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THE FIRST DECADE OF INIS IN JAPAN

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The First Decade of INIS in Japan

Division of Technical Information, JAERI

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Outlined are the operational developments of the JAERI acting as the INIS national center for Japan for ten years from the beginning of the project in 1970. These include preparation of main manuals, establishment of national network, expansion of coverage, improvement of quality, computerization and microfilming for the input as well as machine retrieval on INIS. Subjects of relatively common attention of secondary information societies are also selected from the many studies and examinations published in Japanese during the period. These efforts are summarized on analysis of input processing period, promotion of keyword assignment, search properties of the data base and their evaluation.

Keywords: INIS, Japan, JAERI, Progress Report, Input, Search Properties, Evaluation

日本におけるＩＮＩＳの 10 年

日本原子力研究所技術情報部

（1981 年 6 月 1 日受理）

日本のINIS センターとして1970 年INIS 計画開始以来10 年間にわたる原研の発展的経過を概観する。特に，入力のための主要マニュアル類の作成，国内協力体制の確立，範囲の拡大，質の向上，電算化，マイクロ化，ならびにINIS データベースに基づく機械検索等にふれている。また，同期間中に多くの研究と調査が日本語で発表されたが，その中から２次情報界にとって比較的共通の話題になり得るものとして，入力処理期間の解析，重要語付与の促進，INIS の検索特性とその評価等を選んで要約している。

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1. Introduction

The Government of Japan participated in the INIS Project and nominated Japan Atomic Energy Research Institute (JAERI) for implementation organization of the Project in the country in 1969. JAERI has been playing its role of INIS national center in cooperation with other specialized information centers.

JAERI is sending monthly bibliographic data and abstracts of nuclear documents published in Japan on magnetic tape, including about 4,000 items a year, with full texts of non-conventional literature on microfiche. Half of the documents is written in Japanese and has to be translated into English. In addition, forty percent has no English abstracts and ninety percent no keywords. The specific situation caused relatively high costs of input defrayed by us.

JAERI is also receiving the INIS Atomindexes both on print and on magnetic tape, which are used for effective information service to nuclear community of ours. SDI and RS services are operated for domestic area with 600 profiles. Online access to INIS data base has been finished in success at an experimental stage and will be in service for the Institute this spring and for domestic area next year.

In these ten years, a lot of people engaged eagerly in the establishment and operation of INIS in Japan. Studies and experiences were accumulated to publications in Japanese for recording and dissemination of information. Those papers should be introduced to international information communities in English in celebration of the tenth anniversary of INIS Project and in memory of the efforts.

This report involves essential part of many papers resulted from the studies and tasks by our staff. The papers already published in English are excluded.

I was impressed by the words of Mr. J.E. Terry, former INIS Liaison Officer for United Kingdom, at the Liaison Officers Meeting in 1980 leaving his duty of INIS, who said "early scepticism has been replaced by wondering why INIS has been so successful". The words expressed remarkably the earnest and untiring efforts of the IAEA Secretary and the Member States changing the evaluation of the Project. There is no doubt today of the importance of the INIS as a powerful means of contributing to the world's nuclear research and development. And international collaboration through the INIS is of growing rich fruits.

In passing the first decade of the INIS, I am pleased to publish the report for the communities, in which I expect the report could be appreciated in warm mood and with steady critics.

30th March 1981

Hideshiro NAKAMOTO

2. Progress of INIS Operations in Japan

By Y. Ebinuma

2.1 Preparation of Manuals and Authority Files

(1) The JAERI was designated to participate in the INIS pilot project from 1966 and then in the INIS operation from 1970 as the organization in charge for Japan by the Authorities. For this, Components of our international information processing system were re-set up to meet with this INIS system.

(2) It was considered firstly to become familiar with various and severe international rules, in order to prepare accurate data based on these rules. Since most of the persons concerned were not skillful at English, Nos.1, 3, 4 and 12 of the INIS Reference Series were translated into Japanese to get a better understanding of the international rules and standards for INIS input. As a result of the discussion on application of these tools to input processing of Japanese literature at frequent regular meetings, supplementary manuals were provided in Japnaese. These manuals included a criterion for coverage and selection of nuclear literature, a criterion for bibliographic descriptions and so on.

(3) Authority files have been centralized in our Division. There were many personal author names, corporate entries, issuing bodies and journal titles which had not proper names in English. For example, some 70 % of nuclear documents originating in Japan had printed personal author names romanized, most of which were translated in Hepburn style and registered to the academic societies. Those names were used for INIS input. Otherwise, our cataloguers requested each individual author about how to spell his name in Roman. If no response, his Japanese name was transliterated in Hepburn style by us. Descriptions of journal titles were based upon "Directory of Japanese Scientific periodicals" published by the National Diet Library. This directory transliterates the journal titles in Hepburn style which have not proper names in English. Such transliteration rules were also applied to other authorities.

2.2 Establishment of National Framework

(1) The scope and coverage of nuclear science and technology is extensively broad, and nuclear primary documents are cited in various publications including journal articles, technical reports, books, patent specifications and so on. It was impossible and ineffective to collect

all of the publications to our library section from the viewpoint of budget and manpower. It was further difficult to carry out all of such special works as cataloguing, abstracting and indexing by our Division's own efforts. For this, we decided to manage preparation of worksheets in cooperation with other information centers.

(2) The Japan Information Center of Science and Technology (JICST) had been already making worksheets in cooperation with us since 1963, the International Medical Information Center (IMIC) since 1968. Concerning the scanning of national primary documents, our Division took charge of nuclear core journals of 400 titles, technical reports of 40 series and other types including conference proceedings and books. Of these documents 170 titles of journals, all technical reports and some of other types had been contributed from 500 domestic organizations to our library section, in return for sending of the JAERI technical documents prepared by our information section.

IMIC took charge of medical and biological journals of 350 titles and JICST, general or peripheral scientific journals of 300 titles. In order to avoid duplication of scanning of the publications, a journal list for input was prepared by our section and distributed to these centers. This list of course has been renewed once a year in view of the number of papers selected for input and discontinuance or new publication of a journal which falls within the INIS subject scope and coverage.

Concerning patents, the Institute of Invention & Innovation (III) had taken charge of nuclear issued patents since 1973. This was due to coexistence of the old system and the new system in Japanese patent societies. The societies, however, switched over to the new patent system only during 1976. The Japan Patent Information Center (JAPATIC) has been providing with worksheets on nuclear application patents for us since the second half of 1976.

(3) Work at the Centers consists of scanning, classifying, abstracting, indexing and cataloguing. These tasks are completed on a worksheet. Our INIS section makes the worksheet for the documents which are scanned by ourselves and have English abstracts written by original authors. JICST and IMIC prepare the worksheet not only for the documents scanned by themselves but also for the documents which have not English abstracts but are scanned by our INIS section.

2.3 Improvement of Inputs

(1) Indexing to the documents which our INIS section processes is made first by free lance indexers who are professors and assistants of the Ibaraki University in Mito City and Taga City very near to Tokai-Mura as well as scientists of the Nuclear Engineering Research Laboratory of Tokyo University adjacent to our Tokai Res. Est..

