfilms with assembled index tapes to be used in an electronic printing process. Xerox University Microfilms would create the photocomposed pages, print the various indexes, and market the products. Nine books (subject index plus corporate and personal author indexes) were subsequently created and printed as the five-year cumulative index for *NSA* Volumes 21 to 25 (1967–1971). The printed index totaled more than 9000 pages and contained more than one and one-half million entries.[21] An advertising flyer stated that Xerox University Microfilms offered the cumulative index in four formats: the printed library-bound edition, standard microfiche, and either of 35mm or 16mm negative microfilm. Copyright was assigned to the General Manager of the AEC. Coordinating this gigantic publication effort was DTIE Assistant Manager for Science Communication, James D. Cape.

Eight more volumes of *NSA* were to be published before *NSA*'s demise in 1976. Each of these index volumes was cumulated and published individually by TIC. Volume 26 (1972) was comprised of 60,848 abstracts. However, as earlier stated (see Sec. 16.12), beginning in 1973 the Center was advised that henceforth *NSA* should be published in two volumes each year rather than the conventional one annual volume. The rationale
for two volumes published each calendar year was that annual increases in numbers of items being incorporated were so great that a division into two volumes annually would allow more favorable magnetic-tape marketing and index publication.

For Volume 27 (January–June 1973), 29,925 abstracts were indexed and a single cumulative index published. Published and indexed for Volume 28 (July–December 1973) were 32,212 abstracts; for Volume 29 (January–June 1974), 31,666 abstracts; for Volume 30 (July–December 1974), 34,570 abstracts; for Volume 31 (January–June 1975), 35,724 abstracts; for Volume 32 (July–December 1975), 30,484 abstracts, and final Volume 33 (January–June 1976), 32,604 abstracts.

Four earlier *NSA* cumulative indexes, published by TIC, are Volumes 1–4, 5–10, 11–15, and 16–20.

(For additional information on *NSA* and the indexing program, see Secs. 3.8, 4.10, 4.13, 6.4, 6.7, 9.12, 9.13, 10.11, 11.5, 11.13, 12.8, 13.6, 16.9, 17.5, and 18.4.)

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FAREWELL TO AN ERA

CHAPTER 17

After a brief stint as Atomic Energy Commission (AEC) Chairman (less than a year and a half in office), Dr. James R. Schlesinger left the Commission in January 1973. President Nixon, reelected the previous November, had appointed Dr. Schlesinger to become head of the Central Intelligence Agency. Dr. Dixy Lee Ray, a marine biologist who had been appointed to the Commission by President Nixon in August 1972, was named AEC Chairman effective February 6, 1973.

Commenting on Dr. Ray's appointment as quoted in an AEC Announcement, White House Press Secretary Ron Ziegler stated: "The President also commends the Commission for its attempts to reach a balance between environmental values and the National requirements for energy—and he also indicates his confidence that the effort to achieve this optimum balance will continue under Dr. Ray through vigorous research and development activities."[1]

Earlier, on January 3, Dr. Dixy Lee Ray visited the Technical Information Center (TIC) for a full day. Accompanied by David Jenkins, a TIC alumnus, Dr. Ray was briefed on TIC activities in the morning. In the afternoon she toured the facility, reserving time to speak to all TIC employees in the assembly area. David Jenkins was a former specialist in the Educational Services Section who joined Dr. Ray's staff when she became Commissioner.[2,3] (See Fig. 17.1.)

On February 7, the Executive Reorganization Plan No. 1 abolished the Office of Emergency Preparedness and the Office of Science and Technology (OST), and OST's functions were transferred to the National Science Foundation (NSF).[4] The Committee on Scientific and Technical Information (COSATI) of the Federal Council for Science and Technology was likewise abolished. An announcement from the NSF indicated that no decision had been made to establish a forum similar to COSATI for federal agency information activities.[5]

In the combining of the public and technical information programs, the new Office of Information Services (OIS) returned essentially to a structure that had been separated a dozen years earlier. This new consolidation resulted in a broad-ranging set of programs and activities that demanded an energetic and alert staff possessing talents for operating information programs that were both public and technical. The Administration's admonition to federal agencies to trim programs and do more with less required OIS staff to seek ways to comply. To curtail, eliminate, or reshape programs to meet the new organization's objectives compelled a careful review of each program's purpose, its objectives, and the various needs being met therefrom. One study to determine whether the technical information program could bring in additional revenue through sales of products and services was already under way. Appropriate pricing of products and services was also an issue.

Fig. 17.1 Dr. Dixy Lee Ray, AEC Chairman, reviews capabilities of the Technical Information Center. At left is her assistant David Jenkins, a TIC alumnus. Listening to the briefing being provided by TIC Manager Robert Shannon is Edwin E. Stokely, Assistant Director of Technical Information (1973).

Programs identified and sorted out as technical information were basically those left intact by the previous Director, Edward J. Brunenkant. Except for an earlier decision to reduce funding for public exhibits, not many alterations had occurred since the changeover, except to combine activities that were easily attainable and obvious under the consolidation. An example was the film library program that was now operated completely within TIC. Otherwise, except for the recently added requirement to provide information services to the Regulatory side of the AEC, public and technical information activities were essentially unchanged.

17.1 *1974 OFFICE OF INFORMATION SERVICES BRIEFLY DESCRIBED*

A document describing the information program as established by OIS Director John A. Harris under Dr. Schlesinger (and continued by Dr. Ray) was developed for internal review purposes to identify alternative options in the event further program modifications were deemed plausible. It was essentially this 1974 AEC Information Services Program that later would be merged into the Energy Research and Development Administration (ERDA).

In introducing the newly outlined information program, the report stated that the OIS was providing a timely flow of information to the public on AEC programs and activities, using every available channel of communication. Through the OIS, the AEC also maintained a viable technical information program to provide scientists, engineers, and technicians with technical information gathered worldwide—which was needed to further U.S. nuclear research and development.[6] From the described information activities and program objectives, a description of the AEC's technical information program can be recreated that was essentially still intact at the time of the AEC's demise. The breadth and depth of the 1972–1974 AEC OIS program, as maintained and directed by Harris, are depicted in the following brief paragraphs which state the programs' objectives and purposes:

Public Information Program. To provide factual information to the public on the AEC, in understandable language, principally through the news media. (An average of 32,000 telephone inquiries from the press and public were handled each year, and about 6,500 requests for information were handled by mail.)

General News and Operations News Branches. To prepare and coordinate press releases and responses to news media queries; to prepare fact sheets and background materials; to make arrangements for interviews, briefings, and seminars for the press; and to plan special projects involving the public, such as high-level visits (e.g., Presidential) to AEC installations.

Regulatory News Branch. To handle public information activities related to AEC's Regulatory Program—including health and safety and environmental reviews of applications to build and operate nuclear power plants and other nuclear facilities, and public hearings.

Press Briefings, Seminars, Interviews. To accommodate ad hoc matters that could best be handled in public announcement arrangements. (At Headquarters level, five or six press briefings were held each year; one or two seminars were conducted; and about 200 interviews were conducted annually.)

Feature Services. Three feature services were included: AEC Newsfeatures (short human interest and educational articles on nuclear R&D), Atomic Newsfeatures (quarterly clipsheet of feature stories, photos, and "science" columns), and Radio Features (stories rewritten in capsule format for radio).

Photo Operation. To make available still photos on AEC programs and facilities upon request to news media, educational publications, book publishers, educational institutions, and others (approximately 14,500 historical photos on file).

Speakers Bureau and Headquarters Visits. To maintain a listing of AEC staff who offered to speak to school, civic, business, church, or youth groups that requested speaker programs from the AEC.

Annual Report to Congress. To present AEC activities of timely public significance in a succinct, easy-to-read report that a literate person could assimilate at a sitting. Required by the Atomic Energy Act of 1954.

Production of Motion Pictures and Recorded Radio Programs. To provide information (popular-level and semitechnical) about the peaceful applications of nuclear energy to a broad section of the public.

Information Analysis Center Program. To coordinate the activities of AEC's information and data centers and make their services known to those who needed them; to monitor their methods of providing services. (Some 25 extant centers, whose functions were primarily to make available critically evaluated and analyzed data for scientific and technical users, were supported wholly or partially by AEC. In 1972, five AEC program divisions spent $4 million for these centers. Since 1969, OIS had not budgeted to provide assistance to information centers.)

**Educational Services Program.* Through the use of exhibits, booklets, pamphlets, posters, TV, radio, and films the public's understanding of nuclear energy was increased—its benefits, its problems, and its potential.

**Traveling Exhibits Program.* To help citizens become generally aware of topics of particular concern to the AEC and to explain the intent and considerations underlying AEC decisions. (Cumulative attendance 1949–1972, inclusive of unmanned, manned "jumbo" and large-fair exhibits, plus trailer and other unmanned modular exhibits, approached 75,000,000 persons. TIC assisted in this program by providing booklets or other kinds of literature and by answering requests prompted by exhibitions.)

**AEC Museum Program.* Served science museums throughout the United States through exhibitions and demonstrations of nuclear science and technology. (The program included development and outfitting of the new American Museum of Atomic Energy, which opened in Oak Ridge in 1974. Cumulative number of visitors to AEC circulating exhibits was estimated for the years 1964–1972 at 11,165,000. TIC assisted this program by providing booklets or other kinds of literature used in answering public requests for information.)

**Information Booklets and Posters.* To provide answers to questions about atomic energy applications; to explain the projects and research of AEC sufficiently so that informed and intelligent judgments could be made by the public on projects that became public issues; to provide reference information to science educators, particularly at the secondary school level. (Booklets provided a rapid-response information base that made it possible for replies to be made quickly and economically to the estimated 200,000 requests received each year by the AEC.)

**Technical Information Program.* To assure that the results of the AEC R&D were properly reported and made available to AEC, its contractors, other Government agencies, and the scientific community at large; and to assure that the AEC R&D effort received the scientific and technical information needed to do its job properly, regardless of the source of that information. (Carried out primarily at Oak Ridge, 1974 projections: Staffing at Oak Ridge, 216 positions; Headquarters, 14; costs, $4,850,000.)

**Technical Information Center Database.* To make accessible to AEC scientists the information they needed to perform their work efficiently and economically; to enlarge the fund of technical information in the field of nuclear energy; and to provide a base of information from which

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*Activities identified by an asterisk were programs to which TIC provided a significant contribution or else were conducted totally by TIC.

specialized products and services could be obtained (journals, computer searches, bibliographies, etc.).

**Publication of Nuclear Science Abstracts.* (1) To provide AEC, its contractors, and the scientific community with timely and comprehensive coverage of the unclassified literature of nuclear science and technology in printed form. *NSA* was also developed for use as a library tool. (2) To provide to the scientific community outside AEC a convenient and timely compilation of information concerning the nuclear literature. (In 1973, *NSA's* coverage approximated 60,000 abstracted and indexed items annually; 6,000 copies were printed; 3,000 distributed by TIC for official AEC use; 3,000 made available for GPO subscribers.)

**RECON.* To provide rapid and responsive literature searching capability, using modern computer techniques, for AEC offices, laboratories, and major contractors, plus other government agencies. (The principal database available for interrogation was the Technical Information Center database.)

**International Nuclear Information System.* To obtain worldwide coverage of the nuclear literature through cooperation with other nations which produced that literature. (OIS was the responsible agent pinpointed to ensure appropriate and prompt U.S. input to the INIS; the Technical Information Center was responsible for its execution.)

**Management of AEC R&D Documents (Archiving).* (1) To assure that all AEC-originated scientific and technical reports and published literature were obtained for inclusion in the technical information database. (2) To ensure that the results of AEC-originated research were made available to users within the AEC, other Government agencies, and the scientific community, and were made available to the public. (About 20,000 documents describing AEC research and development results were created annually—equally divided as technical reports distributed by the AEC and as papers published in the open literature.)

**Publishing Activities.* (1) To provide centralized publishing services on a timely basis in order to assure that AEC-generated technical information was published in a form that could be effectively used. (2) To facilitate and enhance the preparation and distribution of technical publications arising from AEC's offsite R&D contractors who lacked in-house publishing and printing capability. (Since its inception, the AEC required an in-house publishing and printing capability in order to manufacture certain information products on a timely basis and, where necessary, under security control.)

**Assistance in Regulatory Activities.* As a new initiative, OIS began to undertake a variety of projects to aid the Director of Regulation via TIC.

Program objectives were: (1) To publish the monthly *Regulatory Adjudication Issuances,* which contained text of adjudicatory decisions and other decisions related to commercial reactor licensing; (2) to prepare digests and indexes of regulatory decisions of the Commission and the Appeal and Licensing Boards and of hearing transcripts of selected Appeal and Licensing Boards hearings; (3) to maintain up-to-date microform files *(FINDs)* containing information submitted by utilities seeking construction and operating licenses for reactors and related correspondence with the Director of Regulation.

**Conferences Program.* Objectives were (1) to aid the U.S. scientific and industrial community in acquiring timely, previously unpublished information on research in progress; (2) to enhance the flow and free interchange of technical and scientific information among scientists throughout the world.

**Book and Monograph Program.* Objectives were (1) to provide the nuclear scientific and technical community with reference books which, due to low sales potential, would not be produced commercially and (2) to assure that scientific textbooks used in the education of nuclear engineering and science students were kept current. (By 1973, more than 200 books and monographs had been published with sales of the various texts ranging from 1,000 copies to 125,000 copies. Basis for publication was always need, not the market.)

**Critical Review Series.* Related to the Book and Monograph program but designed for narrow field-of-interest topics, the Critical Reviews were usually patterned to be approximately 100 pages in length. Objective of the program was to bring order into the facts and theories in a field of scientific interest by providing an analytical in-depth synthesis of information in the field. (Started in 1968, 11 publications had been published during the five-year period, all printed and distributed by TIC and marketed through the National Technical Information Service.)

**Journal Program.* Formerly known as Technical Progress Reviews, this program once claimed a half-dozen titles appearing quarterly. Now the number had dwindled to a single bimonthly publication, *Nuclear Safety.* Objective of this program was to ensure the provision of current information and analyses on the status of nuclear safety research and development for use by AEC personnel, contractors, and the general public. Prepared by staff of the Oak Ridge National Laboratory Nuclear Safety Information Center; the role of OIS was primarily to facilitate the journal's publication by providing TIC editorial and publishing assistance.

**Symposia Proceedings.* To provide nuclear scientists and engineers with significant information that might not otherwise come to their attention. (Six to eight proceedings of symposia sponsored by AEC or its contractors were selected each year for publication in its prestige Symposium Series publications. Selection from approximately 100 conferences per year was based on possible significance of interest to a wide audience. TIC edited, published, and arranged marketing through NTIS. All other conference proceedings were distributed as reports by TIC.)

17.2 *PRESIDENT NIXON SUPPORTS ENERGY REORGANIZATION PLAN*

With H.R. 11510 (the Energy Reorganization Act) and its Senate counterpart bill in mind, President Nixon, in his Energy Message to Congress on June 29, 1973, supported the concept of a new organization that would concentrate on enhancing the nation's energy supply.

These bills would create, in effect, a new federal agency that would "exercise central responsibility for policy planning, coordination, support and management of research and development programs for fossil, nuclear, solar, geothermal, and other energy sources."[7] This new agency, Energy Research and Development Administration (ERDA), would envelop all AEC activities related to atomic energy R&D and the production of nuclear materials. All laboratories, civilian and military, operated by the AEC for these purposes, would be included in the transfer.

As part of the Congressional Act, the remaining functions of the AEC would be separated under a new Regulatory responsibility. The 1973 Commission Report to Congress stated that the AEC fully supported the proposed reorganization measures and took steps to assure that when the transition occurred it would be smooth and orderly.

Also in June 1973, the President directed the AEC Chairman to undertake an immediate review of federal and private energy R&D activities and to recommend an integrated program for the nation.

Within six months, in response to the President's request, Chairman Ray submitted a report entitled *The Nation's Energy Future.* In her transmittal letter to the President dated December 1, 1973, Chairman Ray closed by stating, "I earnestly hope that this Report will be helpful in your efforts to mobilize the Nation's resources toward the attainment of a capacity for energy self-sufficiency by 1980." Among those acknowledged as meriting special recognition for the preparation of the report were Bobbie J. Colley and Marian C. Fox, Chief and Assistant Chief, respectively, of the Technical Information Center's Editorial Branch.[8]

President Nixon's energy message to Congress the following January reflected the recommendations appearing in Chairman Ray's report.[9]

17.3 *PLAN SUBMITTED TO AEC GENERAL MANAGER TO BROADEN LITERATURE SCOPE TO INCORPORATE "ENERGY"*

Concurrent with the Chairman's efforts in developing the President's energy plan for the future, OIS Director John A. Harris was also active in defining a program for indexing energy literature. In a letter drafted July 6, 1973, to General Manager R. E. Hollingsworth, Harris stated: "Last August with your approval, the Office of Information Services undertook a study of the need for establishing a program for indexing both technical and nontechnical literature in the field of energy. We were assisted by an internal AEC committee. The study has been completed, and a copy is enclosed.... The study takes into account the President's June 29 message on the energy problem and the potential impact this may have on the AEC and its future role in energy research and development."[10]

In the study's Summary, the report pointed out that, if the effort were as massive as the proposed R&D program was projected to be, it would certainly require a coordinated and self-consistent documentation system for efficiently storing and indexing, as well as planning for effective retrieval, of the technical information required and produced. Since no comprehensive system existed, the study report proposed that AEC undertake the compilation and development of an energy documentation data bank as the basis of such a system. In addition to existing resources, it was foreseen that services from the private sector would be needed as well.