The worksheet prepared by other centers and the indexing sheet prepared by the free lance indexers are sent to the section once a month. All of the information data entered in WS are checked manually by specialists of the section, to keep quality and accuracy of the inputs. Filling of blank entries and/or correcting of errors are performed carefully throughout the steps of classibying, indexing, cataloguing, typing and punching.

(2) Details on checking of indexing are stated as follows. The necessity of a setup of free-lance indexers was felt strongly at the beginning of 1972, when our input was expanded to the full scope and coverage. For it seemed difficult to submit on steady state to Vienna all documents indexed with high quality by our subject specialists and the documentalists of the cooperative centers mentioned above. Beginning with indexing to documents in the field of theoretical physics by a physicist group in August 1972, the indexing sub-system for outside order was completed in May 1975. Thirty indexers are now concerned to the indexing sub-system, including our subject specialists and the documentalists.

All of the first indexing are checked manually from both aspects of quality and formal errors by our subject specialists. Although the first presents primarily high quality of assignment of specific information items, three of M-Q pairs and/or descriptors are altered in number per a document on an average by addition to and/or deletion from the original set. Formal errors corrected are 10 % to the number of descriptors. In other words, there is a misspelled descriptor in an indexing set to each of all documents on an average. These formal errors are reduced to 1 % by manual check at the three stages of the second indexing, typing and punching, in the same way as in other entries.

Analysis had been made on the INIS Index Terms Error List prepared in Vienna during 1974. Our inputs had included a formal indexing error rate of 1 % to the number of descriptors submitted. 80 % of the errors had been able to correct automatically in Vienna. 60 % of the total errors,

however, could be traced to the neglect of singular or plural form and to the treacherous memory of R and L. Since the analysis revealed a limit of our manual check procedure, it was decided to make an automatic descriptors correction program by ourselves. This program was in operation on our renewed computer system of FACOM 230-75 in November 1975. Error rate in the INIS inputs has reduced to nearly zero by incorporation of the program into the auto-checking system.

2.4 Computerization of Information Processing

(1) It was proceeded to computerize bibliographic records which did not include abstracts. There were special problems to Japan in order to solve for establishment of an input system on magnetic tape in the INIS 120 character set. Home computer processing systems in Japan were usually ready for the use of Kana-Moji in Japanese characters, and then these were not suitable for lower case in English alphabet and for such special symbols as Greek. Ricohtyper Model Standard only defined a 77 character subset among many kinds of home paper punching machines but the remaining 43 characters were not part of the paper tape subset. It was also impossible to print out perfectly the input data in the INIS set on our computer system, because its line printers defined a 47 Kana-Moji subset in the 109 character set. A special encoding scheme was then required for correspondence to the INIS character set.

In addition to the inconvenience of the hardwares to INIS input, it was also difficult to get keypunchers and proofreaders proficient in English at Tokai-Mura, 200 kilometers far from Tokyo. An experiment on punching errors was tried in the spring of 1970, providing with 47 sheets of INIS worksheet, on which bibliographic records were handwritten and typed respectively. Error rates of punching were 0.3 % to the number of characters for the handwritten and 0.1 % for the typed. This resulted in a decision to adopt a typed worksheet as a manuscript for punching. Residual error rates after re-punching reduced to 0.03 % by visual correction and 0.01 % by auto-verification respectively. This auto-verification function was consequently equipped at the punching machine, in order to upgrade an accuracy of punched data, though an operating efficiency decreased to 60 % compared with a system without verification. In order to make punching easier, four kinds of sub-worksheets, each of which was classified by color, were contrived separately for journal

article, technical report, patent and other types of document. As some of the entries and formats are different in the type of documents, it needs to take different carefulness and handling from each other. And also, if a batch cycle is prepared for a type of document, it is possible to make punching errors minimum. A program compatible with the INIS Magnetic Specifications and Character Set was prepared so as to enable check of the errors in various formats and entries by computer.

(2) Bibliographic and indexing records were punched by two punchers of a computer company in using our punching machines placed at the JAERI. Punching was made for about 70 records on the same colored worksheets in a week cycle. Paper tapes were converted into a magnetic tape (9 track and 800 bpi) at the computer center of the JAERI once a month by our specialist. Nuclear Science Abstracts of Japan (NSAJ) was revised to Nuclear Science Information of Japan (NSIJ) which included not abstracts but bibliographic records only. Editing of this periodical was computerized at the beginning of 1971 and thus, it became possible to send Japanese bibliographic records to the INIS on magnetic tape in September 1971.

(3) Concerning machine readable abstracts, this plan had been promoted under a hard schedule since the second INIS Advisory Committee held in Vienna in December 1974. Abstracts were punched and converted into MT by another company in Tokyo, including encoding of characters. We of course prepared special encoding scheme for it. This separate machine processing system came from the reality that the former punching system for bibliographic and indexing records was unstable in keeping PT punchers and not capable of processing much more information data than the present. Our specialists merged the former tape with the latter once a month at the computer center. Abstracts have been sent to the INIS on magnetic tape since March 1975, and inputs with data flagging since January 1979. This separate system, however, has been replaced by a new unified machine processing system at the company in Tokyo since the middle of 1979. In the course of practice on the input, a full coverage was achieved and our secondary information processing was completely computerized. Density of the MT has been upgraded to 1,600 bpi since March 1977.

2.5 Preparation of Microfiche

(1) Ad-Hoc Committee for Preparation and Inspection of Microfiche was

set up in our Division in June 1970, to elaborate specifications of microfiche capable of distributing internationally. There was not a national standard for microfiche production at that time. For this reason, the committee was forced to prepare specifications similar to COSATI Standards in U.S.A.. The Committee studied on description of header information as well as quality of fiche in collaboration with some producers. As a result of the study, we started sending to INIS a full text of non-conventional literature on silver base microfiche with a 60 page format in January 1972. But the format was changed to a 98 page frame in January 1975. These silver base fiches have a sufficient reproductivity of successive generations for a resolution power of 140 to 170/mm and a background density of 1.00 to 1.30. In fact, diazo base fiches of JAERI reports have been reproduced from a copy of the silver and distributed to nuclear institutions all over the world on an exchange basis of primary documents.

(2) A cutting mark has been mounted on the master fiche to make easier automatic duplication at the IAEA since December 1977. The Agency decided to change INIS-MF from silver base to diazo base at the beginning of 1980. This urged us to study on possible deterioration of the silver by residual ammonia on the diazo. Any deterioration was not found by either experiments or inspections of the silver filed with the diazo for eight years. It proved to allow us these filing in environment of the humidity and ultra-violet rays reduced.

2.6 Development of INIS Machine Search

(1) Development of Selective Dissemination of Information (SDI) service system on INIS magnetic tapes was planned in the middle of 1972. Our Division had not so far any machine retrieval service system using other tapes than INIS. The most important problem was development of retrieval program in question.

Document Information Service Program (DISP) was the only one program available for information retrieval on FACOM 230-60 equipped at the Computer Center of our Institute. This was a product of combined efforts of Fujitsu, FACOM maker and JICST, originally developed for the information processing systems for the use of Kana-moji in JICST. As a result of the analysis on functions of the program, it was confirmed that the basic structures were not necessarily pertinent to an application to

INIS tape, but able to use in some parts at the stage of test on small scale. Modifications were made on the three sub-systems of input, index and retrieval, following by preparation of a conversion program into search file. Retrieval keys were determined to be descriptor, category, literary indicator, type of record, language and publishing country. This modified DISP was in operation for SDI service on a batch mode from October 1973.

During this period, the program created not only unsuitable limits for retrieval processing but also unexpected obstacles to normal operation. The necessity of a much more proper program was recognized. In the meantime, Fujitsu completed Information Retrieval Application Systems (IRAS) for FACOM 230-75 late in 1973. The company recommended us to apply the program as an alternative of the DISP in the spring of 1974 and improved the program to meet our specifications in making the best use of the fundamental functions of data conversion, profile preparation and retrieval in the retrieval sub-system. It was also very fortunate to us that our Computer Center decided in October 1974 to replace FACOM 230-60 by -75 through April to October 1975.

(2) This new program was named SPRING-I, SDI Program for INIS in GENKEN. It was in operation through October 1974 to June 1975. It was characterized by the following special features: (1) to read-in 80 descriptors a linked group assigned to a reference at the maxium, (2) to accept 30 retrieval terms, (3) to select one of the three kinds of print out formats - (i) RN number only, (ii) bibliographic descriptions, (iii) bibliographic descriptions and descriptors including upposted terms.

SPRING-II was completed in succession by addition of two functions to the I - use of descriptors codes to shorten search time and evaluation of retrieval terms to find easily suitable retrieval terms for reformulation of a query. It was in full operation for SDI service in July 1975.

SPRING-II was improved further for Retrospective Search service. This SPRING-III is characterized by addition of the three features: (1) to accept 100 search terms, (2) to use 13 kinds of search keys, (3) to select one of 5 print-out formats, (4) to have output ranking function on a weighting scheme to index terms assigned to each document retrieved. SDI and RS services have been executed on a batch mode with this program for nuclear people in Japan since the spring of 1979. We have now 500 profiles for SDI and 120 profiles a year for RS.

(3) On-line service test was carried out at the end of 1980 in using a

domestic software called FAIRS-I (FACOM Advanced Information Retrieval System - I), an application program for FACOM-M200 equipped at our Computer Center in the autumn of 1979. This service will be in operation for internal use of JAERI in 1981.

2.7 INIS Committee and Diffusion of INIS Activities

(1) The "Committee for INIS" was set up as an advisory committee to the president of JAERI in October 1970. The Committee was composed of 25 highly experienced and knowledgeable experts and scientists from universities, industries and institutions in the fields of nuclear science and documentation. It meets periodically, twice a year. During the meetings, a number of valuable comments were given on consolidation of close cooperation with domestic organizations concerned as well as the INIS participants in the Member States. "Technical Sub-committee for Input to INIS" has also contributed to clarification and development of various documentation tools requested for the input. In addition to this Sub-committee, "Technical Sub-committee for Use of INIS Output Tapes" and "Special Sub-committee for Dissemination of Nuclear Information" have been organized under the Committee since September 1972.

(2) Many efforts have been exerted for diffusion of INIS system into the nation. INIS pamphlets written in Japanese have already been distributed over 10,000 sheets. A Japanese version of the INIS film has been completed and screened at the meetings relevant to nuclear field and at some of the information centers. Japanese versions of some of the INIS reference series were prepared. These have served not only as tools for INIS but also as references to manuals for other information and documentation organizations.

3. Analysis on Timeliness of Processing for the Input to INIS

By S. Narui

3.1 Sampling

Analysis was carried out on the INIS inputs from Japan for April, 1978 to March, 1979. We picked up four hundred and forty four items from 4,315 items of the annual production, considering literature types, flow of processing, presence of English abstracts and working time. These samples consist of 329 journal articles, 65 reports, 42 patents and 8 books. As the Table 3.1 shows, 67 % of all documents has abstracts in English. Timeliness depends greatly upon whether the document has abstract in English or not.

3.2 Results

Table 3.2 shows the lead time spent from publishing data to dispatch to Vienna. Some literature are printed by only year or month as publishing date. Then we regarded publishing dates as 1st of January for literature indicated only by the year and as 1st of the month only by the month. One month was calculated as 30 days and one year as 365 days.

As the table shows, journal articles have 9 months on an average. Sixty five percent of these articles was finished within 9 months. The longest one of 16 months occupies 1.2 % of the total.

Reports spent 10.4 months on an average. Compared with the journal articles, the report lead time involves production of microfiches with increase of 1.3 months. Lead time for patents takes 26.9 months from filing date on an average. If calculation starts from the publishing date, it becomes to be 8.3 months on an average.

3.3 Analysis of the Time by Jobs

3.3.1 Acquisition and Scanning

This time portion includes registration in library, since input materials to INIS are prepared from resources in the library. If the documents were acquired only for INIS, the time would decrease. In addition, nominal publishing date might be often different from actual publishing date. It does not seem to be adequate for time analysis that publishing date is used as a starting point.

3.3.2 Classifying, Indexing, M, Q and D Labelling and Abstracting

As Table 3.3 shows, processing period for books and reports takes such a long time as 94 and 96 days respectively, which includes waiting time. Batch processing system on a monthly basis leads averaged time to longer than 15 days.

3.3.3 Checking

The checking and correction of worksheets from the other organizations take considerable period.

3.3.4 Total

There are outstanding difference of the time between articles with English abstracts and without. Articles with English abstracts take 254 days and without take 315 days on an average. This means a really difference of two months.

3.4 Improvement

3.4.1 Parallel Processing of Microfiching

Microfiches of non-conventional literature were made so far after cataloguing. According to the results of the analysis, microfiching has been changed to parallel operation with indexing since April, 1979. Forty four days have been saved in processing.

3.4.2 Adoption of Publishing Date for Patent

From April in 1979, we changed to enter INID code no.43 into tag 403. The change resulted in elimination of eighteen months on apparent lead time.

3.4.3 Print of English Abstracts and Assignment of English Keywords

We are asking Academic Societies and Publishing Companies to print English abstracts and to assign English keywords to articles in free term by authors themselves. If these arrangement will be accomplished to some extent, timeliness will be improved so much.

References

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Table 3.1 Samples

Types	With Abstracts in English	Without Abstracts in English	Total
Journal	237	92	329
Report	58	7	65
Patent	0	42	42
Book	2	6	8
Total	297	147	444

Table 3.2 Lead Time (months)

Types	Av.	Min.	Max.
Journal	9.1	5.0	16.0
Report	10.4	6.0	15.0
Patent	26.9 8.3	7.0	9.0
Book	11.4	-	-
Total	9.8	-	-

Table 3.3 Processing Periods by Job and Type of Record (days)

Jobs \ Types	Journal	Report	Patent	Book
Acquisition Scanning	57	80	68	96
Classifying Indexing Abstracting	75	96	48	94
Checking	40	21	47	33
Cataloguing	41	22	25	77
Microfiching	-	44	-	-
Preparing for Conversion	32	20	33	14
Conversion into Machine-Readable Form	29	29	29	29
Total	274	312	250	343

4. Promotion of Keyword Assignment to Articles in Scientific Journals and Technical Reports

By H. Yokoo

4.1 Introduction

Recently, we find "Keywords" on the first page of articles in some scientific journals and technical reports. Keywords are printed generally under the abstract, or at the top corner. Figure 4.1 shows an example assigned in free terms in the journal of the Atomic Energy Society of Japan (AESJ).