To search out and identify the energy information areas required to satisfy the new mission, a committee had therefore been selected as stated by Harris. The review group, comprised of personnel representing the OIS, Headquarters' program divisions, and other AEC management groups, interviewed technical information staffs of other government agencies. Other abstracting services, professional societies, and private organizations were also reviewed with regard to adequacy of energy literature then being announced and made available to the public. A similar review was carried out internally through consultations with various specialists in AEC program divisions. Representing the Technical Information Center was Lee M. Thompson, Chief of the Energy Research and Technology Section.

In its conclusions and recommendations, the committee report recommended that the OIS be directed to undertake the compilation of a bibliographic database covering the fields of energy as generally outlined in an attachment to the report, which essentially defined the scientific and technical areas likely to become R&D targets of interest under the proposed new energy agency.

The ten-page listing of energy topics, which was largely the effort of TIC Science and Technology Branch staff guided by David Bost and Lee Thompson, was divided into five major categories. This category arrangement was immediately adopted as a working outline for the Technical Information Center to use in refining its own literature database to allow a cleaner segregation of nonnuclear subjects from nuclear energy resource materials. These major fields were Energy Sources, Energy Production and Distribution, Energy Utilization, Energy Conservation, and Energy Conversion. It was this listing, subsequently approved and more finely divided into discrete topics, that became the basis for establishing the Technical Information Center Energy Data Base (EDB).

17.4 *DIRECTOR SEEKS $1,000,000 FROM SALE OF OIS PRODUCTS AND SERVICES*

During an analysis of the AEC's budget request for the Fiscal Year 1973, the Office of Management and Budget (OMB) suggested that the AEC look for ways to earn revenue through the sale of technical information products and services. The amount of revenue suggested by OMB was $1,000,000. Receipts from TIC products and services were averaging about $40,000 annually. OIS's manner of operating, vis à vis existing regulations, would require a careful re-review as well.

OIS Director Harris appointed a committee of six to determine whether and how the OMB suggestion might be accomplished. Three members appointed were outside OIS: James D. Rorer, Office of the Controller, Chairman; Charles E. Jones, Office of the Controller; and Robert E. Grossman, Office of Planning and Analysis. Within OIS were William M. Vaden, Technical Information Center, and Joseph G. Gratton and Betty L. Wagman, Headquarters OIS.[11]

The stated mission of the committee was to study all OIS' products in the technical information program in order to determine their revenue-producing potential. All methods of distribution and sales were to be reviewed. In addition, the committee was asked to examine and identify problems and expenses of changeover should alternative methods be recommended.

The committee began its work under the assumption that the types of products and services then being produced would continue. It also assumed that production of increased revenue would necessitate establishing prices for products then being disseminated free of charge and increasing prices for products and services already being sold. It was also apparent that the operating philosophy of OIS and that of its predecessors over the past two decades would require radical revision if revenues of such magnitude were ever to be attained.

On this point the committee report stated that the concept of selling products and services to produce revenue was a novel one for the technical information program as a whole. The AEC had always considered that it had a statutory mission to disseminate scientific and technical information as interpreted from the Atomic Energy Act of 1954. The relevant portion of the Act states: "The dissemination of scientific and technical information relating to atomic energy should be permitted and encouraged so as to provide that free interchange of ideas and criticism which is essential to scientific and industrial progress and public understanding and to enlarge the fund of technical information."

The committee report further declared that although "free" interchange was not defined as free of charge, most information program managers in AEC, as elsewhere among federal scientific agencies, were eager to disseminate the products that resulted from government research and development as widely as possible. They considered that, since the taxpayers had supported this R&D (to the tune of more than half a billion dollars annually in AEC), they were entitled to be informed of the results of these programs. Considered in this context, taxpayers had already paid for the results.

The revenue committee, although acknowledging the validity of the prevailing view, considered the following alternative rationale: "In order for the technical information program to most efficiently serve the public and the scientific and technical community as a whole, it would be appropriate to transfer from the general taxpaying public to the specific users some of the costs of those products and services which were of specific utility to a particular segment of the population. In defining costs under this concept, the Committee determined that users could bear not only the incremental cost of any product—generally quite nominal—but part of that product's share of the entire information program; e.g., a proportionate share of the costs of amassing the information store and data base from which most of the information stems."

Using the preceding as a philosophical basis for conducting the study, the Committee began by examining for possible revenue the list of products and services shown below that emanated from the Technical Information Center:

Research and Development Reports (Printed and Microfiched)
Commercially Sponsored Books and the AEC Symposia Series

Technical Progress Review *(Nuclear Safety)*
Selective Dissemination of Information (SDI) Data Base Tapes
Nuclear Science Abstracts (Regular Issues and Cumulated Indexes)
TIC Accessions of Unlimited Distribution Reports
Engineering Materials List
List of Reports for Civilian Application
Bibliographies (As specifically requested)
Computer Searches (RESPONSA Batch Searches and RECON Online)
Specialized Indexes: AEC Manual, News Releases, Commissioner's Meetings, etc.
Educational Booklets
Translations Program Materials
FIND: Fiche Index for Nuclear Dockets
Cooperative Weapon Data Indexing Program Materials
CINDA: Computer Index of Neutron Data

From the candidate listing, the committee determined that three items offered the largest revenue-producing potential: *Nuclear Science Abstracts (NSA)*, Educational Booklets, and Report Literature items. However, for *NSA* to be properly marketed for revenue, it would have to be published by an organization outside the jurisdiction of the Superintendent of Documents, such as the American Nuclear Society or the American Institute of Physics (both of which had expressed interest in a joint publication arrangement). The National Technical Information Service (NTIS), also approached as a possible prospect for *NSA* marketing, declined.

Because *NSA* was a scheduled subscription publication of the Government Printing Office, the Joint Committee on Printing (JCP) was approached with a request for a grant of waiver to shift *NSA* publication to alternate arrangements, as described, for the purpose of pursuing increased revenue as suggested by the OMB. The response from Joint Committee on Printing was prompt and negative. In a letter from JCP Chairman Wayne L. Hays the AEC was advised that the issuance of a waiver for that purpose would not be consistent with existing law.

Because the JCP had foreclosed *NSA* as a potential for revenue, the Committee was required to look to the two remaining possibilities. Regarding these, the committee recommended that (1) OIS set a price for its educational booklets so as to make the booklet program self-supporting; and (2) that OIS negotiate with NTIS to increase the price per page for printed reports, charge NTIS for microfiche hitherto provided free of charge, and negotiate for higher prices for "prestige" publications.

A new interagency agreement with NTIS to cover the sale of AEC reports was signed in March 1973. The new agreement provided for an increase of page charges to one-half cent a page and $1 per copy for reports sold by NTIS. Under this plan an estimated annual increase of $100,000 revenue could be obtained.

A charge for booklets was also instituted, with prices being revised from time to time. The charge was not applicable to booklets used by OIS in answering its official public correspondence, however. In handling responses to the public, liberal use of such materials was required. Some additional revenue was accumulated through *NSA* magnetic tape charges. These prices ranged from $1,265 per annum for sales to other federal agencies to $1,845 for all others.[12]

Earning $1,000,000 annually from sales of technical information products and services was an impossible goal, of course, and was never realized.

17.5 *MAIN HEADINGS WITH QUALIFIERS CHOSEN AS NEW* NSA *INDEXING STYLE*

For approximately a decade, all unclassified information slated for announcement in *NSA* had been indexed according to two separate sets of indexing principles, each method having its own subject heading authority to support the indexer. *NSA*'s authority and source for subject headings was *Subject Headings Used by the USAEC Division of Technical Information* (Report TID-5001). The headings, having had their origins in a program designed to index the Chicago Plutonium Project Record (see Sec. 4.10), had been selected and structured to "name" and describe accurately information related to atomic energy research and development.

To prepare *NSA*'s subject indexes for publication, the Technical Information Panel had recommended during its early development that a pattern similar to that of *Chemical Abstracts* should be followed. To accommodate this style, the indexer, upon selecting a main heading, would provide additional textual information (a line immediately below the heading) which would be referenced to the abstract and *NSA* volume number. This index line would be introduced by a standardized subheading, or "file word" (a word relating to an application, a process, etc.). For example:

ALKANES
  reactions with hot recoil tritium, **27**:9417

In the printed index, all main headings (names of things) would be alphabetized, as would the modifier lines under them.

In the mid-1960s, when the TIC began to supply indexing terminology to Euratom, TIC indexers were required to select indexing terms from a separate source (a thesaurus) maintained by Euratom in Luxembourg. In addition, indexers continued to apply *NSA* headings and modifier lines, as appropriate, for the publication of *NSA* subject indexes. The selection of "descriptors" or "keywords" for the newer style of indexing, while requiring precision in selection and application, did not require the intellectual effort of preparing modifier lines. Descriptor indexing, while not a preferred choice for the production of print-style indexes, was the option chosen for Boolean-structured searching by computers.

Whereas the primary focus for descriptor indexing was to comply with the terms of the U.S.–Euratom Agreement, information organizations within AEC, as well as other federal agencies having capabilities for electronic searching, soon began to request copies of the descriptor-indexed magnetic tapes for their internal use. With encoded abstract header information then available, databases could be established, and Selective Dissemination of Information (SDI) could be introduced as an additional service to customers. (When TIC implemented the RECON online database, Euratom thesaurus terminology was also used as the retrieval language for that system.)

In 1972, when TIC began to supply twice-monthly magnetic tapes to INIS, indexing accompanying the citations was based on terminology as defined by INIS' indexing rules and the INIS Thesaurus (a modified and enhanced version of the Euratom Thesaurus). In March 1973, Euratom adopted the INIS Thesaurus as its own standard. OIS's strong commitment to INIS led few in TIC to believe that a deviation in this support was apt to occur soon, if ever.

Therefore one of the most visible areas where manpower utilization improvements appeared possible at TIC was in the Science and Technology Branch where dual indexing was occurring. In addition to duplicate work by indexers, duplicated maintenance and separate index coding were required for each computer program. Independent authorities were also involved in each separate process. These dual efforts, which required additional time in processing, contributed to a delay in the availability of reports for distribution.

Good reasons existed, however, for continuing the two-pronged process. Considerable time and effort had been spent in creating software that would allow improved *NSA* index preparation, both at the Oak Ridge Gaseous Diffusion Plant Computer Technology Center and at the Government Printing Office (GPO). Preparations were being made at GPO for *NSA* indexing tapes to be processed by the Linotron—a new photocomposition and printing process under development specifically for Federal agency programs. Considering *NSA*'s scientific content, there was no known method that was more economical in terms of amounts of information to be compacted on a page. The index's format was conventional, well known, and easy to use. From user hints, resistance to change could be expected.

A directive from Headquarters in August 1972 required that TIC begin planning for a single indexing method for *NSA* for sake of economy and to allow the use of indexing from secondary sources (see Sec. 16.12). After much in-house experimentation and discussion, a decision was made later in the year to adopt a formula for *NSA* indexing that was a compromise between the two indexing modes earlier described. Termed "two-level flagging," the proposed method would require that print programs under development be only slightly modified. The manner of presenting the indexed data on the printed page under the new plan would be very close to the conventional *NSA* style of subject indexing.

The recommended and finally adopted indexing pattern was begun with *NSA* Issue 1, Volume 28 (1973). A brief excerpt from the Introduction to *NSA* Volume 28 Subject Index cumulation explains the compilation process.[13]

> The subject indexing of literature announced in *Nuclear Science Abstracts* is based on the use of descriptors selected from a controlled thesaurus of terms. Subject descriptors and qualifiers (subheadings) are selected and presented in the following format:
>
> SUBJECT DESCRIPTOR/QUALIFIER
> Title (supplementary information), volume number: abstract number
>
> The descriptors selected for use as subject terms are generally the names of specific materials, things, and processes. To the extent possible, a qualifier is selected to describe the properties of, or processes applied to, the subject terms.

The philosophy reflected in the descriptor/qualifier selection was essentially the same as that employed in the conventional *NSA* main heading/modifier style of indexing. The major difference was the admission of the title line in place of the modifier line, formerly prepared for each main heading separately. Under the new plan, it was assumed that some information loss might be possible in the dropping of the specially written modifiers. However, when read in context with the qualifier, the title usually provided a contextual relationship in a manner that emulated the conventional main heading/modifier presentation on the printed *NSA* subject index page. In addition, indexers could augment the title with additional information for those instances where the original title was not sufficiently informative.

However, offsetting the possible loss, under the new plan was the fact that software could now be developed to allow computers to generate index pages automatically for printing from a single data source. Under the new plan, thesaurus terms (names of things) would be uniquely specified and selected by the indexer to create the printed index. These, along with all other terms selected by the indexer, could be stored as a part of the total database for use in retrieval or for other purposes.

By-products of the *NSA* indexing effort included magnetic tapes for SDI users, INIS transmittals, and updating the AEC/RECON database. Thus, through the adoption of the new plan, TIC was able to consolidate and unify many database building and indexing activities. TIC staff effort could now be expanded into new fields that would encompass the entire energy arena. No longer limited to the production of *NSA,* TIC's new system could, of course, continue to produce *NSA*, but now, bulletins, bibliographies, and special topical listings (covering all of the new energy fields) could also be created and published at will from TIC's Energy Data Base.

One problem still remained, however. To achieve the greatest economies in printing future indexes for both TIC and INIS, outputs from these organizations should be mergeable. Indexed information from INIS should be standardized for direct processing into TIC's Energy Data Base and *NSA*, and the U.S. nuclear portion of the Energy Data Base should be similarly processed by INIS for the creation of *INIS Atomindex* printed index.

(Additional information on *NSA* and the indexing program may be found in Secs. 3.8, 4.10, 4.13, 6.4, 6.7, 9.12, 9.13, 10.11, 11.5, 11.13, 12.8, 13.6, 16.9, 16.13, and 18.4.)

17.6 *TWO-LEVEL FLAGGING ADOPTED BY INIS FOR* ATOMINDEX

The new indexing pattern chosen for *NSA* and introduced with Issue 1, Volume 28 (July 15, 1973) was received with scarcely any objection from those subscribing to the printed index. Those receiving *NSA* indexes on magnetic tapes detected no change at all. The internal TIC software developed for executing the *NSA* main heading/qualifier relationships proceeded as scheduled, and all twelve issues of *NSA* Volume 28 (1973) were published uneventfully. Once the system was debugged, considerable improvement in throughput time was also realized. And, as planned, the production elements of the old system involving *NSA* subject-heading index printing were eliminated, along with all related systems maintenance activities and responsibilities.

In the meanwhile, *INIS Atomindex* was being operated full scope (effective January 1972). The revised INIS Thesaurus had been introduced for general INIS membership use, and output tapes were being issued semimonthly. Now, member countries were being requested to provide ideas for creating a printed subject index that would appear regularly in the semimonthly *Atomindex* issues and that could be easily cumulated.

At the 1972 Consultative Meeting of Liaison Officers, members were invited to make their own recommendations and to comment on the Secretariat's sample offering. The U.S. representative, TIC Deputy Manager William Vaden, proposed that INIS members consider an indexing pattern recently adopted for the *NSA* subject index. As explained by Vaden, it was constructed especially to allow the continued use of conventional main heading/subheading relationships for printed indexes; it was designed to produce an economical printed page; the INIS Thesaurus would be the authoritative source for indexing terminology; and it would not limit or inhibit (for retrieval) the assignment of descriptors considered necessary for database indexing. Should INIS adopt the two-level flagging concept, it would allow INIS to construct a system compatible with *NSA*—the largest producer of information for INIS—and allow an efficient merging and processing of information by these systems.

It was explained by Vaden that this last point was a matter of especial concern to the United States, because *NSA* would very likely cease publication at some future date in favor of *Atomindex*. This could only occur, however, if countries dependent on *NSA* could be convinced that *Atomindex* could satisfactorily supplant *NSA*. Having comparable indexing patterns that would allow easy and economical merging of products of two systems that otherwise were essentially identical would enhance this possibility.

The principal of two-level flagging was favorably received by the Liaison Officers and was provisionally adopted, to be developed further by the INIS Secretariat. Instructions for inputters were given in an INIS Circular Letter issued in January 1973.[14] In a subsequent Circular Letter inputters were informed that computer programs for processing subject index information were operational at INIS and that input without two-level flagging would not be accepted after mid-July 1973.

After an initial experimental period, INIS formally initiated the two-level flagging concept for *Atomindex* subject indexes, and from 1974 onward, all printed subject indexes were prepared under this plan. Although some discussion in recent years at INIS Liaison Officers' meetings has focused on possibly discontinuing two-level flagging—the argument being that printed subject indexes are now outmoded and, hence, two-level flagging is unnecessary—this popular method of creating indexes by computer continues at INIS in 1992.

17.7 *TIC PRODUCTS, SERVICES, AND WORK FOR OTHERS ANALYZED*

With the planned splitting away of regulatory functions from the AEC, OIS Headquarters requested the TIC Manager to survey the total Center workload to obtain a clearer picture of how established programs might be integrated into the new Energy Research and Development Administration (ERDA) organizational structure under development. Assumed in this planning should be a program to provide service to the separated regulatory activity.

An exhaustive survey was performed by TIC staff in late 1973, and a report[15] dated January 1974 was forwarded to OIS that detailed products, services, and administrative/management oversight provided by TIC. The report provided detailed information on total staff years applied to each activity by Branch. The following tabulation shows the distribution of TIC staff as of June 30, 1973:

Component	Regular	Temp./Part-time	Total
Office of the Manager	6		6
Asst. Mgr. for Administration	4		4
Off. Asst. Mgr. for Production and Document Management	4		4
Editorial Branch	12	.5	12.5
Publishing Services Branch	56	5.2	61.2
Printing Branch	20	4	24
Document Management Branch	24	1	25
Off. Asst. Manager for Information Services/Systems	1		1
Science & Technology Branch	31	2	33
Reference Branch	25	1.3	26.3
Computer Services Branch	21	.5	21.5
			218.5

Staff years applied to work projects for requesting organizations (i.e., work for others), in addition to TIC's own program activities, were found to be as follows:

Technical Information Center	173.100
Office of Information Services (Symposium Series, Film Library Operations, Technical Project Reviews, Flyers, Bulletins, Educational Booklets)	23.327
Director of Regulation	8.173
Asst. Manager for Energy and Development Programs	3.468
Oak Ridge Operations Office	1.549
Chairman and Commission (miscellaneous)	1.367
AEC Contractors (excluding Union Carbide)	1.355
Union Carbide (miscellaneous printing)	1.242
Asst. Manager for Physical Research	1.068
All Other (miscellaneous)	3.862
	218.511

For the 173 staff years devoted solely to TIC program activities, the top user in staff years was the *NSA* bibliographic and publication program (including cumulative indexes) with a 68 total. Program management and administration followed with 15. Others, in descending order, were books, conference proceedings, and symposia, 13.5; request services (educational materials and reports), 11.5; document control (limited and unlimited distribution), 10; and reports processing (full cycle and direct), 10. The remaining 45 staff years were divided among a dozen miscellaneous activities, including INIS, for which 3.5 years were assigned.

In response to Headquarters' request that printing operations in Oak Ridge be consolidated, TIC began to supply Union Carbide Corporation (Nuclear Division) with essential printing needs. In 1973, the Congressional Joint Committee on Printing approved AEC's request to transfer printing activities of the Oak Ridge Gaseous Diffusion Plant (K-25) to TIC as an economy measure. For a six-month period (July–December 1974), more than 2½ million pages had been printed for Union Carbide at a reimbursement cost of more than $26,000. [16]

17.8 *1974: A RECORD YEAR FOR INFORMATION ITEMS CATALOGED AND PROCESSED*

By the end of calendar year 1974, TIC cataloging staff had processed 94,516 abstracted and indexed items—more than forty times the annual number reported when the cataloging program began 27 years earlier. (In the first AEC Report to Congress, it was reported that 2,223 abstracts had been assembled and circulated throughout the Commission's contractor groups.) The combined total for *NSA* and *Power Reactor Docket Information* was 74,671, of which, 25,690 reports were included. *Abstracts of Weapon Test Reports* totaled 1,081, and *Abstracts of Limited Distribution Reports* contained 1,278 items. In preparation for the new ERDA programs, 17,486 items on "energy" (as recently defined) had been added to the TIC database. Items processed to INIS for the year totaled 23,234.[17]

Published literature (journal articles, books) for the year provided 48,981 abstracts, the majority of which were obtained from regularly scanned journals. As of December 31, 1974, the numbers of serial titles scanned, and the organizations scanning them, were divided as shown:

United States:	
Technical Information Center	1,645
American Institute of Physics	36
Foreign:	
Aktiebolaget Atomic Energy Commission (Sweden)	49
Atomic Energy of Canada Limited	67
Australian Atomic Energy Commission	80
Commissariat a l'Energie Atomique (France)	291
Danish Atomic Energy Commission	58
Finnish Atomic Energy Commission	34
Institutt for Atomenergi (Norway)	22
Japan Atomic Energy Research Institute	750
Reactor Centrum Nederland (Netherlands)	23
United Kingdom Atomic Energy Authority	343
Zentralstelle fuer Atomkernenergie-Dokumentation (ZAED) (Federal Republic of Germany)	213
	3,611

Magnetic tapes were becoming a routine medium for the transfer and exchange of technical information by the end of 1974. On a semimonthly basis, TIC's Computer Services Branch was transmitting magnetic tapes of *NSA* processed data to INIS, SDI users, and to the Computer Technology Center to supplement the database for RECON. Incoming tapes, to be incorporated in Energy Data Base, were being processed from ZAED in Germany, the Netherlands, and the American Institute of Physics. The 100,000th item processed by INIS was, incidentally, received from the United States on magnetic tape and published in *INIS Atomindex*, Volume 5, Number 3 (1974).

17.9 NEW PRODUCTS DERIVED FROM THE TIC DATABASE FILE

Numerous modifications were made to existing (nuclear information) computer programs, and new ones were written to allow categorization and assembly of abstracts for publication in new fields of energy—in anticipation of ERDA researchers' needs. Bibliographies, extracted from the TIC's Energy Data Base and published prior to the end of 1974, were *Coal Processing (A Bibliography 1930-1974)* (TID-3349), comprised of 7,441 citations plus subject and author indexes, and *Solar Energy* (TID-3551), comprised of 3,545 citations with indexes. In the production line for publication in 1975 were *Geothermal Resources (Exploration and Exploitation)* (TID-3354) containing 3,890 citations plus indexes, and *Magnetohydrodynamics* (TID-3356), 8,539 citations plus indexes.

By the end of 1974, computer programming was completed to arrange for entering abstracts into the data file to produce *Energy Abstracts for Policy Analysis (EAPA)*. Formerly titled *NSF-RANN Energy Abstracts, EAPA* was sponsored by the National Science Foundation (Research Applied to National Needs), the Federal Energy Administration, and the Atomic Energy Commission.

EAPA provided coverage of publicly available nontechnological literature contributing to energy-related analysis and evaluation in policy, conservation, research and development studies, economics, supply and demand, forecasting, systems studies, and environmental effects.

Initially begun under the joint editorship of Miriam P. Guthrie (ORNL) and Lee M. Thompson (TIC), *EAPA* within a few years became the sole publishing responsibility of the Technical Information Center.

17.10 "HARMONIZATION OF INFORMATIONAL POLICIES" BECOMES INTERNATIONAL TOPIC

The International Atomic Energy Agency (IAEA) and the Food and Agriculture Organization (FAO) of the United Nations were operating two successful international information systems in 1974: INIS and AGRIS, respectively. UNESCO, via UNISIST, was active in developing tools and standards to enhance systems interconnectibility and database utilization. Online information systems were being developed and used with modest success by users who interrogated files for pertinent scientific and technical information. Databases were being augmented haphazardly largely through techniques involving the use of surrogates of other systems.

As efforts to establish databases from multiple sources increased, needs for international policies and standards to guide the manner in which data should be processed and communicated became more obvious. Existing techniques and practices among producers varied widely.

To further the potential of international information interchange and to provide a forum for discussion, three international organizations, IAEA, UNESCO, and FAO, organized a symposium to discuss the problems relating to interconnecting different information systems. The symposium entitled "Information Systems, Their Interconnection and Compatibility,"[18] was held at Varna, Bulgaria, September 30–October 3, 1974. The conference was attended by 146 participants from 37 countries and 14 international organizations.

Speakers who represented the United States were Edwin E. Stokely, OIS Headquarters, whose invited paper was entitled "Standardization in Information Systems: Some Pros and Cons;" William M. Vaden, TIC, who spoke on "USAEC Technical Information Center Data Base Expansion to Include Non-Nuclear Information;" and A. A. Brooks, Union Carbide Corporation, Oak Ridge, whose talk (coauthored by Thomas E. Hughes, OIS) was "The AEC/RECON System: A Case Study."

17.11 *LEGISLATION SIGNED TO ENACT ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION*

President Nixon resigned on August 9, 1974, and Vice-President Gerald R. Ford became President. On October 11, President Ford signed legislation that abolished the AEC and created the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC).

AEC Announcement 207, dated October 16, 1974, explained that the actual activation dates for ERDA and NRC would be decided by the President. The legislation provided that the new agencies should be activated no later than 120 days subsequent to enactment of the legislation, which would place the latest possible date at February 8, 1975. The actual date for ERDA's activation was January 19, 1975, with Robert C. Seamans, Jr., being nominated as Administrator.

The 1974 Annual Report to Congress, an Office of Information Services responsibility, discussed transition plans of programs soon to be established in their new agency orientations. Divided into two parts, Part One of the report detailed AEC operating and developmental functions, and

Part Two described the regulatory functions soon to be incorporated into the Nuclear Regulatory Commission.*

17.12 *A FINAL AEC ASSIGNMENT; A COMPLIMENT; A CHARGE FOR THE FUTURE*

After returning from the INIS Advisory Committee meeting in Vienna on December 18, 1974, Edwin Stokely advised TIC Manager Robert Shannon that, as a result of the Committee's recommendation, fully digitized abstracts should be forwarded to INIS beginning July 1, 1975.

In a memorandum dated December 31, Stokely stated that, although it was not mandatory that TIC input abstracts in machine-readable form beginning July 1, he felt that it was essential that the United States exercise leadership by being among the first to begin providing its abstracts in machine-readable form.

A few days later, in a post-holidays note to Shannon, Stokely sent the following:

> This is a belated note to compliment you and members of the Technical Information Center (TIC) staff on the outstanding accomplishments achieved during 1974. I was particularly impressed with the outstanding job done by your Science and Technology Branch in handling the record number of items into our data base and the supporting work done by the rest of the staff, both in the Production and Document Management side and the Information Services and Systems portion of the organization. I know it has been a frustrating year for TIC in that with every mail delivery, you and your people received additional assignments which called for enterprise, hectic work, and initiative, and yet the same mail never contained any authorizations for additional personnel to carry out these tasks. It is the mark of highly efficient and dedicated staff to be able to carry out such assignments under these handicaps.
>
> As we move from AEC into the new ERDA agency, I know that you and all of your people will continue this type of performance, and I trust that if your responsibilities expand, ERDA will provide you with the resources to carry these out.
>
> Please express to all the members of your staff my sincere appreciation for the manner in which all of you carried out your assignments in the past year.[19]

17.13 *IAEA DIRECTOR GENERAL EKLUND TOPS TIC VISITORS' LIST*

The impending demise of *NSA*, TIC's involvement with INIS, RECON's modest successes, and TIC's growing databases (nuclear and nonnuclear)

*A note to the files in the OSTI Resource Center states: "The ERDA 1975 Annual Report was written and left at Dr. Seaman's desk. It was never printed."

all contributed to the concerns of other nations and international organizations that close ties should be maintained with OIS during its program realignment. Dr. Sigvard Eklund, Director General of the IAEA, visited TIC on October 16, 1973, for discussions on INIS. Accompanying Dr. Eklund were Dr. Gerald Tape, U.S. Ambassador to the IAEA, and Mr. James Ammons, AEC Division of International Programs.[20]

Visiting OIS Headquarters in May 1973 was Zhan Turkov, Chief of the IAEA INIS Section, Vienna. In addition to meeting with TIC and OIS representatives on INIS matters, Turkov, a national from the USSR, also spoke to attendees at the May meeting of technical information representatives.

On October 3, Dr. Soren Lindhe, atomic energy attache to the Swedish Embassy in Washington, visited the Center for a general orientation. On a separate visit in October, M. J. Iung, Head, Section de Documentation Scientifique, and M. P. Debraine, Centre D'Etudes Nucleaires de Saclay, France, visited the Center for two days to discuss TIC systems for processing *NSA* and plans for integration with INIS. [20]

Chairman Dixy Lee Ray visited TIC in the afternoon of December 15, 1974, serving as host to visitors from the Commissariat l'Energie Atomique (CEA). The party included Mr. Andre Giraud, Administrator General, CEA; Mr. Claude Frejacques, Director, Division of Chemistry; Mr. Jacques Chevalier, Head, Division of Military Applications; and Dr. Bertrand Goldschmidt, Director of International Relations, CEA. Chairman Ray's party included David N. Jenkins, Technical Assistant to the Chairman; Dr. Abraham Friedman, Director, Division of International Programs; and General Edward B. Giller, Assistant General Manager for National Security. AEC RECON was demonstrated during the visit.[17]

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FINAL DAYS: ERDA

CHAPTER 18

Under the provisions of the Energy Reorganization Act of 1974, the U.S. Atomic Energy Commission (AEC) was abolished, and the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC) were established. Effective date of the reorganization was January 19, 1975.

Within the new ERDA organization, the Office of Information Services (OIS) was renamed the Office of Public Affairs (OPA). The Technical Information Center (TIC), assigned to OPA, reported to the Assistant Director for Technical Information with no name change. Former OIS Director John A. Harris accepted a position as Director, Office of Public Affairs with NRC. Appointed as Director of the ERDA Office of Public Affairs was John W. King, who left a position as Chief of Public Information, Kennedy Space Center, Cape Canaveral, Florida. Effective date of King's assignment was March 2, 1975.[1]

Four Assistant Directors reported to King, including Edwin E. Stokely, who retained the position of Assistant Director for Technical Information. Alfred P. Alibrando was appointed Assistant Director for Public Information with responsibility for providing information to the news media and the public. Bart J. McGarry, Assistant Director for Public Services, was appointed to handle functions related to increasing public awareness of national energy options. McGarry's responsibilities included sponsoring special projects and fostering educational programs. Charles W. Pelzer was responsible for exhibits, audiovisuals, and publications.

Also assigned to the Director's office were the Program Coordination Branch, headed by Florence E. Buckley, and the Office of the Historian, headed by Richard G. Hewlett.

Reporting to Stokely, in addition to the Technical Information Center at Oak Ridge, were the Systems Development Branch, headed by Thomas E.

Hughes; the Sciences Services Branch, headed by Joseph G. Gratton; and the Special Assistant for Conferences, John H. Kane.

The ERDA Administrator Robert C. Seamans, Jr., in his first announcement to all employees, declared that ERDA's mission was broad in scope and direct in purpose: to guide and promote energy research and development to meet immediate and long-range needs. He further asserted that "early results of our research and development programs are among the most crucial in the history of man."

Although approximately 2000 employees of the ERDA nuclear program remained at Germantown, Maryland, a new federal building located in downtown Washington was assigned for ERDA Headquarters. Located near Union Station and the Capitol at 20 Massachusetts Ave., NW, the new ERDA Headquarters building provided offices for more than 1000 employees.

18.1 *ERDA'S TECHNICAL INFORMATION ROLE ENLARGED*

Although Jack King would not be arriving until March, Edwin E. Stokely had become very active early in 1975 in defining the new ERDA role in technical information and setting the stage for action once policy had been approved and was in place.

In a paper delivered on January 23 at a Conference on Cooperation in Energy Information at Arlington, Virginia, Stokely outlined a general plan for the new ERDA technical information program. A month later, on February 24–25, he met with ERDA librarians. Then again on March 20–21, Stokely described future technical information program plans to a specially called ERDA-wide meeting of project and field information program officers, contractor representatives, information center directors, and project librarians. This meeting, held in Oak Ridge, was attended by approximately 100 persons and functioned to introduce to attendees the new ERDA information program that was no longer solely nuclear oriented. While providing a means to review ERDA plans and policies with field and contractor people, the meeting also afforded an appropriate opportunity to meet attendees connected with the Energy Research Centers, the Office of Coal Research, and other organizational units that had been recently merged with ERDA but were unfamiliar with the technical information program carried out under the AEC.

Future goals cited by Stokely at the Oak Ridge meeting included overall improvement of communication among ERDA components, establishing a new Office of Public Affairs concerned with users' needs, expanding the RECON network, and maintaining the NRC interagency agreement to provide technical information assistance at least to the following fiscal year.

The working policy included searching for and using, wherever possible, technical information products and services from the private sector. It was not ERDA's desire or intent to be a competitor with private firms in this regard. In terms of literature coverage for the database, ERDA would cover areas that the private sector did not cover and would also cover areas in which ERDA required more information than provided by the private sector.