We have learned in our experience that these keywords are very useful for INIS indexing. As they can be easily converted into INIS descriptors with a considerable accuracy, we have been wishing more periodicals to introduce keyword assignment systems. Then, we made a series of actions as: (I) a retrieval experiment to estimate their effect on INIS indexing, (II) a survey of present status of keyword assignment systems applied to journals and reports in Japan, (III) preparation of guidelines for system introduction, and (IV) requests to the main societies and institutes related to nuclear field in Japan to introduce keyword systems.

4.2 Retrieval Experiment to Estimate Effect of Keywords on INIS Indexing[1]

The simple indexing based on conversion of keywords into INIS descriptors (hereinafter abbreviated to "K-indexing") was compared experimentally with the normal indexing on the INIS rule (hereinafter "N-indexing").

4.2.1 Procedure

As a measure for the comparison, retrievability was obtained by the following procedure.

(1) Restrospective search on the INIS database was made by 130 queries for SDI service.

(2) From the search results, the items were extracted which originated from the two journals (J. Nucl. Sci. Tech. and Genshiryoku Gakkaishi) published by the AESJ during the period from Nov. 1973 to May 1975.

(3) A new descriptor set was assigned by the K-indexing to each item extracted. It was made as mechanically and objectively as possible. For a comparison, another set of descriptors was assigned through translation of the title only which we call "T-indexing". Table 4.1

shows an example of these indexing data for the item shown in Fig. 4.1.

(4) The set of K-indexing to each item was checked on whether the set could satisfy the original query or not. Retrievability of T-indexing set was also checked for a comparison.

(5) All items extracted in (2) were divided into two groups of hits and noises, and the numbers of items retrievable or unretrievable were counted in each group.

4.2.2 Results and Discussion

Total items of 99 were extracted from the two journals by 49 queries. Since some items were derived from more than two queries, the actual number of articles was 68. Average number of keywords was 9.1 and those of indexer-assigned descriptors were 11.2, 9.2 and 4.7 for N-, K- and T- indexing, respectively.

Table 4.2 shows retrievabilites by means of three types of indexing sets. Of 99 items extracted by N-indexing set, 70 items (71 %) were retrievable by K-indexing set, and 40 items (40 %) by T-indexing set. If the combination set (K+T) were applied, 74 items (75 %) were retrievable.

It is of interest to notice that high retrievability could be achieved for hits, while low for noises. Precision increased from 74 % to 90 %.

Fig. 4.2 shows the relation between these numbers. The relation indicates that recall ratio by means of K-indexing can be larger than 86 % of normal recall ratio.

In conclusion, the keyword-based indexing can be a practical method which gives as high retrievability as the normal indexing, as far as keyword system as the AESJ's is adopted. Since such a system makes indexing simple and easy, it is desirable to be introduced into many periodicals.

4.3 Survey of Present Status of Keyword Assignment Systems Applied to Periodicals in Japan[2]

By scanning 400 titles of the periodicals for INIS input, it was found that 19 titles of 17 publishers have their own rules of keyword assignment. Questionnaires were sent them on the following:

1) year, and purpose (motive) of introduction,
2) selector(s) of keywords,
3) thesaurus and manual,
4) language and number of terms, etc.

Table 4.3 presents summary of the answers. Purposes of introduction were classified into 5 types of uses: (a) use as heading terms in subject index to be put at the end of the volume, (b) general use for secondary information processing, (c) use as index terms for internal machine retrieval, (d) use for internal management of documents, (e) general use for title augumentation for readers to grasp the outline quickly, and (f) others.

It should be noted that (a), (c) and (d) are attributed to internal use, contrary to (b) and (e) of broader use. In general, keyword sets comprise 3-5 terms for internal uses, while 7-10 terms for general uses. One journal uses 1-3 terms(s) as heading(s) in subject index out of 7-8 terms. It may be unique that keywords of another periodical are used for machine search in microfiche retrieval system.

Concerning selector(s) of keywords, author is primary (assigner) and editor is secondary (checker) in all periodicals. Keywords are assigned in free terms in most systems and few have their proper thesauri. A few periodicals have neither manual nor instruction. These periodicals appear to attach importance on the secondary checking by editor.

4.4 Preparation of Guidelines for Introduction of Keyword Assignement System

On the basis of the survey and our experience in secondary information processing, guidelines were prepared for periodicals to introduce keyword system.

(1) Assignment of about 10 terms is necessary for general use like secondary information processing and quick grasp of outline of article, even when main purpose is put on internal use like management of documents or heading for subject index.
(2) Keywords should be assigned primarily by author who has a thorough knowledge on the article, and be checked by editorial board who is responsible to keep their uniformity.
(3) Assignment of free terms is preferable to that of controlled terms, because the author can easily select the most proper terms to his article and the editor need not maintain any thesaurus.

(4) Instructions should be prepared for contributors to carry out sustematic assignment. Examples should be presented, which would be better than wordy style.

4.5 Requests to Scientific Societies and Institutes to Introduce Keyword Systems

A letter of favor was sent to make editorial board of more than 100 societies and institutes to introduce keyword system. It was accompanied by the present status and executive guidlines of keyword assignment. Stresses were placed in the letter on effectiveness of keyword system to the societies due to rapid information transfer. At the same time, Proposal for More Effective Communication of Scientific Information was presented at the 1978 Symposium on Atomic Energy, Tokyo, Japan[4], where a lecture was made on promotion of keyword assignment in connection with the status and guidelines mentioned above.

In addition to the main actions, several articles were presented on keyword assignment[5].

A lot of responese have been brought us so far, and more than 25 publishers started or are planning to start their assignment systems. Table 4.4 shows the summary.