Stokely emphasized that ERDA would continue full support of IAEA and INIS. When *INIS Atomindex* became sufficiently mature, *NSA* publication would cease. A reason given for this decision was that ERDA did not wish to emphasize one form of energy over another. A new program of "applied technology" was under development, and it was ERDA's intention to intensify the prompt universal distribution of energy information produced by ERDA. In doing so, more research in information-handling systems was being planned. All in all, the full capabilities of the Technical Information Center would be called on.[2]

To initiate the new ERDA technical information policy, TIC Manager Robert L. Shannon announced that new distribution categories were being introduced for the new research and development (R&D) fields in non-nuclear areas. A new abstracting service, *ERDA Research Abstracts (ERA)*, was being developed to provide an announcement outlet for R&D results from all ERDA projects, non-nuclear as well as nuclear. Until the nuclear announcement program was safely within INIS' responsibility, *NSA* would continue as an ERDA task. *Power Reactor Docket Information (PRDI)* would also be continued for NRC until other accommodations could be arranged. The newly introduced *Energy Abstracts for Policy Analysis (EAPA)* would also be continued as a part of the ERDA bibliographic announcement program.[2]

Other topics covered at the meeting included a review of the ERDA legislation as it related to information generation and dissemination, an introduction to the ERDA Energy Research Centers and their responsibilities, a review of the policies of the Information Analysis Centers, and a full discussion of the capabilities of RECON and the databases available to the meeting participants.

18.2 *A GIFT FROM THE AEC: AN ERDA ENERGY DATABASE*

Concurrent with Chairman Ray's efforts to define the Nation's energy program for the future, John Harris had set in motion a program to define, categorize, and collect energy information likely to be sought by the new ERDA (see Sec. 17.3).

The AEC in 1973 had approved a recommendation that the agency begin to assemble a comprehensive bibliographic database covering the entire field of energy.[3] With guidance from Headquarters, TIC since that time had worked toward producing a database covering broad energy fields that followed approved guidelines. These were

- Develop an online mission-oriented system to be used primarily for the R&D needs of the agency.
- Develop and use, insofar as possible, information available from outside resources to enlarge the database either through exchange arrangements or agreements.
- Obtain the assistance of the private sector in adapting information materials to the agency's needs.

With the use of the new energy categories as a template, TIC's Science and Technology Branch had developed for ERDA's use (just prior to AEC's demise) a database on energy that approached a half million items suitable for interrogation on modern, fully developed online retrieval systems.[4]

Planners of the database for the future expected that 40 percent of the information could be obtained by exchange arrangements with other organizations, principally government agencies. Nuclear research was continuing to supply the largest portion of the database. Approximately 30 percent of the overall total was expected to be procured through purchase or lease agreements, and the remaining 30 percent was to be collected by ERDA itself through TIC. All information would, however, regardless of source, be subject to the standards and checks established for data entry into the TIC bibliographic processing system.

Although the entire database would be available via RECON, access to the database would be restricted essentially to organizations representing ERDA's interests to avoid conflict with the private sector.

As part of the cooperative effort to broaden the resource base for information to match the new categories, the Morgantown Energy Research Center (MERC) forwarded to TIC the major portion of its collection of publications on coal research dated from 1947 to 1974 for inclusion in the Energy Data Base. More than 90 percent of the 383 items were found to be in scope.[5]

From Bartlesville (Oklahoma) Energy Research Center (BERC), 2441 technical reports on petroleum and natural gas were received by TIC. This collection constituted approximately 92 percent of the total number of reports issued by BERC since it was established. The major portion of these reports was announced and redistributed.[5]

The San Francisco Energy Research Center (SFERC) library was relocated at the ERDA San Francisco Operations Office after the demise of the AEC. The library's petroleum and gas journals, books, and reports (dating back to near the beginning of the century) were shipped to TIC to be gleaned for relevant information for adding to the energy database building effort.[6]

Through these internal ERDA efforts and by opening up newly developed information resources covering all fields of energy, the TIC Science and Technology Branch was able quickly to expand the energy database for the ERDA scientific and technical community. Total database exploitation for ERDA researchers exceeded 808,000 abstracted and indexed items by October 1975. Online database resources for both RESPONSA and RECON systems, begun by the AEC and continued under ERDA, are shown in Table 18.1.[7]

For initiation of the new ERDA technical information program, plans had been effected to have the RECON network expanded to 65 to 70 terminals to provide online database access for ERDA contractors as they were brought into the information program. To service both the East and West Coast sectors, plans were promulgated to extend the day for "up time" and to allow online access on weekends.

18.3 *NEW ANNOUNCEMENT JOURNAL ISSUED:* ERDA RESEARCH ABSTRACTS

An ERDA news announcement dated December 15, 1975, provided official confirmation of plans for making available to the public a new abstracting service beginning January 1976. *ERDA Research Abstracts (ERA)* was being published to announce ERDA-originated results of R&D that appeared in technical reports, journal articles, conference papers, patents, theses, and books. Whereas *NSA* strove to be comprehensive in the field of nuclear science and technology on a worldwide basis, *ERA* was being limited to the announcement of results of ERDA's research efforts.[8]

Formerly known as *ERDA Reports Abstracts, ERA* had actually been started in March 1975 but, during the developmental period, had been limited to non-nuclear research and was distributed only to ERDA offices and contractors. Both nuclear and non-nuclear research results were included in the revised and broadened *ERA* scope. Included in each *ERA* issue were the conventional subject, author, issuing organization, and report number indexes. Availability to the public was by subscription from the Superintendent of Documents.

Table 18.1 ERDA ENERGY DATABASE SEARCHABLE ON TWO COMPUTER SYSTEMS (1975)[7]

(Depicting Nuclear and Non-Nuclear Information Categories)

Subject categories	RESPONSA only	RECON	Total base
Coal and Coal Products		9,663	9,663
Petroleum		413	413
Natural Gas		265	265
Oil Shales and Tar Sands		1,500	1,500
Fission Fuels	7,220	18,935	26,155
Isotope & Radiation Source Technology	2,956	5,426	8,382
Hydrogen		3,240	3,240
Other Synthetic and Natural Fuels		291	291
Hydro Energy		10	10
Solar Energy		5,446	5,446
Geothermal Energy		4,221	4,221
Tidal Power		31	31
Wind Energy		71	71
Electric Power Engineering		1,685	1,685
Nuclear Power Plants		61,430	61,430
Nuclear Reactor Technology	19,966	21,284	41,250
Energy Storage		1,100	1,100
Energy Policy		3,247	3,247
Energy Conversion		8,262	8,262
Energy Conservation, Consumption and Utilization		197	197
Advanced Automotive Propulsion Systems		97	97
Materials	19,247	41,683	60,930
Chemistry	28,438	48,021	76,459
Engineering	3,398	13,232	16,630
Particle Accelerators	3,920	12,127	16,047
Instrumentation	13,707	29,598	43,305
Explosions and Explosives	2,555	5,671	8,226
Environmental Sciences	4,466	13,003	17,469
Biomedical Sciences	32,928	62,851	95,779
Physics Research	62,803	190,374	253,177
Controlled Thermonuclear Research	9,757	25,292	35,049
General and Miscellaneous	3,584	5,255	8,839
Totals	214,945	593,921	808,866

18.4 NUCLEAR SCIENCE ABSTRACTS *CEASES PUBLICATION*

During the Fall of 1975, Edward J. Brunenkant, Director, Division of Scientific and Technical Information, IAEA, visited the OPA Headquarters office in Washington and reported that *INIS Atomindex* was now fully able to supply U.S subscribers with an abstract journal on essentially the same time schedule, with the same content, and at a subscription price comparable to that provided by *NSA*. These were requirements that the IAEA was expected to meet before ERDA would allow *NSA* to expire.

With assurance from the IAEA that these requirements could now be met, a schedule to discontinue publication of *NSA* could be drawn up. An early communicating of this information to *NSA's* subscribers was essential to allow a continuity of access to nuclear science research information via *INIS Atomindex*.

Announcements, fliers, and news releases provided the necessary notification of the planned demise of *NSA*. One announcement merits more than passing attention because, not only was it a farewell to *NSA*, but it was also a statement of appreciation to the TIC staff who had made *NSA* the principal jewel in TIC's crown. Prepared by TIC Manager Robert L. Shannon (*NSA's* most fervent advocate), the announcement officially recognized the arrival of a new era—a period that required management and staff to reapply their efforts to the entire field of energy research, not just nuclear science and technology.

The TIC announcement[9] evinced an honest, sentimental regard for *NSA* that was doubtlessly felt by all TIC staff. In memorializing *NSA*, however, the announcement could also be considered a tribute to its author as well—a man who dedicated much of his life toward making *NSA*, for three decades, one of the world's preeminent scientific research announcement publications. To quote:

> I have recently been reminded that no general announcement to TIC staff has been made regarding the discontinuance of *Nuclear Science Abstracts*. The text of the announcement that was sent to *NSA* users and subscribers, and which has appeared in *NSA* for the past few months, is quoted below:
>
> The publication of *Nuclear Science Abstracts* is planned to be discontinued after Vol. 33, No. 12, dated June 30, 1976. *Atomindex,* published by the International Atomic Energy Agency and a product of the International Nuclear Information System (INIS), will provide essentially identical literature coverage, subject scope, abstracting and indexing with that of *NSA*. For all practical purposes the two journals are identical. The Energy Research and Development Administration, formerly the Atomic Energy Commission, has supported the concept and development of INIS for several years. At this time, it is quite apparent that the decentralized scanning, abstracting and indexing on a country-by-country basis is reliable and successful. Consequently, it is no longer necessary for the United States to bear the entire burden of publishing an abstract journal covering the world's nuclear literature. ERDA will continue to provide coverage of U.S. nuclear literature to INIS.

Indeed, the last issue of *NSA* is now being prepared, and I would like to share a few thoughts with you at this time. For many years, *NSA* has been the principal publication of TIC. During the 27-year span of the AEC, *NSA* was the only abstract journal in the world devoted to nuclear science and technology. The excellence of *NSA* has been attested to the world over and its value to the international scientific community has never been disputed.

Bearing on this is the following statement by Jack Terry, Atomic Energy Research Establishment, Harwell, England, which appeared in the British *Aslib News,* Vol. 21, No. 2, dated February 1976:

"In July, *Nuclear Science Abstracts* will cease publication after 28 years. From the beginning, new techniques had to be developed to deal effectively with the report literature which played such an important role in this subject area. However, it was with the introduction of subject indexes in every issue and the speed with which the quarterly and annual indexes appeared that *NSA* led the way in the sixties at a time when one had to wait over a year for the annual indexes to some other abstract journals.

"Since 1967, the United Kingdom and other countries collaborated with *NSA* by selecting and abstracting relevant literature published in their own countries. This was a fruitful and pleasant collaboration which gave valuable experience for the wider decentralization of the International Nuclear Information System, whose *Atomindex* will take over the role of *NSA*. It is a measure of the success of *NSA* that the criterion by which *Atomindex is* being judged is the extent to which it matches up to *NSA*.

"It would be wrong for *Nuclear Science Abstracts* to disappear without a word of thanks to all those at the Technical Information Center at Oak Ridge for the fine job they have done."

There are few people at TIC who have had no part in the publishing of *NSA*. Most of us, directly or indirectly, have been involved. *NSA* was by no means a one-man show. Hundreds of people have had a hand in its success. In 1970, I delivered a paper in Vienna entitled "Nuclear Science Abstracts, A 21-Year Perspective." From that paper, the following paragraphs are quoted:

"The successful publication of *NSA* for more than two decades has not been the accidental result of its management's good intentions. Rather, it is the result of a system carefully constructed over many years which has required the best efforts of many people. It is the result of a demand for information that knows no national boundaries, and it is the result of its own faithfulness in discharging its stated mission. It is also the result of good will substantially enriched by international support.

"Principally, *NSA* is the result of the efforts of the people who are directly responsible for its publication and who wear the service badges for time invested as well as some scars incurred along the way. These people have shaped its policies, regulated its course, rebutted its critics and profited by its mistakes. These people, to their everlasting credit, have labored for its journalistic integrity and scientific excellence, timeliness and prompt availability."

To all of you who helped create and sustain a remarkable scientific publication, my thanks. Your own memories and pride in the *NSA* story, and the fact that those volumes will rest in distinction for decades to come in the science libraries throughout the world is, in my opinion, the best possible reward for a job well done. (Signed, Robert L. Shannon).

In acknowledging ERDA's decision to discontinue *NSA*, the INIS Secretariat, through the January 1976 *INIS Newsletter,* published the following statement: "*Nuclear Science Abstracts* has for almost 30 years provided an indispensable service to the nuclear community. During this time it has achieved a standard against which other abstracting journals could be measured. Now that the first issues of *INIS Atomindex* in its new format as an international nuclear abstracting journal have been issued, we hope that it will prove in every way to be a worthy successor to *NSA*."

For other information on *NSA* and the indexing program, see Secs. 3.8, 4.10, 4.13, 6.4, 6.7, 9.12, 9.13, 10.11, 11.5, 11.13, 12.8, 13.6, 16.9, 16.13, and 17.5.)

18.5 *IEA COAL RESEARCH SERVICE ESTABLISHED*

While President Nixon was still in office and prior to the abolishment of the AEC, the Organization of Arab Petroleum Exporting Countries, on October 17, 1973, embargoed oil to the United States and The Netherlands because of their support for Israel. In response to this act, President Nixon called for Project Independence (self-sufficiency from foreign petroleum by 1980). The embargo lasted until March 17 of the following year.[10]

On November 15, 1974, after President Gerald R. Ford had been sworn into office, major oil consuming nations of the industrial world (the United States, Canada, Japan, plus fifteen European countries) joined together to mount a coordinated response to threats of future energy crises such as had been experienced earlier in the year. An outcome of this initiative was the creation of the International Energy Agency (IEA), an organization subsequently placed under the aegis of the Organization for Economic Cooperation and Development (OECD), located in Paris, France.

In the Spring of 1975, the U.S. representative of the IEA Working Party on Coal sent copies of draft Implementing Agreements to TIC that proposed the creation of IEA organizations to carry out specific tasks. Comments from TIC were solicited particularly with respect to those areas of the proposed agreements relating to technical information.

The United Kingdom National Coal Board, London, had been appointed operating agent for proposals that included plans for a Coal Technical Information Service, an Economic Assessment Service, a Fluidized Combustion of Coal Research Project, a Mining Technology Clearinghouse Service, and a World Resources and Reserves Databank.

The objectives of the Coal Technical Information Service, as defined in the May 28, 1975, draft implementing agreement, were to

- Collect from published sources, scientific, technical, and other data relevant to coal research and development within a defined scope.
- Perform data processing functions not available from other sources, including the preparation of abstracting bulletins, bibliographies, and literature reviews in the field of competence of the Service.
- Maintain an inquiry service for the Members' benefit using collected data.
- Create and maintain an annual register of ongoing publicly supported coal research throughout the world.
- Perform other additional duties as spelled out by the Executive Committee.

A series of meetings, held in London to review the various drafts, resulted in finalizing agreements for signature by the various Member States' representatives. Dr. William Gouse, ERDA Deputy Assistant Administrator for Fossil Energy, headed the U.S. delegation. William M. Vaden, TIC Deputy Manager, was named alternate for the Coal Technical Information Service, for which the formal signing occurred October 1975.

On July 22, 1976, an announcement from the Coal Research Operating Agent informed Members that Ian Hogg had been named to head the Service. (Hogg was well known to TIC; he had earlier visited TIC while serving in an information management capacity in the U.K. nuclear program.)

The fact that the United States was the largest contributor, both in terms of money and information, was sufficient cause for TIC to be a cautious participant during the developmental meetings of the Coal Technical Information Service. Before the IEA had been conceived, TIC had been active in building a strong ERDA database on production, properties, and processing of coal. Indexing terminology for coal had been added to the ERDA Thesaurus; the TIC computer processing system had been expanded to allow special bibliographies and bulletins to be ordered at will, including data on coal. New energy categories had been introduced and new information resources had been identified.

Much could be lost by TIC in establishing a collaborative arrangement unless, at the early stage of the Coal Research Service's development, agreement could be reached on compatible operational details. No technical planning had yet occurred for the Service; the National Coal Board used only manually filed catalog cards to provide references to its literature base.

Hogg was invited to visit Oak Ridge to discuss these major points of TIC's concern. In his telegraphed acceptance, he requested September 26–28, 1976, as meeting dates.

As stated in the Implementing Agreement, in addition to processing current coal information, the Coal Information Service also had a responsibility to create an "inquiry service" for its membership. To produce meaningful responses, a satisfactory database for searching was required. To allow a quick access to a database, Hogg was offered, during his visit to TIC, magnetic tapes containing the coded data used to create TID-3349, *Coal Processing (A Bibliography 1930–1974)*, updated through 1976. Total information was estimated at about 17,500 items on coal taken from worldwide sources. From that period onward, however, only the current U.S. coal information would be supplied, as stipulated in the Implementing Agreement.[11] If this offer were to be accepted, however, Coal Information Service would have to agree to accept indexing terms as taken from the ERDA Thesaurus (to be refined later as mutually agreed) along with the cataloging tags as identified and used in the production of the TIC energy database.

Agreement was reached between TIC and the Coal Research Service on these terms, and, except for the creation of software needed to extract relevant U.S. coal information from the monthly accrued energy database file, little else was required of TIC to initiate cooperation. In October 1976, to enhance the development of common terminology for the use of the entire membership, TIC generated a subset of the ERDA/TIC Thesaurus specifically on coal. This tape was supplied Coal Research Service for further elaboration.

In the succeeding years since the agreement was reached, cooperation has been cordial and productive for both sides and has been carried out with a minimum of difficulty.

18.6 *TIC'S ROLE INCREASES AS A SUPPLIER OF PUBLIC SERVICE DOCUMENTS AND FILMS*

During 1975, OPA distributed public service announcements to 538 selected television stations and 2414 radio stations. Collectively, these stations were estimated as being capable of reaching 87 percent of the Nation's population.

These announcements (30 seconds in length and produced in color) highlighted the nation's energy problems and described ERDA's role in energy R&D. Interested viewers were invited to write ERDA for information about the Government's programs being developed to provide new energy sources and improve old ones.[12]

A plan was also drafted to improve public communication to furnish consumers with sufficient information so that value judgments could be made on the full range of technology options included in ERDA's programs. This plan called for distribution of energy technology program fact sheets and fact books, for reviews of draft environmental impact statements, a broad public education program to maintain communication with energy users, and school programs to provide the public with opportunities to learn more about energy technology options.[13]

Whereas TIC was not responsible for the development of the response materials for the activities cited (a Headquarters responsibility), much of the execution of the final product, including printing, was accomplished by TIC. Warehousing of the informational materials, maintaining accountability records, and using these materials to provide answers to official and public requests was a major and very labor-intensive TIC activity.[14] For a typical month (April 1976), reference services and official responses to ERDA requests and the general public are illustrated by the following statistics:

Reference searches (745 ERDA and official Government)	1,326
Report items requested (6,274 public requests)	11,955
Requests from students, teachers, and the general public (special educational materials provided):	
(a) Educational packets	72,378
(b) Pamphlets, etc.	186,270

In addition to fulfilling requests for reference services and publications as described, TIC maintained the ERDA centralized motion picture film library and loan service. The library contained 8600 prints of 185 active film titles. An online computer booking service provided confirmation letters, address labels, shipping notices, mailing lists, and statistical information, using data entered from the initial keyboarding of the request. In 1976, TIC processed over 65,000 mailings to an estimated 6,700,000 viewers. (See Fig. 18.1.) Loaned to schools, colleges, universities, industry, professional societies, and the general public, the films' subject matter covered the range of ERDA's energy research responsibilities.[15]

(See also Secs. 5.7, 7.11, 9.3, 11.4, 16.8, and 17.1.)

18.7 *ERDA TECHNICAL INFORMATION PROGRAM REORGANIZED*

A new position of Assistant Administrator for Institutional Relations (AIR) was established by ERDA effective July 4, 1976. Heading the new office was Dr. Eric Willis, former Director, Division of Geothermal Energy. As a part of the reorganization, TIC was transferred from the Public Affairs Office to the new AIR organization.[16]

Fig. 18.1 The TIC motion picture film library. In 1976, more than 65,000 mailings of films provided viewings for approximately 6,700,000 persons. An online computer booking service was installed at the Center as an aid in scheduling mailings.

In this new responsibility, the Assistant Administrator for Institutional Relations directed and coordinated the activities of the Office of University Programs, Office of Industry Relations and Technology Transfer, Office of Governmental Relations, and Office of Technical Information.

Functions of this new office, created a year and a half after the establishment of ERDA (which was still in the throes of shakedown), involved planning, managing, developing, and directing the program of institutional relations and technology and technical information transfer activities that supported ERDA's programs of research, development, demonstration, commercialization, and conservation. This office was also responsible for formulating policy guidance and practice for institutional activities of ERDA organizations involved with federal, state, and local governmental communities. Also added as a new responsibility was the development and management of an unclassified database customized to fit ERDA programs and energy technology and the dissemination of relevant information to national and international energy communities and to the general public. An information outreach program that focused on the interests of the public and private sector was also an objective of the new office.[17]

Thomas Hughes, formerly the Chief of the Systems Development Branch, Office of Public Affairs, was named Acting Director, Office of Technical Information (OTI).

18.8 *STUDIES ORDERED FOR THE ERDA TECHNICAL INFORMATION PROGRAM*

The Reimers' Study. A memorandum by Dr. Willis dated November 23, 1976, which was directed to the Heads, Office of Technical Information, Technical Information Center, and Office of University Programs, announced news of the appointment of a consultant who had been enlisted to conduct an "objective evaluation of our technical information responsibilities."

The memorandum explained that the study was to examine and analyze five areas: (1) the existing sources and mode of handling of technical information processed by TIC, (2) the desirability and capability of expanding the sources of technical information to meet market demands and a definition of those markets, (3) the capabilities and operation of the TIC and its ability to meet those demands, (4) the functions and responsibilities of the Headquarters Technical Information Office as it related to the ERDA charter in the enabling legislation, and (5) the impact on the customer's needs and his satisfaction with the technical information made available through the AIR technical information system. [18]

With the exception of item (4), all other study objectives called out in Willis' memorandum involved examining technical information programs at TIC.

Paul R. Reimers was the consultant chosen by Dr. Willis to conduct the study. Having only recently left the Library of Congress where he had been Coordinator of Information Systems for eight years, Reimers' personal resume cited rich experience in the marketing and use of information systems.

Accompanied by John van Santen and Thelma Twigg of the Assistant Administrator's office, Reimers arrived at TIC on November 29, 1976, to be introduced to the Center's operations and to become acquainted with that portion of the AIR program then being conducted at Oak Ridge.[19]

Reimers completed his study approximately two months after receiving his assignment. Titled *Effective Dissemination of Technical Information: A Report Prepared for the Assistant Administrator for Institutional Relations, ERDA,* the study report dated January 1977 was given promptly to Dr. Willis.

The TIC management and staff could only have been pleased at the complimentary nature of the report's findings. Whenever statements or references were made about the Center and the ERDA technical information programs carried out in Oak Ridge, they were barely short of being laudatory. Citing the high quality of the Center's services and operations, the section devoted solely to TIC stated that the Center was a valuable asset to ERDA.[20] Its most important values derived from an experienced staff that had been developed to a high level of technical proficiency. In this regard, TIC staff had already broadened its information coverage from nuclear to other emerging fields of energy. The report stated that TIC had been able to accomplish this feat much more quickly than could any other information group because of a strong energy orientation, especially in fields of high technology.

Although positive features of the ERDA technical information program were cited by the study and the importance of the Center was highlighted, TIC never received authorization to reproduce and disseminate the report, and only office copies that were reproduced by TIC staff remain today as evidence of the Reimers' ERDA information program review.

Proposal for ERDA Technical Information Policy and Procedures Review. Within a few weeks after receipt of the Reimers' report, an action memorandum from Willis was prepared for submission to ERDA Administrator Dr. Robert C. Seamans, Jr., subject, "ERDA Technical Information Policy and Procedures Review."

The memorandum[21] complained that a lack of consensus among ERDA managers and program administrators had resulted in the development of specialized technical information activities that focused on particular technologies and goals. These were differing in scope, level of effort, and methods among the different ERDA programs. They were also being accomplished outside program channels that did not involve the OTI and the TIC, which were established to give direct support to such efforts. The crux of the problem, and the need for a study as outlined, was: "To achieve an effective and well-coordinated technical information program, a comprehensive statement of agency policy and procedures is required based on consensus among ERDA program managers as to what ERDA's basic technical information needs are and how best to accomplish them. As a basis for developing such a statement, it proposed that a review of technical information needs and practices in ERDA be undertaken as quickly as possible."

Willis' recommended option for initiating the study was to engage the assistance of competent persons from other agencies. Three such persons were identified: Colonel Andrew Aines, Office of Science Information Service, National Science Foundation; Melvin S. Day, Deputy Director of the National Library of Medicine; and Hugh Sauter, Administrator of the Defense Documentation Center, Department of Defense. In addition to these persons, the panel would include representatives from key ERDA program areas, as well as someone from the technical publishing community.

In finalizing the study plans, however, the review team was expanded to include, in addition to Aines, Day, and Sauter as representatives of outside agencies, Dr. Alexander G. Hoshovsky, R&D Information Officer, Department of Transportation. Named from ERDA were Albert H. Linden, Jr., Deputy Assistant Administrator for Data Services; Theodore M. Albert, Director, Office of Environmental Information Systems; James D. Cape, Technicai Information Center; John E. Klansek, Office of Assistant Administrator for Conservation; Tom C. McCarron, Office of Assistant Administrator for Fossil Energy; David M. Richman, Office of Assistant Administrator for Solar, Geothermal and Advanced Energy Systems; and Glenn W. Wensch, Office of Assistant Administrator for Nuclear Energy. Melvin S. Day was appointed Chairman.

The purpose of the ERDA Technical Information Policies and Procedures Review Panel, which was officially established on March 4, 1977, was "to review, evaluate, and recommend any needed changes regarding ERDA's technical information policy, procedures and program."[22]

In accordance with procedures and guidelines adopted by the Panel as a means to gain information, a series of meetings was held during the ensuing weeks, during which time presentations were made by representatives of OTI, TIC, ERDA Administrative Offices, consultants, and others.

Within a period of four months, Panel Chairman Melvin S. Day was able to transmit the final report to Dr. Willis. Dated July 28, 1977, the transmittal letter opened somewhat apologetically: "The Panel has completed its deliberations and is pleased to forward its report to you. In accordance with John van Santen's request this report is being sent to you without some ERDA prepared material. . . . I believe that you will find that the sections being transmitted to you at this time are the substantive portions of the report which will be of greatest value."[22]

In view of the scope of work assigned the Panel, four months could be considered a modest amount of time required for a large panel to reach consensus on such a sizable and complex number of issues covered. Because of the summoning action inferred from the transmittal letter's language, it could have been assumed that the Office of Assistant Administrator for Institutional Relations suddenly and urgently required the Panel's views and requested their delivery, albeit perhaps prematurely.

This assumption might also be supported by the wording in the final paragraph to "Findings and Conclusions" of the short report which stated: "It is to the credit of the Assistant Administrator for Institutional Relations, Eric H. Willis, that he perceived the need for strong actions to reverse the decline. His establishment of the Technical Information Policies and Procedures Review Panel is evidence of his concern. The Panel hopes that this report will provide him with a requisite shopping list to add to his resolve for change."

Indeed, the "decline" referred to in the conclusions section had been depicted in a listing headed "Problems and Issues Encountered and Unsolved." Five problems "common to large institutions" and 12 "unique" problems were highlighted. The tone of the entire report was negative, and many statements were made without substantiation or documentary evidence.[22]

Two weeks after receipt of the report (August 17, 1977), Robert L. Shannon, TIC Manager, returned to John van Santen, AIR Executive Director, a rebuttal.[23] Introducing it he stated: "We do not argue so much with the recommendations as we do the statements of the problems and the findings and conclusions. In this regard, the report from beginning to end is utterly negative. Absolutely no recognition for any accomplishment is given. Small problems are magnified out of proportion and major problems are not understood. It is couched in semitruths, misinformation, and out-and-out misstatements of fact. To believe the report, one would of necessity look for substantiating evidence of failure—complaints and scandal both within and outside ERDA—but no such evidence exists. As to the recommendations, they are conditional on the appointment of an information manager . . . thus making it appear that ERDA management needs recommendations from a study group to install this official."

18.9 "GENERAL AND PRACTICAL" ENERGY DATABASE ESTABLISHED TO ASSIST STATES

In April 1977 a new ERDA program was announced that was intended to assist states in promoting energy conservation and alternative energy technologies. Named the ERDA Energy Extension Service, it was initially developed to be a pilot program, restricted to 10 states, which would be operated at the state level. The two-year experimental program was designed to furnish citizens, businesses, institutions, hospitals, and government agencies assistance and information on energy-related topics.

To assist the Energy Extension Service clients in obtaining access to useful information for carrying out their programs, TIC began to establish a General and Practical (GAP) database file of relevant informational topics. Specifically, the file included energy information available as mass-media products, such as pamphlets, flyers, films, and posters, and technical information for the general public. Information, primarily in the areas of energy conservation and solar-energy use, was designed to answer "How Can I?" questions.[24]

Various types of general and practical items represented in the file were:

- Use of solar energy for heating, cooling, water heating, and processing; solar-energy economics
- "How-to" for energy conservation for the handyman, industrial operator, building-maintenance personnel
- Structural and mechanical retrofit options for energy conservation
- Building design and management for energy conservation
- Energy-efficient transportation practice, including auto efficiency, car pooling, and mass transit
- Optimal energy-saving behavioral and lifestyle practices, including planned communities
- Economics, including financing, of energy-saving technologies
- Energy-saving products, including appliance efficiency and products to modify energy intensiveness
- Federal, state, local, and private-sector energy-related policies, programs, and services
- Energy auditing, accounting, and survey programs for mass consumption

- Residential and small-business building codes and standards
- Reduction of utility bills by insulation, installation of storm windows, and off-peak energy use
- Industry-wide overviews and pilot studies of energy consumption, conservation, or utilization
- Waste and biomass processing for use as a fuel, conversion to fuel, or materials recovery
- Emergency plans for energy shortages
- Wind- or water-current energy utilization on a small scale
- Educational materials on energy

Because of the nature of the information, the collected documents (the originals were filed at the TIC facility) had a short half-life, and materials five years old or older were continuously purged. Nevertheless, at the height of the program, "GAP" grew to approximately 20,000 informational items, all accessible online through OTI's RECON service.

18.10 *TIC ASSISTS WHITE HOUSE IN SEEKING INPUT TO THE NATIONAL ENERGY PLAN*

In February 1977 TIC was requested to assist in executing a plan to secure from United States' citizens information that would be useful in developing President Jimmy Carter's National Energy Plan. The assignment at Headquarters was co-directed by Eric Willis, Assistant Administrator for Institutional Relations, and Bert Greenglass, Office of Program Support. At Oak Ridge the planning and executing of an accelerated mail-out of questionnaires, to be distributed throughout all segments of U.S. society, and the collecting and recording of responses became the responsibility of Robert L. Shannon, TIC Manager.

Deadline for public comment was March 21. The results of the survey were for use in formulating a comprehensive national energy plan scheduled for release on April 20, 1977.

To obtain a cross-section of citizens' reactions to energy needs and concerns, more than 600,000 "invitations to comment" were prepared and mailed from the TIC facility. Material to solicit responses, instructions, and address labels were printed at TIC. Computer programs were written to record the returned energy survey data in formats that subsequently were used to obtain relevant statistical information.

Business, industry, public-interest groups, state and local governments, educators, labor union officials, and the general public were mailed invitations. Almost 28,000 replies were received—a 4.8 percent response rate.

An analysis of these responses, printed by TIC, is provided in *Report of the Written Responses on National Energy Policy.*[25]

In a separate White House initiative, a series of "mini-conferences" was held to obtain viewpoints on energy problems from organizations, state and local governments, interest groups, and individuals organized in small meetings. Twenty-one such conferences were held from March 14 to March 25, 1977. Summaries of the conferences were published in a report printed and disseminated by TIC.[26]

18.11 *ASSIGNMENTS OF ACTING DIRECTORS, OFFICE OF TECHNICAL INFORMATION*

An announcement by Assistant Administrator Eric H. Willis, dated February 3, 1977, stated that effective February 7, 1977, Mr. Joseph Gratton was designated Acting Director, OTI.

This appointment date coincided with the date Thomas Hughes, who had served as Acting Director since July the previous year, resigned. Hughes had accepted the position of Assistant Chief, Science and Technology Division, Library of Congress.

In the memorandum to Gratton, Willis stated: "As you know, Tom was holding the fort for us while we go through the process of selecting a permanent Director. . . . Although I do not expect that you will be instituting thrusts in new directions, I do expect that you will provide the aggressive direction needed to continue our current programs and policies."[27]

In less than six months, on July 10, 1977, Gratton was reassigned to an ERDA position to which he had earlier applied that related to a newly developed federal program established to promote energy conservation within the states.[28] For his work with the technical information program, including the time of his appointment as Acting Director, Gratton was granted an ERDA Special Achievement Award.

In August 1977 it was announced that Theodore M. Albert had been assigned "additional duty as Acting Director, OTI, Institutional Relations."[29] Albert was also serving as Director, Office of Environmental Information Systems, Environment and Safety Program. Although no official appointment letter has been located in TIC files so designating him, Albert did, in fact, visit TIC on August 18 and 19, 1977,[30] stating to Shannon and Vaden (TIC Manager and Deputy Manager) that he had been assigned as Acting Director of the ERDA OTI.