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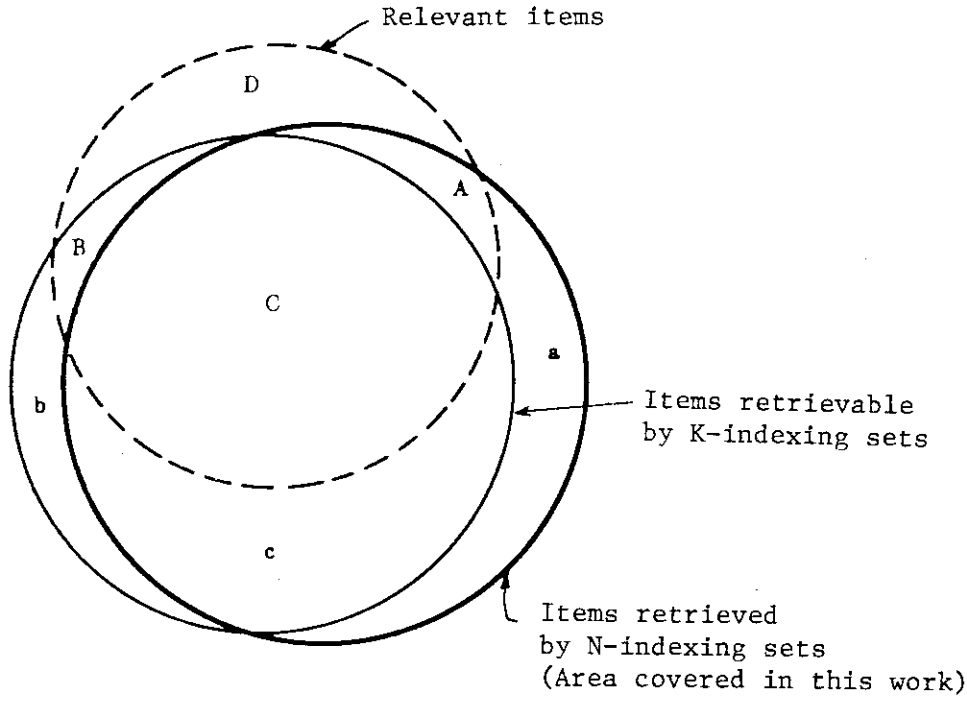
Mechanical Properties of Graphites for High Temperature Gas-Cooled Reactor

A review is presented of recent results obtained by many investigators in this field concerning the mechanical properties of graphites intended for use in high temperature gas-cooled reactors, with particular reference to the important properties related to the structural design of graphite sleeves and graphite blocks in the reactor core. Firstly, problems in the design of the structural components of the core and the properties thereof are reviewed. Then the static mechanical properties such as stress-strain curves, elastic modulus and strength are examined, followed by a description of the irradiation creep behavior and discussion on the statistical treatment of strength and fatigue. Data are given on the essential properties required in the core design. It is noted in particular that the statistical nature of strength and fatigue offers important bases for determining design criteria, such as allowable stress. As yet, the data available on irradiation creep, strength and fatigue are not sufficient, and further studies are being planned for the future.

KEYWORDS: *high temperature gas cooled reactor, graphite, mechanical properties, irradiation effects, stress-strain curve, elastic modulus, strength, fracture probability, irradiation creep, fatigue*

Fig. 4.1 An example of "keywords" in a journal

(Nippon Genshiryoku Gakkai-Shi)



A : 10 B : ? C : 63 D : ?

a : 19 b : ? c : 7

Fig. 4.2 Relation of areas retrievable or unretrievable by K sets and/or N sets in comparison with relevant area

Table 4.1 An example of three types of indexing sets

keywords	K-indexing	N-indexing	T-indexing
high temperature gas cooled reactor	HTGR TYPE REACTORS	VERY HIGH TEMPERATURE*	HTGR TYPE REACTORS
		REACTOR COMPONENTS	
graphite	GRAPHITE	GRAPHITE	GRAPHITE
		MATRIX MATERIALS	
irradiation effects	RADIATION EFFECTS	PHYSICAL RADIATION EFFECTS	
stress-strain curve	STRESSES	STRESSES	
	STRAINS	STRAINS	
mechanical properties			MECHANICAL PROPERTIES
elastic modulus	ELASTICITY	YOUNG MODULUS	
		POISSON RATIO	
fracture probability	FRACTURE PROPERTIES		
	PROBABILITY		
strength		COMPRESSION STRENGTH	
irradiation creep	CREEP	CREEP	
fatigue	FATIGUE	FATIGUE	
		TEMPERATURE DEPENDENCE	
		REVIEWS	
		SPECIFICATIONS	

* 1000°K ~ 4000°K

K: indexing based on conversion of keywords into INIS descriptors

N: normal indexing on the INIS rule

T: indexing based on translation of title

Table 4.2 Retrievabilities of hits and noises by mean of simple indexing sets

Hit-Noise	Number of items	Retrievability	K-indexing		T-indexing		(K+T)-indexing	
			Item	Ratio	Item	Ratio	Item	Ratio
Hit	73	Yes	63(C)	0.86	35	0.48	64	0.88
		No	10(A)	0.14	38	0.52	9	0.12
Noise	26	Yes	7(c)	0.27	5	0.19	10	0.38
		No	19(a)	0.73	21	0.81	16	0.62
Total	99	Yes	70	0.71	40	0.40	74	0.75
		No	29	0.29	59	0.60	25	0.25

Table 4.3 Summary of keyword assignment in scientific periodicals in Japan at May 1977

Publisher			Periodicals	Intr.	Purpose						Selectors	Thesaurus	Manual or	Term	
No.,	type,	field	type-lang.	year	a	b	c	d	e	f	ass./check		Instr.	numb.	lang.
1	U	Medical	j-J	1968		o			o		auth/edit.	-, (MeSH)	o	-10	E, J
2	C	Industr.	j-J	1969	o				o		auth/edit.	EJC	-	7- 8	E
3	S	Polymer	j-J, j-E	1970	o	o		o	o		auth/edit.	-	o	-10	E
4	S	Astrono.	j-E	1970						o	auth/edit.	-	-	3- 5	E
5	U	Medical	j-E	1970		o					auth/edit.	-	-	3- 7	E
6	S	Radiolo.	j-JE	1971	o						auth/edit.	-	o	3- 5	E
7	C	Radiolo.	j-J	1971	o						auth/edit.	-	o	3- 4	J
8	S	Nuclear	j-J, j-E	1972		o			o		auth/edit.	-	o	-10-	E
9	C	Medical	j-J	1973	o	o					auth/edit.	-	-	2- 6	E
10	C	Industr.	j-J	1973		o	o	o			auth/edit.	-	o	7-10	E
11	U	Medical	j-J	1974	o				o		auth/edit.	-	o	- 5	J
12	S	An.Chem.	j-J	1975	o	o		o			auth/edit.	proper	o	- 6	E, J
13	S	Inspect.	j-J	1975				o			auth/edit.	mod.JICST	o	5-	J
14	S	Physics	j-E	1975						o	auth/edit.	-	-	5-15	E
15	I	Enginee.	r-J	1975		o	o				auth/edit.	DDC	-	- 5-	E
16	I	Enginee.	r-J	1976		o	o				auth/--	-	o	- 5-	J
17	I	Nuclear	r-JE	1977		o			o		auth/edit.	-	o	-10-	E

C: company
I: institute
S: society
U: university

j: journal
r: report
J: Japanese
E: English

a: heading term in subject index
b: secondary inform. processing
c: internal machine retrieval
d: internal management of docum.
e: quick grasp of article content
f: others