18.12 *SCHLESINGER SWORN IN AS NEW SECRETARY OF ENERGY*

President Carter, presiding at a White House swearing-in ceremony, congratulated the American people for having an able man who had put together "a comprehensive energy proposal that the congress is now addressing in a very effective way." Thus Dr. James R. Schlesinger, onetime AEC Chairman, became the first Secretary of Energy on August 5, 1977. The new Cabinet-level agency was not to be effected until October 1, 1977, however—the beginning of a new fiscal year.[31]

Dr. Robert Seamans had submitted his resignation as ERDA Administrator on January 20, 1977, after having served a two-year term. Robert Fri, who was appointed Deputy Administrator in March 1975, assumed Acting Administrator responsibilities and remained as ERDA head during the transition period.

In the new Department of Energy organization, the TIC was assigned to the Executive Office of the Assistant Secretary for Intergovernmental and Institutional Relations (IR). The IR Assistant Secretary was given the responsibility for coordinating Departmental contacts with other government agencies, organizations related to fields of education, business, labor, and consumer affairs, with the press, and with individuals desiring information on energy. Phillip S. Hughes was named IR Assistant Secretary. John van Santen was appointed head of the IR Executive Office, to which TIC was consigned for program reporting.

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2. N. Hardin, *ERDA Technical Information Meeting Notes,* Meeting held March 20–21, 1975, American Museum of Atomic Energy, Oak Ridge, Tennessee (Unpublished).
3. *ERDA Technical Information Newsletter,* No. 1, Office of Public Affairs, Energy Research and Development Administration, Washington, D.C., January 1975.
4. Monthly Report of Operations, USAEC Technical Information Center, Oak Ridge, Tennessee, December 1974.
5. *ERDA Technical Information Newsletter,* No. 5, Office of Public Affairs, Energy Research and Development Administration, Washington, D.C., September 1975.
6. *ERDA Technical Information Newsletter,* No. 6, Office of Public Affairs, Energy Research and Development Administration, Washington, D.C., November 1975.
7. Monthly Report of Operations, Office of Public Affairs, Energy Research and Development Administration, Technical Information Center, Oak Ridge, Tennessee, October 1975.
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10. Prentice C. Dean, *Energy History Chronology from World War II to the Present*, DOE/ES-002, Office of the Executive Secretary, U. S. Department of Energy, Washington, D.C., August 1982.
11. William M. Vaden, TIC Deputy Manager letter dated June 30, 1978, to I. M. Hogg, Technical Information Service (IEA Services) National Coal Board Ltd.
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13. *ERDA News*, Vol. 1, No. 2, Energy Research and Development Administration, Washington, D.C., December 19, 1975.
14. Monthly Report of Operations, Energy Research and Development Administration, Technical Information Center, Oak Ridge, Tennessee, April 1976.
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17. Draft Manual Chapter for AIR Organizational Functions, Energy Research and Development Administration, Washington, D.C., September 14, 1976 (Unpublished).
18. Appointment of Mr. Paul Reimers, Memo from Eric H. Willis to Heads, TI, TIC, and OUP, Energy Research and Development Administration, Washington, D.C., November 23, 1976.
19. Monthly Report of Operations, Technical Information Center, Energy Research and Development Administration, Oak Ridge, Tennessee, December 1976.
20. Paul R. Reimers, *Effective Dissemination of Technical Information*, (Report TID-3759), January 1977. A Report prepared for the Assistant Administrator for Institutional Relations, ERDA (Unpublished).
21. Action Memorandum Draft from Eric H. Willis, Assistant Administrator for Administration to Dr. Robert C. Seamans, Jr., Administrator, Subject: ERDA Technical Information Policy and Procedures Review, copied January 19, 1977, Energy Research and Development Administration.
22. Melvin S. Day, letter, to Dr. Eric H. Willis, dated July 28, 1977, enclosing untitled report "ERDA Technical Information Policies and Procedures Review Panel" (Unpublished).
23. Robert L. Shannon, ERDA Technical Information Center, letter to John H. van Santen, Jr., Executive Director, AIR, dated August 17, 1977.
24. *Energy Information Data Bases Produced by the DOE Technical Information Center*, Report TID-22783, Technical Information Center, U.S. Department of Energy, Oak Ridge, Tennessee, January 1978.
25. Report of the Written Responses on National Energy Policy, Executive Office of the President, Energy Policy and Planning, Washington, D.C., May 1977.
26. Report of the White House Mini-Conferences on National Energy Policy, Executive Office of the President, Energy Policy and Planning, Washington, D.C., May 1977.
27. Letter, Eric H. Willis, ERDA Assistant Administrator for Institutional Relations to Joseph Gratton, Acting Director, Office of Technical Information, dated February 7, 1977.
28. Personal communication.
29. *ERDA News*, Vol. 2, No. 16, Office of Public Affairs, Research and Development Administration, Washington, D.C., August 8, 1977.

30. Monthly Report of Operations, Technical Information Center, Energy Research and Development Administration, Oak Ridge, Tennessee, August 1977.
31. *ERDA News,* Volume 2, Number 17, Office of Public Affairs, Energy Research and Development Administration, Washington, D.C., August 22, 1977.

THE AEC/ERDA TECHNICAL INFORMATION PROGRAM PROFILED BY PRESIDENTIAL ADMINISTRATIONS

APPENDIX 1

U.S. President	Chairman	Tech. Info. Prog. Dir.	Oak Ridge Manager	Oak Ridge Name	Headquarters' Organization
		U.S. Atomic Energy Commission			
1947 Truman	Lilienthal	--	Thompson	TID(ORO)	Oak Ridge Directed Operations
1948 Truman	Lilienthal	Thompson	Boardman	TIB(ORE)	AEC Div. of Public & Technical Information Service
1949 Truman	Lilienthal	Thompson	Boardman	TID(ORE)	AEC Div. of Public & Technical Information Service
1950 Truman	Lilienthal/ Dean	Thompson	Boardman	TID(ORE)	AEC Div. of Public & Technical Information Service
1951 Truman	Dean	Thompson	Boardman/ Abdian	TIS(OR)	AEC Div. of Information Service
1952 Truman	Dean	Thompson	Abdian	TIS(OR)	AEC Div. of Information Service
1953 Eisenhower	Dean/ Strauss	Thompson	Abdian	TIS(OR)	AEC Div. of Technical Information Service
1954 Eisenhower	Strauss	Thompson	Abdian	TIS(OR)	AEC Div. of Technical Information Service
1955 Eisenhower	Strauss	Thompson/ Fry	Abdian	TIS(OR)	AEC Div. of Information Services
1956 Eisenhower	Strauss	Fry	Day (Act'g)	TISE	AEC Div. of Information Services
1957 Eisenhower	Strauss	Fry	Day	TISE	AEC Div. of Information Services
1958 Eisenhower	Strauss/ McCone	Fry	Day	TISE	AEC Div. of Information Services
1959 Eisenhower	McCone	Day	Shannon	TISE	AEC Div. of Information Services
1960 Eisenhower	McCone	Day	Shannon	OTIE	AEC Office of Technical Information
1961 Kennedy	Seaborg	Brunenkant	Shannon	OTIE	AEC Office of Technical Information
1962 Kennedy	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1963 Johnson	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1964 Johnson	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1965 Johnson	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1966 Johnson	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1967 Johnson	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1968 Johnson	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1969 Nixon	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1970 Nixon	Seaborg	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1971 Nixon	Seaborg/ Schlesinger	Brunenkant	Shannon	DTIE	AEC Div. of Technical Information
1972 Nixon	Schlesinger	Brunenkant/ Harris	Shannon	TIC	AEC Office of Information Services
1973 Nixon	Schlesinger/ Ray	Stokely	Shannon	TIC	AEC Office of Information Services
1974 Nixon/ Ford	Ray	Stokely	Shannon	TIC	AEC Office of Information Services
		Energy Research and Development Administration			
1975 Ford	Seamans	Stokely	Shannon	TIC	ERDA Office of Public Affairs
1976 Ford	Seamans	Willis	Shannon	TIC	Asst. Dir. for Institutional Relations

AEC TECHNICAL INFORMATION PANEL

APPENDIX 2

The Technical Information Panel was established by the AEC General Manager in 1948 as a continuation of the Manhattan Project Editorial Advisory Board. Members had the responsibility of ascertaining the information needs of the Project sites they represented, providing advice to the Director of the Technical Information Service, recommending policies regarding information services throughout the AEC, and recommending ways and means to improve the dissemination of atomic energy research information efficiently. Panel members were expected to act as liaison officers between the AEC's Technical Information Service and their local technical information organizations.

The following is a listing of Technical Information Panel members from the time of the Panel's first meeting on April 2, 1948, to December 1970. Members' names and their service history were obtained from the Commission's Reports to Congress and from information recorded in Panel Minutes. Service years are indicated in parentheses.

Chairmen

Dr. Alberto F. Thompson, Chief, Technical Information Service, AEC, Washington, D.C. (1948–54)
Bernard M. Fry, Chief, Technical Information Service, AEC, Washington, D.C. (1955–57)
Melvin S. Day, Assistant Director, Technical Information Service, AEC, Washington, D.C. (1958–60)
Edward J. Brunenkant, Director, Office of Technical Information, AEC, Washington, D.C. (1960–70)

Panel Secretaries

John H. Martens, Assistant to the Chief, Technical Information Service, AEC, Washington, D.C. (1948–54)

Robert L. Shannon, Manager, Division of Technical Information Extension, AEC, Oak Ridge, Tenn. (1963–70)

Members

H. S. Allen, Babcock & Wilcox Co., Lynchburg, Va. (1963–65)
Dr. Russell Baldock, Carbide & Carbon Chemicals Corp. (Y-12), Oak Ridge, Tenn. (1948–51)
Dr. L. G. Bassett, Rensselaer Polytechnic Institute, Troy, N.Y. (1948–49)
Robert A. Benson, Monsanto Research Corporation, Mound Laboratory, Miamisburg, Ohio (1968–70)
Dr. Henry A. Blair, Atomic Energy Project, University of Rochester, Rochester, N.Y. (1948–60)
Dr. Brewer F. Boardman, Technical Information Branch, ORE, Oak Ridge, Tenn. (1949–51). Technical Information Branch, Phillips Petroleum Co., Idaho Falls, Idaho (1952–67)
Dr. John Z. Bowers, Division of Biology and Medicine, AEC, Washington, D.C. (1948–49)
Clarence T. Brockett, Technical Information, Lawrence Radiation Laboratory, Livermore, Calif. (1966–70)
Charles W. Campbell, Sandia Corp., Albuquerque, N. Mex. (1954–57)
Dr. Thomas S. Chapman, Technical Information Officer, Dow Rocky Flats, Golden, Colo. (1955–66)
C. L. Chase, General Electric Co, Cincinnati, Ohio (1963–65)
James W. Conder, Technical Information, Dow Chemical Company, Golden, Colo. (1969–70)
Fred E. Croxton, Information and Records, Goodyear Atomic Corporation, Portsmouth, Ohio (1956–60)
W. W. Culbertson, Information & Publications, Westinghouse Electric Corp., Pittsburgh, Pa. (1956)
Donald H. Culver, Technical Information, General Electric - NMPO, Cincinnati, Ohio (1966)
Dr. F. Leicester Cuthbert, National Lead Company of Ohio, Cincinnati, Ohio (1952–60)
John E. Davis, Department of Materials Engineering, Battelle Memorial Institute, Columbus, Ohio (1967–70)
Dr. A. J. Dempster, Argonne National Laboratory, Chicago, Ill. (1948–49)
James B. Dodd, Babcock and Wilcox Company, New York, N.Y. (1957–60)
W. E. Dreeszen, Ames Laboratory, Ames, Iowa (1948–70)
Dorothy Duke, Atomic Energy Division, Babcock & Wilcox Co., Lynchburg, Va. (1966–70)
Douglas DuPen, Stanford Linear Accelerator Center, Stanford University, Stanford, Calif. (1963–67)
Ernest E. Hall, USAEC Office of Industrial Development, Washington, D.C. (1957–60)
William H. Hamilton, Westinghouse Atomic Power Division, Pittsburgh, Pa. (1950–52)
Dr. M. M. Haring, Mound Laboratory, Miamisburg, Ohio (1948–51)
Dr. C. D. Harrington, Mallinckrodt Chemical Corporation, St. Louis, Mo. (1956–59)
Sylvan Harris, Documents Department, Sandia Corporation, Albuquerque, N. Mex. (1949–53)
W. L. Harwell, Patents and Declassification, Union Carbide and Carbon Corporation, (K-25), Oak Ridge, Tenn. (1949–67)
Charles R. Horner, General Electric ANP Department, Cincinnati, Ohio (1956–59)

Edward L. Hill, Technical Services, General Electric Company, Lockland, Ohio (1951–56)

John F. Hogerton, The Kellex Corporation, New York, N.Y (1948–53)

Dr. John P. Howe, Research Laboratory, Knolls Atomic Power Laboratory, Schenectady, N.Y. (1948–49)

Joules J. Kastantin, Westinghouse Electric Corporation, Pittsburgh, Pa. (1957–58)

James P. Kearns, General Electric Company, Cincinnati, Ohio (1962)

Dr. C. P. Keim, Technical Information Division, Oak Ridge National Laboratory, Oak Ridge, Tenn. (1962–70)

William T. Kirk, Technical Information Department, Stanford Linear Accelerator Center, Menlo Park, Calif. (1962)

R. B. Korsmeyer, Carbide & Carbon Chemicals Corporation, (K-25), Oak Ridge, Tenn. (1948–49)

Max K. Linn, USAEC Albuquerque Operations Office, Albuquerque, N. Mex. (1958–70)

Frank R. Long, North American Aviation, Inc., Downey, Calif. (1952–70)

John H. Martens, Argonne National Laboratory, Chicago, Ill. (1957–70)

Glenn Maynard, California Research and Development Corporation, Livermore, Calif. (1952–53)

Dr. James R. Merrill, Goodyear Atomic Corporation, Akron, Ohio (1952–53)

W. A. Minkler, Bettis Plant, Westinghouse Electric Corporation, Pittsburgh, Pa. (1959–68)

Dr. James W. Morris, Savannah River Laboratory, E. I. du Pont de Nemours & Company, Augusta, Ga. (1954–64)

Dr. E. J. Murphy, Oak Ridge National Laboratory, Oak Ridge, Tenn. (1948–60)

Dr. G. M. Murphy, New York University, New York, N.Y. (1948–54)

Dr. Judd C. Nevenzel, University of California, Los Angeles, Los Angeles, Calif. (1958–70)

Steward W. O'Rear, Technical Information Service, Savannah River Laboratory, Aiken, S. C. (1965–70)

George Owens, Technical Information Department, Standard Linear Accelerator Center, Menlo Park, Calif. (1969–70)

Harry Pearson, Technical Information, Idaho Nuclear Corporation, Idaho Falls, Idaho (1969–70)

A. D. Pepmueller, Technical Information Department, Sandia Corporation, Livermore, Calif. (1967–69)

Dr. Daniel J. Pflaum, Materials and Information Branch, Division of Research, AEC, Washington, D.C. (1949–56)

Dennis Puleston, Information and Publications Division, Brookhaven National Laboratory, Upton, N. Y. (1949–70)

Mrs. Helen Redman, Librarian, Los Alamos Scientific Laboratory, Los Alamos, N. Mex. (1956–70)

Dr. Richard F. Riley, Atomic Energy Project, University of California, Los Angeles, Calif. (1949–57)

D. P. Rudolph, Chicago Operations Office, AEC, Chicago, Ill. (1952–55)

Dr. Archie E. Ruehle, Mallinckrodt Chemical Works, St. Louis, Mo. (1960–65)

Dr. Howard W. Russell, Battelle Memorial Institute, Columbus, Ohio (1952–64)

Frank Shearin, Monsanto Research Corporation, Mound Laboratory, Miamisburg, Ohio (1963–68)

Dr. John U. Shepardson, Mallinckrodt Nuclear Corporation, St. Louis, Mo. (1960)

Dr. W. E. Shoupp, Westinghouse Electric Corporation, Pittsburgh, Pa. (1953–54)

Dr. Charles Slesser, Technical Information and Declassification Branch, AEC, New York, N.Y. (1948–54)

Dr. Ralph Carlisle Smith, Documentary Division, Los Alamos Scientific Laboratory, Los Alamos, N. Mex. (1948–54)

Wayne Snyder, Technical Information, Battelle Memorial Institute, Pacific Northwest Lab., Richland, Wash. (1970)

Dr. Robert I. Staniforth, Mound Laboratory, Miamisburg, Ohio (1954)

Dr. John R. Stehn, Knolls Atomic Power Laboratory, Schenectady, N.Y. (1950–54)

Virginia Sternberg, Bettis Technical Information, Westinghouse Electric Corp., West Mifflin, Pa. (1969–70)

C. G. Stevenson, Library, General Electric Company, Richland, Wash. (1948–70)

Dr. Stuart Sturges, Knolls Atomic Power Laboratory, Schenectady, N.Y. (1963–70)

Charles D. Tabor, Goodyear Atomic Corporation, Piketon, Ohio (1963–70)

L. R. Thiesmeyer, Brookhaven National Laboratory, Upton, N.Y. (1948–49)

Joseph W. Votaw, National Lead Co. of Ohio, Cincinnati, Ohio (1963–70)

Mrs. Delia F. Vroman, Patents and Declassification, Knolls Atomic Power Laboratory, Schenectady, N. Y. (1956–60)

Dr. Raymond K. Wakerling, Information Division, Radiation Laboratory, Berkeley, Calif. (1948–70)

Willis H. Waldo, Mound Laboratory, Miamisburg, Ohio (1951–53)

Dr. John C. Woodhouse, Atomic Energy Division, E. I. du Pont de Nemours & Co., Wilmington, Del. (1950–52)

Dr. Hoylande D. Young, Information Division, Argonne National Laboratory, Chicago, Ill. (1948–60)

ADVISORY COMMITTEE ON INDUSTRIAL INFORMATION and *ADVISORY COMMITTEE ON TECHNICAL INFORMATION*

APPENDIX 3

First formed in 1949, the Ad Hoc Committee on Technological Information for Industry was expanded in April 1952 into an Advisory Committee on Industrial Information to provide advice and assistance in the planning and execution of the AEC's industrial information program. In 1961, the committee was modified yet again and the name changed to more closely match the AEC's continuously evolving technical information program. Members' service years are indicated in parentheses. Whereas Technical Information Panel members were selected from AEC sites, Advisory Committee members were recruited from industrial organizations, publishing houses, and editorial boards of professional and technical societies and organizations.

Chairmen

Sidney D. Kirkpatrick, Chairman (1949–1956). Vice president and director of editorial development, McGraw-Hill Book Co. Inc.

E. E. Thum, Chairman (1956–1959). Editor, *Metal Progress*, American Society for Metals.

Stanley A. Tucker, Chairman (1960–1961). Publications and business manager, American Society of Mechanical Engineers.

Edward J. Brunenkant, Chairman (1962–1970). Director, Division of Technical Information, U.S. Atomic Energy Commission, Washington, D.C.

Secretaries

Dr. Alberto F. Thompson, Secretary (1949–1955). Chief, Technical Information Service, AEC, Washington, D.C.

Bernard M. Fry, Secretary (1955–1958). Assistant Director, Technical Information Service, Division of Information Services, AEC, Washington, D.C.

Melvin S. Day, Secretary (1958–1959). Assistant Director, Technical Information Service, Division of Information Services, AEC, Washington, D.C.

Edward J. Brunenkant, Secretary (1959-1961). Director of Technical Information, U.S. Atomic Energy Commission, Washington, D.C.

Members

Leonide N. Albert, president, Prentice-Hall International, Inc. (1969–1970)
Herbert S. Bailey, director, Princeton University Press (1961–1964)
Henry A. Barton, director, American Institute of Physics (1949–1951)
John Beall, manager of publications, The American Institute of Mining and Metallurgical Engineers (1952)
H. E. Blank, editor, *Modern Industry*, Magazines of Industry, Inc. (1949–1953)
Carroll G. Bowen, director, the M.I.T. Press, Massachusetts Institute of Technology (1966–1970)
John E. Dobbin, project director, Educational Testing Service, Princeton, N.J. (1961–1970)
Dr. Hoylande Young Failey, Chicago, Ill. (1964–1966)
Bernard M. Fry, deputy head, Office of Science Information Service, National Science Foundation; Director, Clearinghouse for Federal Scientific and Technical Information, National Bureau of Standards. (1960–1964)
James L. Gaylord, senior partner, James L. Gaylord Associates (1961–1970)
Dr. Allen G. Gray, editor, *Steel*, Penton Publishing Co.; later editor, *Metal Progress*, American Society of Metals (1953–1970)
Eugene Hardy, National Association of Manufacturers (1949–1962)
Keith Henney, consulting editor, *Nucleonics and Electronics*, McGraw-Hill Publishing Co. Inc. (1949–1960)
Dr. Elmer Hutchisson, editor, *Journal of Applied Physics*, American Institute of Physics (1952–1956)
Norman H. Jacobson, editor, market issue, *Electric Light and Power*, Haywood Publishing Company (1952–1966)
Walter E. Jessup, editor, *Civil Engineering*, The American Society of Civil Engineers (1952–1957)
Andrew W. Kramer, editor, *Power Engineering*, The Technical Publishing Co. (1952–1962)
Edward Kreutzberg, editor, Penton Publishing Company (1949–1951)
John W. Landis, assistant manager, atomic energy division, The Babcock and Wilcox Co., representing American Nuclear Society (1957–1966)
Everett S. Lee, American Institute of Electrical Engineers (1952–1956)
Dr. Walter J. Murphy, editor, *Chemical and Engineering News*, American Chemical Society (1949–1958)
D. O. Myatt, managing editor, *Industrial and Engineering Chemistry*, American Chemical Society (1951,1952)
Frederick A. Pawley, research secretary, American Institute of Architects (1954–1962)
Dr. Fred Peters, vice president, Reinhold Publishing Co. (1964–1968)
W. A. Phair, managing editor, *The Iron Age*, Chilton Publications, Inc. (1949)
Edward H. Robie, secretary, American Institute of Mining and Metallurgical Engineers (1953–1956)
Charles S. Rich, editor, *Electrical Engineering*, American Institute of Electrical Engineers (1950–1951)
Karl T. Schwartzwalder, director of research, A-C Spark Plug Division, General Motors Corp., representing the American Ceramic Society, Inc. (1952–1970)
J. J. Smith, American Institute of Electrical Engineers (1949)
George Stetson, editor, *Mechanical Engineering*, American Society of Mechanical Engineers (1949–1951)

George F. Sullivan, managing editor, *The Iron Age,* Chilton Publications, Inc. (1950–1960)

Dr. Alberto F. Thompson, chief, Office of Science Information Service, National Science Foundation (1956)

E. E. Thum, editor, *Metal Progress,* American Society for Metals (1949–1960)

Walter Toerge, engineering editor, *Steel,* Penton Publishing Co. (1952)

Oliver Townsend, secretary, Atomic Industrial Forum, Inc. (1953–1968)

Stanley A. Tucker, publications manager, American Society of Mechanical Engineers (1950–1962)

F. J. Van Antwerpen, editor, *Chemical Engineering Progress,* American Institute of Chemical Engineers (1949–1956)

John W. Wight, vice president, McGraw-Hill Book Co., Inc. (1960–1970)

PERSONNEL ASSIGNMENTS FOR THE 1949 ORGANIZATION

APPENDIX 4

The earliest roster of AEC Oak Ridge technical information program personnel recorded in OSTI archives is dated November 14, 1949. Personnel assignments are shown in this Appendix as structured in the 1949 organization chart. Although the McGraw-Hill Book Company staff were acknowledged as a contract contingent, they were shown as being directed by the Chief, Publishing Branch. Of interest is the number of designated specialists (e.g., Proportional Space Compositors, Hand Compositors, and IBM Tabulating Equipment Operators) which reflected Management's intent to use the latest technologies available, thus laying the base for the AEC's "cold type" publishing program and for the production of the National Nuclear Energy Series.

Office of the Chief

Brewer F. Boardman, Chief, Technical Information Division
Lillian E. Hays, Secretary

Albert W. Lutz, Deputy Chief, Technical Information Division
L. P. Barry, Secretary

Control Office

Armen G. Abdian, Chief
Martha J. Thorne, Secretary
A. R. Carpenter, Clerk-Stenographer

Production Control Section

R. L. Metter, Chief
Myra S. Barr, Statistical Clerk
G. F. Koprowski, Clerk-Typist

Program Monitoring Section

James F. Pritchard, Budget and Fiscal Officer
John C. Collins, Accountant

Robert H. Cravens, Accounting Clerk
Frances H. Jackson, Accounting Clerk
Myra S. Pearson, Clerk-Typist

Administration Section

James E. Thomas, Acting Chief
B. Cary Borthick, Personnel Officer
E. I. Whisenant, Personnel Clerk
Anne L. Ludie, Clerk (Mail)
V. H. Sargent, Clerk-Typist
Ivy K. Brandon, Clerk-Typist
B. F. Breazeale, Clerk-Messenger

Publishing Branch

(Vacancy) Chief
(Vacancy) Assistant Chief

Editorial Section

(Vacancy) Chief

Project Editorial Unit

Walter C. Schnopp, Scientific Editor
Mary E. McLeod, Information and Editorial Specialist
Harry L. Painter, Editorial Clerk
Elma S. Taylor, Clerk-Typist

Special Editorial Unit (McGraw-Hill Editorial Staff)

Charles P. Chadsey, Executive Editor
Martha Gerrard, Associate Editor
Lucie D. Connolly, Assistant Editor
A. Stanley Higgins, Assistant Editor
Charles Freedhand, Assistant Editor
Merton T. Henry, Assistant Editor
R. Bruce, Assistant Editor
Marina Botkin, Editorial Assistant #2
Marian C. Fox, Editorial Assistant #2
Vincent P. Malahan, Editorial Assistant #1
John T. Milloway, Editorial Assistant #1
G. S. Whaley, Editorial Assistant #1
George W. Zopf, Jr., Editorial Assistant #1
Bobbie J. Colley, Supervisor
Eunice S. Nunnelley, Information and Editorial Specialist
Marian M. Smith, Information and Editorial Specialist
Violet M. Vosburgh, Clerk-Stenographer
Fannie D. Smith, Clerk

Survey Unit

Mella A. Martin, Supervisor
Sylvia L. Glazier, Printing and Publications Clerk
N. L. Keaton, Printing and Publications Clerk
Myrtle J. Farmer, Clerk-Typist

Art and Composition Section

Carl B. Holmes, McGraw-Hill Book Company, Technical Art Adviser and Executive Editor
Edwin C. Schulte, Acting Chief

Illustration Unit

Wert J. Pearson, Supervisor
Francis H. Lee, Engineering Draftsman
Eugene H. Walmsley, Engineering Draftsman
Robert M. Freestone, Jr., Engineering Draftsman
Joe H. Bratten, Engineering Draftsman
L. Dale Sanders, Engineering Draftsman
William C. Colwell, Jr., Engineering Draftsman
Hiram F. Mathews, Engineering Draftsman

Paul J. Gouge, Engineering Draftsman
Kenneth M. Young, Artist Illustrator
Thomas F. Neal, Artist Illustrator

Makeup Unit

Edward Immerblum, Supervisor
Ralph W. Comellas, Makeup Editor #1
Philip Ritter, Jr., Makeup Editor #1
Walter Stalter, Makeup Editor #1
M. W. Fine, Makeup Editor #1
Louise Gilbert, Draftsman
Charles E. Shelton, Assistant Makeup Editor #2

Photography Unit

Howard M. Jacoby, Supervisor
Anthony M. Martinez, Photographer

Machine Composition Unit

William M. Vaden, Supervisor
James W. Jarvis, Assistant Supervisor
Hasket W. Hensley, Senior Proportional Space Compositor
Mildred R. Moyers, Senior Proportional Space Compositor
Mary D. Scott, Senior Proportional Space Compositor
Willard E. Rodgers, Senior Proportional Space Compositor
Agnes E. Bryan, Proportional Space Compositor
Ruth F. Carroll, Proportional Space Compositor
Jim Amy Robbins, Proportional Space Compositor
Mary G. Mease, Proportional Space Compositor
Evelyn Lawson, Proportional Space Compositor
Frances M. Murray, Proportional Space Compositor
Alvin E. Davis, Jr., Proportional Space Compositor
D. W. Ball, Proportional Space Compositor
Stella M. Durham, Proportional Space Compositor
Shelby L. Hall, Trainee Proportional Space Compositor
Audrey W. Stewart, Trainee Proportional Space Compositor
Hiram Crutchfield, Trainee Proportional Space Compositor
Kenneth L. Frame, Trainee Proportional Space Compositor
Mary H. Ogle, Trainee Proportional Space Compositor
Irene D. Keller, Senior Varitypist
Rosebud Powers, Senior Varitypist
Margaret P. Thomas, Senior Varitypist

Special Composition Unit

Charles R. Bruce, Supervisor
Evelyn L. Pearson, Assistant Supervisor
Juanita D. King, Hand Compositor
Anita B. Hillman, Hand Compositor
Sara N. Wright, Hand Compositor
Margaret H. Boden, Hand Compositor
Peggy C. Bevington, Hand Compositor
Euretha R. Irwin, Hand Compositor
David L. Steelmon, Hand Compositor
Robert F. Erwin, Hand Compositor

Proofreading Unit

Evelyn D. Belmont, Supervisor
Jane E. Richards, Proofreader
Eugene T. Bond, Proofreader
Phyllis B. Rose, Trainee Proofreader
Maude W. Hill, Trainee Proofreader
Josephine C. Rutherford, Trainee Proofreader

Printing Section

Edwin C. Schulte, Chief
John W. Stephenson, Assistant Chief
Thomas L. Ralls, Jr., Plant Foreman
Edna L. Taylor, Clerk-Stenographer
Vera W. Warren, Clerk-Typist
Edward P. Tiller, Chauffeur-Messenger

Raymond F. Hooks, Chauffeur-Messenger
Quentus T. Miles, Office Laborer

Platemaking Unit

Blanche M. Neal, Supervisor
Clyde E. Sellers, Senior Cameraman and Platemaker
Albert L. Miller, Cameraman and Platemaker
Toward R. Prater, Cameraman and Platemaker
Thomas R. Woods, Platemaker

Press Unit

James J. Morrissey, Supervisor
Carl Kelly, Operator (17 x 22)
Fred P. Jeffers, Operator (17 x 22)
Frank Cook, Duplicating Unit Operator
Everett L. Scantlin, Duplicating Unit Operator
John W. Key, Jr., Duplicating Unit Operator
Ralph O. Miller, Duplicating Unit Operator
Edward P. Pharr, Duplicating Unit Operator
Willie R. Grayson, Duplicating Unit Operator

Bindery Unit

Charles E. Wrinkle, Supervisor
Lemuel G. Green, Cutting Machine Operator
Clyde F. Witt, Office Appliance Operator
Carl R. Kelly, Office Appliance Operator
Robert F. Skeen, Office Appliance Operator
Guy McLemore, Office Appliance Operator
Leonard H. Crunk, Office Appliance Operator
William G. Lenoir, Office Appliance Operator

Reproduction Unit

J. B. Wells, Supervisor
Charles W. Robbins, Photostat Operator

Photography Unit

James E. Westcott, Supervisor
Ethel M. Braille, Photographer
David W. Hopkins, Photographer
William E. Hall, Photographer

Library Branch

I. Albert Warheit, Chief
Gordon E. Randall, Assistant Chief
Vivian L. Jones, Secretary

Acquisition Section

Walter Koester, Jr., Acting Chief

Accession Unit

Edna L. Connor, Library Assistant

Loan Unit

Nancy W. Gammill, Library Assistant

Exchange Unit

Margaret L. Pflueger, Supervisor
Martha W. Parker, Library Assistant

Reference Section

Robert L. Shannon, Acting Chief
Marguerite K. Parker, Clerk-Stenographer

Information Unit

John W. Norris, Acting Supervisor
Thomas W. Laughlin, Library Assistant
Willie E. Clark, Library Assistant
Dot E. Henderson, Library Assistant
Maude I. Keith, Clerk-Stenographer

Cataloging Section

(Vacant) Chief

Abstracting Unit

James H. McGee, Supervisor [Editor, *Nuclear Science Abstracts*]
Chancellor Bramblett, Scientific Analyst
Alan T. Morphew, Scientific Analyst
Anne M. Gwaltney, Scientific Analyst
Florence L. Bowers, Clerk-Typist
Aileen A. Thorson, Clerk-Typist
Oveda J. Hall, Clerk-Typist

Indexing Unit

Alden G. Greene, Supervisor
Joseph E. Dunipace, Scientific Analyst
Mary H. Newman, Scientific Analyst
Donald D. Davis, Scientific Analyst
Robert L. Morgan, Scientific Analyst
L. Irene Woods, Library Assistant
Grace A. Campbell, Clerk-Typist

Catalog Maintenance Unit

Charlotte F. Chestnut, Supervisor
Katherine C. Breckenridge, Library Assistant
Hanna B. Mayfield, Library Assistant

Document Control Branch

(Vacant) Chief
Paul S. Feinstein, Assistant Chief
Nancy K. Beasley, Clerk-Stenographer

Routing and Records Section

(Vacant) Chief
J. E. Sadler, Clerk-Typist

Receiving Unit

Virginia H. Hutton, Supervisor
Nora F. Eaton, Tabulating Equipment Operator
Bertha R. Lain, Clerk-Typist
Clara L. Fox, Clerk-Typist
Louise K. Bumgardner

Inventory and Audit Unit

Grace H. Berry, Supervisor
Mildred S. Neumann, Library Assistant
Dorothy G. Roberts, Library Assistant
Grace S. Sullivan, Library Assistant
Robert H. Cantrell, Clerk