Table 4.4 Responses of introduction of keyword assignment system

Publisher			Periodicals	Introduct.	Terms	
No.,	type,	subj. field	type-lang.	month year	numb.	lang.
1	S	Health Phys.	j-JE	Mar 1978	A	E
2	S	Radiat. Eff.	j-E	Apr 1978	B	E
3	S	Mass Spectr.	j-JE	Apr 1978	B	E
4	I	Radiat. Eff.	j-J	Jul 1978	A	E
5	U	Science	j-E	Jul 1978	B	E
6	I	Mechanics	j-J, j-E	Sep 1978	A	E
7	S	Nucl. Medic.	j-JE	Oct 1978	B	E
8	I	Nuclear Eng.	j-E	Oct 1978	A	E
9	S	Radioisotope	j-JE	Jan 1979	A	E
10	A	Ceramics	j-J	Jan 1979	A	E
11	S	Electr. Chem.	j-JE	Jan 1979	B	E
12	I	Chemistry	j-E	Jan 1979	B	E
13	C	Electronics	j-E	Jan 1979	A	E
14	I	Electricity	r-J	Apr 1979	B	J
15	I	Welding	j-E	Jun 1979	B	E
16	I	Aeronautics	r-J	Sep 1979	A	E
17	S	Precis. Eng.	j-J, j-E	Dec 1979	A	E
18	I	Nuclear Eng.	j-JE	Dec 1979	A	E
19	I	Nuclear Eng.	r-JE	1979	A	E
20	I	Nuclear Phy.	r-E	1979	A	E
21	I	High En. Phy.	r-JE	Apr 1980	A	E
22	S	Radiat. Tech.	j-E	Apr 1980	A	E
23	I	Electricity	j-J	1980	A	J
24	S	Mechani. Eng.	j-J, j-E	Jan 1981	A	E
25	S	Inf. Process.	j-J, j-E			

C: company
I: institute
S: society
U: university

j: journal
r: report
J: Japanese
E: English

A: 5∿ terms
B: ∿5 terms

5. INIS Retrieval System in JAERI

By Y. Komatsubara

5.1 Introduction

SDI service using the INIS database started for scientists and engineers in the JAERI in 1973. Up to now, many improvements were made to reduce mainly the burden of searcher's work related to query formulation. Both SDI and RS services are being performed at present for nuclear people in Japan by the system named SPRING, Search Program for INIS in GENKEN, which is operated in batch mode. Following is a brief description of the information retrieval system operating in the JAERI.

5.2 Description of the System

The information retrieval system consists of two phases, one for query formulation and another for regular of normal operation.

5.2.1 Profile Formulation

We have adopted the following procedure to formulate a user profile. A profile is handled as a retrospective search in the first stage, for both of RS and SDI. A flow chart for profile formulation is given in the Fig. 5.1.

(1) Initial Query Formulation

After understanding and interpretating the search subject requested by an end user, a searcher makes an initial query intentionally on the first step so that the query retrieves all or most of relevant documents from the pre-search file. He tries to get "recall" as high as possible, being indifferent to "relevancy". Recall is unknown in general, but it is not preferable to prepare only a tight query charged with the risk of missing relevant documents.

(2) Search on Fixed Database (pre-search file)

Search is performed by the initial query matching against the fixed database which contains 35,000 documents for the file specified to query formulation. This database is a half year volume of INIS products and updated on semi-annual cycle. Two sets of search result are printed on the answer list with the items of RN, Bibliographic reference and Descriptors. Documents are printed on the print out list within one hundred.

(3) User's Evaluation and Weight Generation

We send the "User Response List" together with the printout list mentioned above. The user is requested to supply his response to the searcher. This is indispensable to confirm a tendency of both relevant and irrelevant documents to the user's question. "Profile Evaluation Program" is operated based on this response. It counts hit and noise figures of all descriptors indexed to hit and noise documents respectively. The frequencies picked up from the INIS file are arrenged in a descending order. It lists up also superfluous descriptors, that is, the retrieval terms which didn't match against any of the descriptors assigned to the answer. Fig. 5.2 shows an example of the "Descriptor Frequency Counting List".

Each descriptor weight is calculated by the simple model as follows:

$$W_i = (P_h - P_n) \times 100$$

Where P_h : $\dfrac{\text{Number of relevant documents the descriptor appears in}}{\text{Total number of documents judged relevant}}$

P_n : $\dfrac{\text{Number of irrelevant documents the descriptor appears in}}{\text{Total number of documents judged irrelevant}}$

Weights for every descriptors and a set of RN numbers of the documents evaluated are recorded on a machine readable device with the each profile number. Both files are used in the weighted search operation which is described in the next chapter.

(4) Weighted Search[1)]

If high relevance ratio is obtained in the pre-search, the profile is regarded as a final one and fed into the computer system for normal search operation. If not, weighted search will be performed in using the fixed database and the initial query without any modification. The descriptor weight file is put to calculate score of each document retrieved. By matching the descriptors assigned to the retrieved document against a set of descriptors contained in the weight file, document score is calculated by summation of the figure of each weight of descriptors. The evaluated RN file is also put into the system to print a "Ranking RN List" which is conveniently used to determine a cut-off value for the query. Fig. 5.3 shows a typical example of Ranking RN List". Initial search gains only the relevance ratio of 36 % but that list reveals that if you shall set the cut-off of -100, the final query

will be able to get the relevance ratio of 75 %. Searcher can usually get such high relevance ratio without any modification of the initial query on the fixed database.

(5) Registration or Reformulation

If the searcher judges that the query is sufficient to the normal operation, the initial profile is fed into the system and weighted search is performed through the normal operation. If the query has to be modified, the "Descriptor Frequency Counting List" will help the searcher to reformulate the profile[2]. It is possible to determine a final query easily by detecting more appropriate descriptors as retrieval terms with the list. After effectiveness of a new query are confirmed on the fixed database, the query is used for normal SDI/RS search operation as a final one.

5.2.2 Normal Operation for SDI/RS Service

Both services are performed by the SPRING[3], because of no difference between SDI and RS operation except for size of retrieval targets. The system is operated by the following seven programs:

(1) Data Conversion Program
(2) Thesaurus Conversion Program
(3) Profile Creation/Maintenance Program
(4) Search Program
(5) Answer List Printing Program
(6) Retrieved Reference Record Extraction Program
(7) Profile Evaluation Program

A flow chart of the SDI/RS operation is shown on the Fig. 5.4.

Description of programs is given along with the flow of jobs except for the "Profile Evaluation Program" which is already explained in the chapter (3) of section I.

(1) Data Conversion Program

The function of this program is to extract search terms from the INIS original tape(s) and to create a retrieval item file. Search terms are as follows: 1) Descriptor code, 2) Subject category, 3) Type of Record, 4) Literary indicator, 5) Issuing country code, 6) Language code, 7) Author's affiliation code, 8) Corporate entry code, 9) Personal author name, 10) Journal title, 11) Report code, 12) Volume and issue number of INIS Atomindex and 13) Publication year of the document. The permissible

number of search terms contained in one linked group is one hundred at the maximum.

The old retrieval item file is merged into the new one every month for RS. If we specify the first and/or last RN number, data conversion starts from and/or terminates in the specified RN number respectively. Another important role of this program is to convert the INIS code of 120 characters into the EBCDIC one which is handled easily in the computer system.

(2) Thesaurus Conversion Program

The original INIS thesaurus tape contains such information as descriptor itself, descriptor code, relational code, frequency, related descriptor code and deletion indicator, etc. We use only descriptor and descriptor code as search terms. The function of this program is to extract only descriptor and code of descriptor from the original INIS thesaurus tape and to generate a descriptor file of numerical code. The descriptor code recorded by packed decimal is converted into five characters of EBCDIC code.