Machine Records Unit

Raymond T. Childers, Supervisor
Marie B. Jett, Tabulating Equipment Operator
Dorothy D. Fairbanks, Tabulating Equipment Operator
Beatrice C. Gwinn, Tabulating Equipment Operator
Eddie S. Kelly, Tabulating Equipment Operator
R. Nell Stair, Tabulating Equipment Operator
Lillian E. Brown, Tabulating Equipment Operator
Joyce M. Webb, Tabulating Equipment Operator

Files Section

(Vacant) Supervisor

Joe Bridges, File Clerk
M. I. Stratton, File Clerk
Robert C. Spradlen, File Clerk
Francis E. Greene, File Clerk
Leon Smith, File Clerk
Millard Lawson, File Clerk
Herman A. Watkins, File Clerk
Charles R. Bayless, File Clerk

Distribution Section

Herman F. Carroll, Chief
James H. Thompson, Assistant Chief
Rose M. Sullivan, Clerk-Typist
Mary Baker, Clerk-Typist
Olga C. Coward, Distribution Clerk
Lois B. Loy, Distribution Clerk
M. E. Johnson, Distribution Clerk
Robert O. Stooksbury, Distribution Clerk
Fannie M. Edmonds, Distribution Clerk
Lois W. Tramel, Distribution Clerk
Gertrude B. Goans, Distribution Clerk
Elizabeth A. Smith, Distribution Clerk
H. L. West, Distribution Clerk
Richard H. Lenoir, Distribution Clerk
William C. Bridges, Distribution Clerk
Paul T. Sellers, Distribution Clerk
Helen R. Ellison, Distribution Clerk

TECHNICAL INFORMATION CENTER ORGANIZATION—FINAL DAYS OF ERDA

APPENDIX 5

Office of the Manager

Robert L. Shannon, Manager
William M. Vaden, Deputy Manager
James D. Cape, Special Assistant to Manager
Dorothy Dewey Smith, Secretary
Mildred L. Sargent, Secretary

Office of Assistant Manager for Administrative Services

James H. Parks, Assistant Manager for Administration
Genevieve S. Kramer, Deputy Asst. Manager for Administrative Services
Raymond O. Satterfield, Building Superintendent
Naomi B. Farmer, Fiscal Accountant
Crystal L. Lewis, Clerk-Stenographer

Office of Assistant Manager for Production and Document Management

Robert C. Dreyer, Assistant Manager
Thomas W. Laughlin, Deputy Assistant Manager
Phillip W. Rosser, Technical Information Officer
Hazel K. Harber, Publications Clerk

Editorial Branch
Bobbie J. Colley, Chief
Marian C. Fox, Supervisory Editor
Vida L. Sample, Secretary

Symposium/Journal Section

Eugene T. Bond, Publications Editor
Phyllis B. Rose, Publications Editor
Ruth N. Bean, Publications Editor
Anne M. Goulden, Publications Editor

Book Section

Margaret L. Givens, Publications Editor
Jean S. Smith, Publications Editor
William F. Simpson, Jr., Publications Editor
Mary N. Hill, Publications Editor

Special Projects Section

Marian C. Fox, Supervisory Editor
Maggie W. Jared, Publications Editor

Joan F. Roberts, Publications Editor

Publishing Services Branch

Charles R. Bruce, Chief
Wert J. Pearson, Assistant Chief
James N. Holt, Printing Procurement Specialist
Loretta Dwyer, Printing Assistant
Sharon A. Tittsworth, Clerk-Stenographer

Technical Photography Section

Mary J. Rose, Photographer (General)
Cecil E. Henry, Photographer

Scientific Illustration Section

Robert L. Connatser, Scientific Illustrator (Supervisor)
Gordon A. Spangler, Scientific Illustrator
Alvarez Seay, Scientific Illustrator
James W. Miller, Scientific Illustrator
Wayne D. Sadler, Scientific Illustrator
Kathleen I. Haynes, Scientific Illustrator

Design and Layout Sections

Nathaniel I. Johnson, Scientific Illustrator (Supervisor)
Felix Ray Parrott, Jr., Publications Illustrator
Evelyn L. Pearson, Layout Artist (Publications)
Sarah N. Wright, Layout Artist (Publications)
Bessie H. Burrows, Layout Artist (Publications)
Adelma Jean Moore, Layout Artist
G. Faye Freels, Student Aid

Composing Section

Irene D. Keller, Chief
Bessie M. Tinnel, Assistant Chief
Hazel K. Asher, Editorial Assistant
Margaret L. Hembree, Senior Editorial Assistant
Kathleen A. Stephens, Senior Editorial Assistant
Audrey B. Smith, Senior Editorial Assistant
Johelen Norton Bahler, Senior Editorial Assistant
Sharon M. Jordan, Senior Editorial Assistant
Doris M. Hillard, Senior Systems Compositor
Mary D. Scott, Senior Systems Compositor
Etta R. Chastain, Senior Systems Compositor
Mary S. Hunter, Systems Compositor
Norma J. Amos, Systems Compositor
Helen R. Walker, Systems Compositor
Barbara M. Goad, Systems Compositor
Brenda G. Harrison, Editorial Assistant
Sandra C. Hicks, Editorial Assistant
Doris Henegar Saylor, Editorial Assistant
Nancy L. Gray, Editorial Assistant
Carolyn J. Chesney, Systems Compositor
Johnnie D. Norris, Journal Compilation Group Leader
T. Lewis Whitson, Proofreading Clerk
Judy L. Di Gregorio, Proofreading Clerk
Ruth P. Branson, Composition Machine Operator
Eleanor S. Blue, Composition Machine Operator
Reba M. McGinnis, Composition Machine Operator
Mae O. Gill, Composition Machine Operator
Shirley G. Finch, Composition Machine Operator
Margaret G. Clouse, Composition Machine Operator
Ellen M. Redmon, Composition Machine Operator
Gail R. Harp, Composition Machine Operator
Pamela R. Burchfield, Composition Machine Operator

Rachel M. Griffin, Composition Machine Operator
Mary K. Copeland, Composition Machine Operator (Trainee)
Doris V. Holloway, Composition Machine Operator (Trainee)
Ginger O. Carden, Student Aid

Printing Branch

Thomas L. Ralls, Jr., Chief
Charles F. Kelley, Jr., Assistant Chief
Vera M. Warren, Clerk

Camera and Platemaking Section

Charles W. Robbins, General Lithographer Foreman (Offset)
Jack Oran, General Lithographer
Anthony M. Martinez, General Lithographer
Arthur G. Jones, General Lithographer (Platemaker)
Bobby T. Qualls, General Lithographer (Platemaker)

Press Section

Everett L. Scantlin, Press Foreman, Offset
Willie R. Grayson, Offset Pressman
James E. Parks, Offset Pressman
Clyde F. Witt, Offset Pressman
Lavoy Killian, Offset Pressman
John K. Broyles, Offset Pressman

Bindery Section

Oscar E. Hensley, Bindery Supervisor
Hubert Owens, Power Collator Operator
James A. McConkey, Power Collator Operator
James F. Renfro, Bindery and Finish Worker
Glinel Towns, Bindery and Finish Worker
Edward C. Helton, Student Aid
Tyrone E. Holmes, Student Aid

Photocopy Services Section

James T. Hannah, Photocopy Specialist
James H. Reynolds, Photocopy Specialist

Document Management Branch

Thomas B. Abernathy, Chief
James G. Smith, Assistant Chief
Ruth M. Harrell, Administrative Assistant
Gwendolyn Gaither, Library Technician
Susan W. Moody, Clerk Stenographer

Evaluation and Control Section

John H. Mitchell, General Physical Science
Mary H. Newman, General Physical Science
Ted Redmon, General Physical Science
Margaret R. Tevis, Library Technician
Edna E. Cockrell, Library Technician
Evelyn L. Bolton, Library Technician
Ernest G. Baker, Library Technician
Tommie J. Stevens, Library Technician
Robert E. Adams, Sr., Library Technician
Ramona N. Nelson, Library Technician
Laverta A. Hardin, Library Assistant
Patricia D. Chapman, Library Assistant
Betsy Paulette Goodman, Remote Station Operator
Christine F. Moyers, Mail and File Supervisor
Orville F. Watson, Mail and File Clerk
Jane M. Holt, Student Aid
Mary Ellen Wilson, Student Aid
Mickey K. Blair, Student Aid
Lisa L. Hair, Student Aid
Vicki Ann Coates, Student Aid

Distribution and Central Services Section

Ervin Duncan, Storekeeping Clerk (Supervisor)
Buford W. Burrows, Storekeeping Clerk

Jim E. Meredith, Storekeeping Clerk
Willie W. Worrill, Storekeeping Clerk
Gordon A. Mason, Storekeeping Clerk
Hugh F. Garrison, Storekeeping Clerk
Paul C. Pitsenbarger, Storekeeping Clerk
Martha W. Mathis, Receiving Clerk
Carol F. Hayden, Storekeeping Clerk
David Sims, Storekeeping Clerk
Thomas J. Morgan, Storekeeping Clerk
Terry L. Smith, Storekeeping Clerk
Alan R. Tackett, Storekeeping Clerk
John W. Scruggs, Jr., Storekeeping Clerk
Rodney B. Russell, Storekeeping Clerk
Randall L. Riggs, Student Aid
Vincent L. Harvest, Student Aid
Kenneth D. Ivey, Jr., Student Aid

Office of Assistant Manager for Information Services and Systems

Irving Lebow, Deputy Assistant Manager

Science and Technology Branch

David E. Bost, Chief
Lee M. Thompson, Assistant Chief
Lawrence T. Whitehead, Assistant to Chief
Everett J. Hoffman, Assistant to Chief
Dora H. Moneyhun, Scientific Analyst (Chemistry)
Martha C. Mitchell, Clerk Stenographer
Cecil E. Mourfield, Library Assistant
Vida Kelly, Library Assistant (Typing)
Frances A. Barnes, Library Assistant (Typing)
Cynthia D. Soles, Student Aid
Judy E. Hawkins, Student Aid

Nuclear Energy Section

Henry D. Raleigh, Scientific Analyst
David C. Cunningham, Scientific Analyst (Reactor Technology)
Jessie W. Rushing, Scientific Analyst (Reactor Technology)
Francis L. Sachs, Scientific Analyst (Reactor Technology)
Darrell O. Galde, Scientific Analyst (Reactor Technology)

Environmental, Biomedical and Safety Section

Sidney F. Lanier, Chief
Helen L. Ward, Scientific Analyst (General Physical Science)
Carolyn D. Houston, Scientific Analyst (General Physical Science)
Ellis Ray Bedford, Scientific Analyst (General Physical Science)
Polly C. Summers, Scientific Analyst (General Physical Science)

Conservation and Engineering Section

Robert C. Kelly, Scientific Analyst
Theodore F. Davis, Scientific Analyst (Chemistry)
Lisbeth C. Lieberman, Scientific Analyst (Mechanical Engineering)
Martha C. Wilson, Scientific Analyst (Physics)
P. Martin Alexander, Scientific Analyst (Physics)

Physical Research Section

Charles E. Stuber, Scientific Analyst

Robert W. Rutkowski, Scientific Analyst (Physics)
Jean F. Peckham, Scientific Analyst (Physics)
Stanley D. Frey, Scientific Analyst (Physics)
George Thoeming, Scientific Analyst (Physics)

Fossil Energy Section

Mary Catherine Grissom, Scientific Analyst
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James R. Dulaney, Scientific Analyst (Chemistry)
Julia S. Redford, Scientific Analyst (Chemistry)
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Lorne T. Newman, Scientific Analyst (Physics)

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Milton O. Whitson, Scientific Analyst (Physics)
William H. Kinser, Jr., Scientific Analyst (Physics)
Jane Gray Buchanan, Scientific Analyst (Chemistry)
Mona H. Raridon, Scientific Analyst (Physics)

Reference Branch

Margaret L. Pflueger, Chief
Thomas D. Sample, Assistant Chief
Emmer D. Day, Clerk Stenographer

Publications Request Section

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Doris V. Brooks, Technical Information Specialist (Education)
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Ruby E. Baker, Library Technician
Frank Cook, Library Technician
Kate C. Piper, Library Assistant (Education)
Faye H. Horn, Library Assistant (Education)
Mary H. Glovier, Library Assistant (Education)
Dorothy K. Eldridge, Library Technician
Oveda H. Pearson, Library Assistant
Carolyn Y. Cranmore, Student Aid
Janice M. Basler, Student Aid

Bibliographic Support Section

Nancy E. Hardin, Librarian
Clara L. Fox, Library Technician
Helen Lee Gardner, Library Technician
Doris H. McGinnis, Library Technician
Clata R. Worley, Library Technician
Patsy L. Hendricks, FIND Publications Editor
Elizabeth P. Carter, FIND Publications Editor
Wanda H. Williams, FIND Publications Editor
Mickey M. Moore, FIND Publications Editor
Mary G. Mease, Library Assistant
Julia H. Daniel, Library Assistant
Helen M. Hill, Library Assistant
Arlene M. Corona, Library Assistant
Cynthia D. Moore, Student Aid
Laurene C. Livesay, Student Aid

Motion Picture Services Section

Willie E. Clark, Chief
Carol B. Patterson, Library Specialist (Motion Picture)
Ruth L. Corey, Library Specialist (Motion Picture)

Descriptive Cataloging Section

J. Paul Meredith, Library Technician (Supervisor)
Bob G. Johnson, Library Assistant

(Descriptive Cataloging)
Gwen S. Aird, Library Assistant (Descriptive Cataloging)
Elizabeth A. Chaney, Library Assistant (Descriptive Cataloging)
Emma E. Brummett, Library Assistant (Descriptive Cataloging)
Jack C. Ridenour, Library Assistant (Descriptive Cataloging)
Alice F. Twitty, Library Assistant (Descriptive Cataloging)
Doris M. Henline, Library Assistant (Descriptive Cataloging)
Eleanor M. Hunter, Library Assistant (Descriptive Cataloging)
Joyce L. Adcox, Library Assistant (Descriptive Cataloging)
Frances D. Sprouse, Library Assistant (Descriptive Cataloging)
Juanita F. Davis, Library Assistant (Descriptive Cataloging)
Barbara M. Averitt, Library Assistant (Descriptive Cataloging)
Jackie Ray Oxendine, Library Assistant (Descriptive Cataloging)
Viola W. Robinson, Library Assistant (Typing)
Tanuja J. Dagley, Library Assistant (Typing)
Christina Stinnett, Library Assistant (Typing)
Nancy E. Burns, Library Assistant (Typing)
Susan A. Giles, Library Assistant (Typing)

Computer Services Branch

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Albert M. Craig, Jr., ADP Systems Analyst
Julia A. Marcum, Clerk-Stenographer

Computer Operations Section

Frederick E. Marsh, Jr., Chief
Billy H. Brady, Computer Operations Supervisor
Dorothy D. Fairbanks, Computer Operator
Edna M. Cate, Computer Operator
Carl E. Huskey, Computer Operator
Barbara A. Crowder, Computer Operations Specialist
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Marie Kesterson Watts, Senior Data Control Clerk
Benny Goodman, Computer Operator
Patricia A. Harmon, Computer Operator (Trainee)
Beverly J. Weaver, Computer Operator (Trainee)

Programs and Systems Development Section

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Arthur E. Busse, ADP Systems Analyst
Anne G. Ward, ADP Systems Analyst
Edrick G. Coppock, ADP Systems Analyst
Sue J. Davis, ADP Systems Analyst
Gloria S. Young, ADP Systems Analyst
Chalmers Wilson III, ADP Systems Analyst
Barry R. Fernandez, Programmer Analyst
Bobbie J. Dunlap, Programmer Aid
David W. Vest, Computer Programmer (Trainee)
Douglas G. LaVerne, Computer Programmer (Trainee)

SUBJECT INDEX

NAME INDEX

(Names appearing in the Appendixes and References are not recorded in this index.)

WILLIAM McGILL VADEN has been associated with the technical information programs of the Department of Energy (DOE) and its predecessor agencies for more than 40 years. Beginning his federal service with the Atomic Energy Commission (AEC) Technical Information Division in 1947, Vaden was engaged in 1951 to serve as Assistant Chief to a McGraw-Hill Book Company contract group organized initially in Oak Ridge to produce the National Nuclear Energy Series (NNES). Returning to the AEC's technical information program in 1955, he remained at the Oak Ridge facility until his retirement in 1985, serving for more than 20 years as its Deputy Manager.

Through his present employer, Labat-Anderson Inc., Vaden serves as an Operating Agent's Representative to the Energy Technology Data Exchange, a program of the International Energy Agency (IEA) (Paris) for which the Department of Energy's Office of Scientific and Technical Information is Operating Agent. Past IEA program assignments have included his appointment as U.S. delegate for the implementation of the Coal Research Service (London) and later for the IEA's Biomass Information Program (Dublin). In 1968, he served as the U.S. Study Team Member for the Design of the International Atomic Energy Agency's International Nuclear Information System (INIS) (Vienna).

Federal service honors include the Department of Energy's Meritorious Service Award.

Vaden is a graduate of Tennessee Polytechnic Institute (now Tennessee Technological University).

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