(3) Profile Creation/Maintenence Program

The function of this program is to check validity of spellings of search terms and to create a profile file for searching. To economize core memory and computer machine time for searching, descriptors are converted into the five digits numerical code corresponding to each descriptor. Logical formula is described by the use of + (OR) and * (AND) operators. Negative logic is expressed as N (NOT). Search conditions of L (Less Equal) and G (Greater Equal) can be used only for two search items of the volume and issue number of INIS Atomindex and the publication year of the document. Left-adjust-truncation can be applied for the search terms of author name, subject category, report code and journal title. An exact match is required for other items.

Input of search query is accepted on punch cards and all new or changed profiles are printed on the printout list. Search terms in one query are allowed to use eighty at the maximum.

(4) Search Program

The aim at this program is to scan the records in the retrieval item file. The record on the retrieval item file is read into core memory, one record at a time, and each profile is compared with the reocrd. If a record is relevant to a particular profile, the RN number

with the query number is put to an answer file. Each record has to be examined one after anothor from beginning to end, because so called sequential search is conducted in this program. Searching is usually performed only by search terms combined together with a Boolean logic. Weighted search can be carried out in using a weighted descriptor file.

(5) Answer List Printing Program

This program accomlishes output of the results from the search. Output record is usually in an ascending order of RN number. However, it allows to arrange the references according to a descending order of a score of each documents. One of five kinds of printout formats can be selected. These are (i) RN number only, (ii) RN number and Bibliographic reference, (iii) RN number, Bibliographic reference and Descriptors, (iv) RN number, Bibliographic reference and Abstract and (v) RN number, Bibliographic reference, Descriptors and Abstract. Fig. 5.5 is an example of an answer list of the format (iv). The format (iv) list is provided for SDI users, format (ii) list for RS users. The form (iii) is very usuful for searcher to judge validity of a query and to reformulate better queries. Format (i) and (v) are scarcely used.

(6) Retrieved Reference Record Extraction Program

This program is used to gain an answer list of retrospective search only. The target records for RS have already reached to 480,000 references and these are stored on the twenty five volume of magnetic tapes. The computer system doesn't allow to occupy more than four tape units simultaneously. This program picks up only the retrieved reference records from the INIS master tapes using the RN numbers as matching keys. By cyclic and repeating operation of this program, we are able to reduce a great volume of the master to the reasonable size which can be handled at one time in the computer system.

5.3 Future Plan

On-line service was tested on one year INIS database by fifty people of JAERI for two months last year in using a domestic software called FAIRS-I (FACOM Advanced Information Retrieval System - I). A few users pointed out that speeding up of response time and improvement of output print form have to be accomplished by the time when a full scale on-line service starts. Almost users eargerly requested us to establish an on-line retrieval system as soon as possible. Urgent building-up of on-line

retrieval system is required for us to respond to growing voices calling for an on-line service.

References

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2) Komatsubara, Y. et al.: Use of profile evaluation list for query formulation (In Japanese), Proc. 13th National Convention for the Study on Information and Documentation, 83-93 (1976).
3) Komatsubara, Y. et al.: INIS-SDI system at JAERI (In Japanese), Joho Kanri, 21(8), 573-585 (1978).

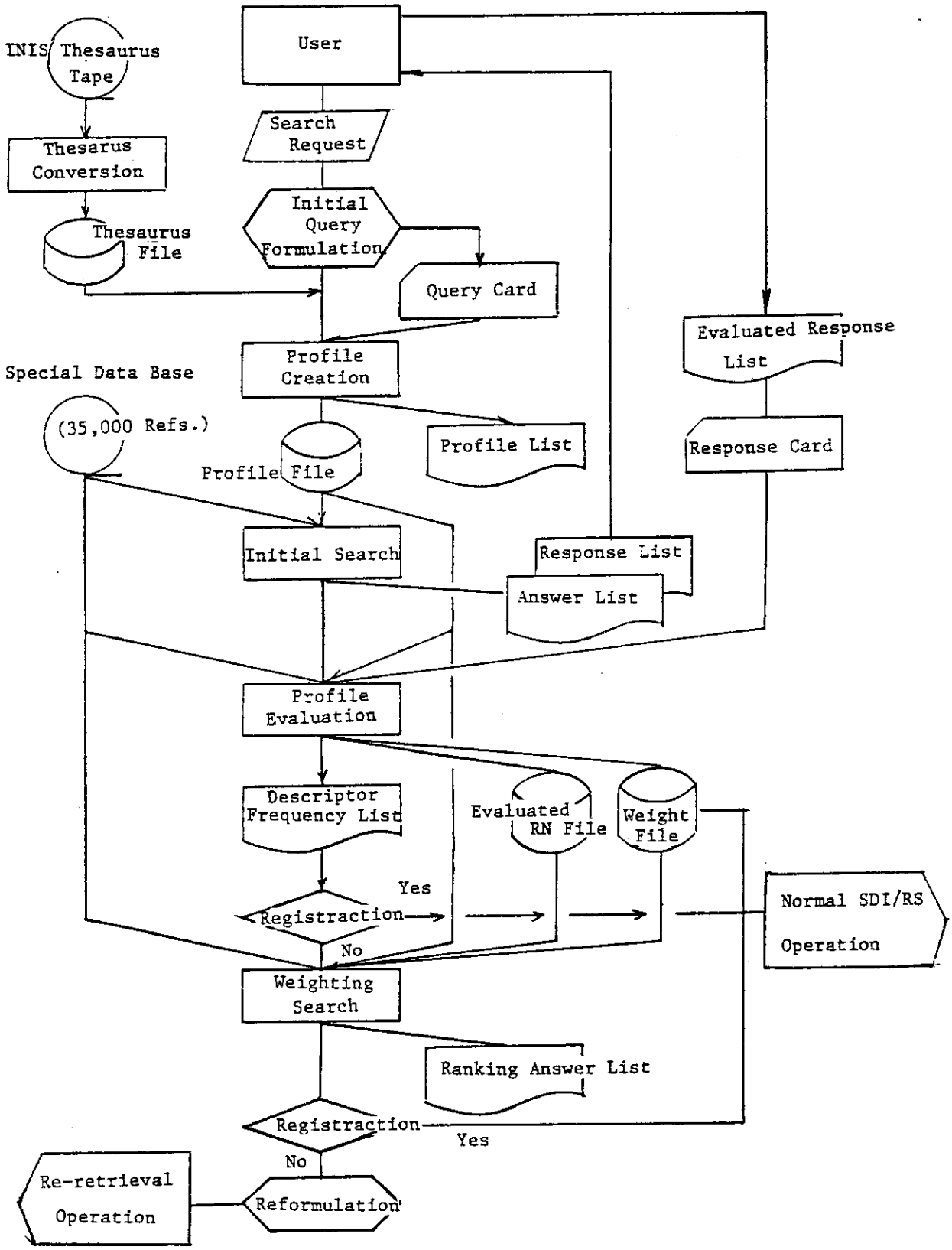

Fig. 5.1 Flow Chart for Profile Formulation

** QUERY= ** RADIATION MONITORING OF NUCLEAR FACILITY BY COMPUTERS.

(MONITORING+RADIATION MONITORS+RADIATION DETECTION+RADIATION DETECTORS+RADIATION DOSES)*(NUCLEAR FACILITIES+REACTORS+ACCELERATORS+ACCELERATOR BREEDERS+ACCELERATOR FACILITIES+HOT LABS+LABORATORY EQUIPMENT+LABORATORY SYSTEM)*(COMPUTER CODES+COMPUTERS+COMPUTER CALCULATIONS+COMPUTER NETWORKS+COMPUTER-AIDED DESIGN+COMPUTER-GRAPHICS DEVICES+DATA PROCESSING+PROGRAMMING+ON-LINE SYSTEMS+REAL TIME SYSTEMS)

TOTAL OUTPUT 41 HIT 15 (36) NOISE 26 (63) KNOWN 0 (0)

* HIT DESCRIPTORS *

		H	N
1	*NUCLEAR FACILITIES	10	(5)
2	*MONITORING	8	(10)
3	*COMPUTER CODES	7	(5)
4	NUCLEAR POWER PLANTS	7	(4)
5	POWER PLANTS	7	(4)
6	THERMAL POWER PLANTS	7	(4)
7	ENVIRONMENT	6	(2)
8	ISOTOPES	5	(1)
9	*ON-LINE SYSTEMS	5	(8)
10	*RADIATION DOSES	5	(3)
11	RADIATION MONITORING	5	
12	RADIOISOTOPES	5	
13	*COMPUTER CALCULATIONS	4	(2)
14	HUMAN POPULATIONS	4	(1)
15	POPULATIONS	4	(1)
16	RADIOACTIVE EFFLUENTS	4	(2)
17	RADIOACTIVE MATERIALS	4	(2)
18	RADIOACTIVE WASTES	4	(2)
19	*REACTORS	4	(16)
20	WASTES	4	(2)
21	AIR	3	
22	ALARM SYSTEMS	3	
23	*COMPUTERS	3	(7)
24	FLUIDS	3	(1)
25	FOOD CHAINS	3	
26	GASES	3	
27	INTAKE	3	
28	MATHEMATICAL MODELS	3	(1)
29	MEASURING INSTRUMENTS	3	(19)
30	OXYGEN COMPOUNDS	3	
31	*RADIATION DETECTORS	3	(14)
32	RADIONUCLIDE MIGRATION	3	(1)
33	A CODES	2	
34	AEROSOLS	2	(1)
35	BETA DECAY RADIOISOTOPES	2	
36	BETA-MINUS DECAY RADIOISOTOPES	2	
37	COLLOIDS	2	(1)
70	WATER MODERATED REACTORS	2	(8)
71	WWER TYPE REACTORS	2	
72	*ACCELERATORS	1	(6)
73	ACCIDENTS	1	(4)
74	ACTINIDE COMPOUNDS	1	
75	AERIAL MONITORING	1	
76	AIR POLLUTION	1	
77	AIR SAMPLERS	1	
78	ALPHA DETECTION	1	
79	ALPHA DOSIMETRY	1	
80	AQUATIC ORGANISMS	1	
81	AVAILABILITY	1	
82	BETA SPECTRA	1	
83	BODY	1	
84	CAMAC SYSTEM	1	(1)
85	CARBIDES	1	
86	CARBON COMPOUNDS	1	
87	CDC COMPUTERS	1	
88	CHALCOGENIDES	1	
89	CHARGED PARTICLE DETECTION	1	(2)
90	CHARGES	1	
91	COATED FUEL PARTICLES	1	
92	*COMPUTER NETWORKS	1	
93	*COMPUTER-GRAPHICS DEVICES	1	(3)
94	COOLING SYSTEMS	1	(1)
95	CROPS	1	
96	DATA COMPILATION	1	
97	*DATA PROCESSING	1	(7)
98	DAUGHTER PRODUCTS	1	
99	DAYS LIVING RADIOISOTOPES	1	
100	DECAY	1	
101	DIGITAL SYSTEMS	1	
102	DISPLAY DEVICES	1	(3)
103	DISTRIBUTION	1	(13)
104	DISTURBANCES	1	
105	DOSE COMMITMENTS	1	
106	EMERGENCY PROVISIONS	1	
138	*LABORATORY EQUIPMENT	1	
139	LASL	1	
140	LEAK TESTING	1	
141	LI-DRIFTED DETECTORS	1	
142	LI-DRIFTED GE DETECTORS	1	
143	LIGHT NUCLEI	1	
144	LIQUID WASTES	1	
145	LOVIISA-1 REACTOR	1	
146	LOVIISA-2 REACTOR	1	
147	MASS SPECTROSCOPY	1	
148	MICROPROCESSORS	1	(1)
149	MULTI-CHANNEL ANALYZERS	1	(1)
150	MULTIPLEXERS	1	
151	MULTIWIRE PROPORTIONAL CHAMBER	1	(5)
152	NEUTRON DETECTORS	1	(7)
153	OFF-GAS SYSTEMS	1	
154	ON-LINE CONTROL SYSTEMS	1	(3)
155	ON-LINE MEASUREMENT SYSTEMS	1	(3)
156	OPERATION	1	(3)
157	ORGANS	1	
158	OXIDES	1	
159	PARTICLES	1	
160	POP COMPUTERS	1	(2)
161	PLANTS	1	
162	POLLUTION	1	
163	PRIMARY COOLANT CIRCUITS	1	(1)
164	PROBABILITY	1	
165	PROCESS COMPUTERS	1	(1)
166	PROPORTIONAL COUNTERS	1	(6)
167	PULSE ANALYZERS	1	(1)
168	QUANTITY RATIO	1	
169	*RADIATION DETECTION	1	(4)
170	RADIATION DOSE DISTRIBUTIONS	1	
171	RADIATION HAZARDS	1	
172	RADIOACTIVITY	1	
173	REACTOR ACCIDENTS	1	(3)
174	REACTOR CONTROL SYSTEMS	1	(1)

Fig. 5.2 Descriptor Frequency Counting List

#.NO = 0162

* EVALUATED RN LIST *

REF.NO	HANTEI	WEIGHT	REF.NO	HANTEI	WEIGHT	#.NO	RUN
389121	H	569	389891	N	-185	0162	01
382526	H	566	395924	N	-195	0162	01
401405	H	464	392142	N	-202	0162	01
407994	H	406	383890	N	-213	0162	01
408236	H	352	398932	N	-218	0162	01
378946	H	338	404294	N	-228	0162	01
391933	H	296	383917	N	-229	0162	01
383896	H	256	395641	N	-234	0162	01
404869	H	239	404564	N	-239	0162	01
389946	N	197	393879	N	-241	0162	01
411353	H	191	396918	N	-263	0162	01
401741	H	180	399139	N	-285	0162	01
391917	N	177	395919	N	-317	0162	01
383640	H	115	405196	N	-325	0162	01
404915	H	81	406277	N	-325	0162	01
411765	N	72	379846	N	-349	0162	01
403091	N	37				0162	01
379543	H	29				0162	01
411756	N	8				0162	01
396175	H	-81				0162	01
395275	N	-107				0162	01
401897	N	-108				0162	01
383225	N	-121				0162	01
402129	N	-140				0162	01
411755	N	-167				0162	01

Fig. 5.3 Ranking RN List

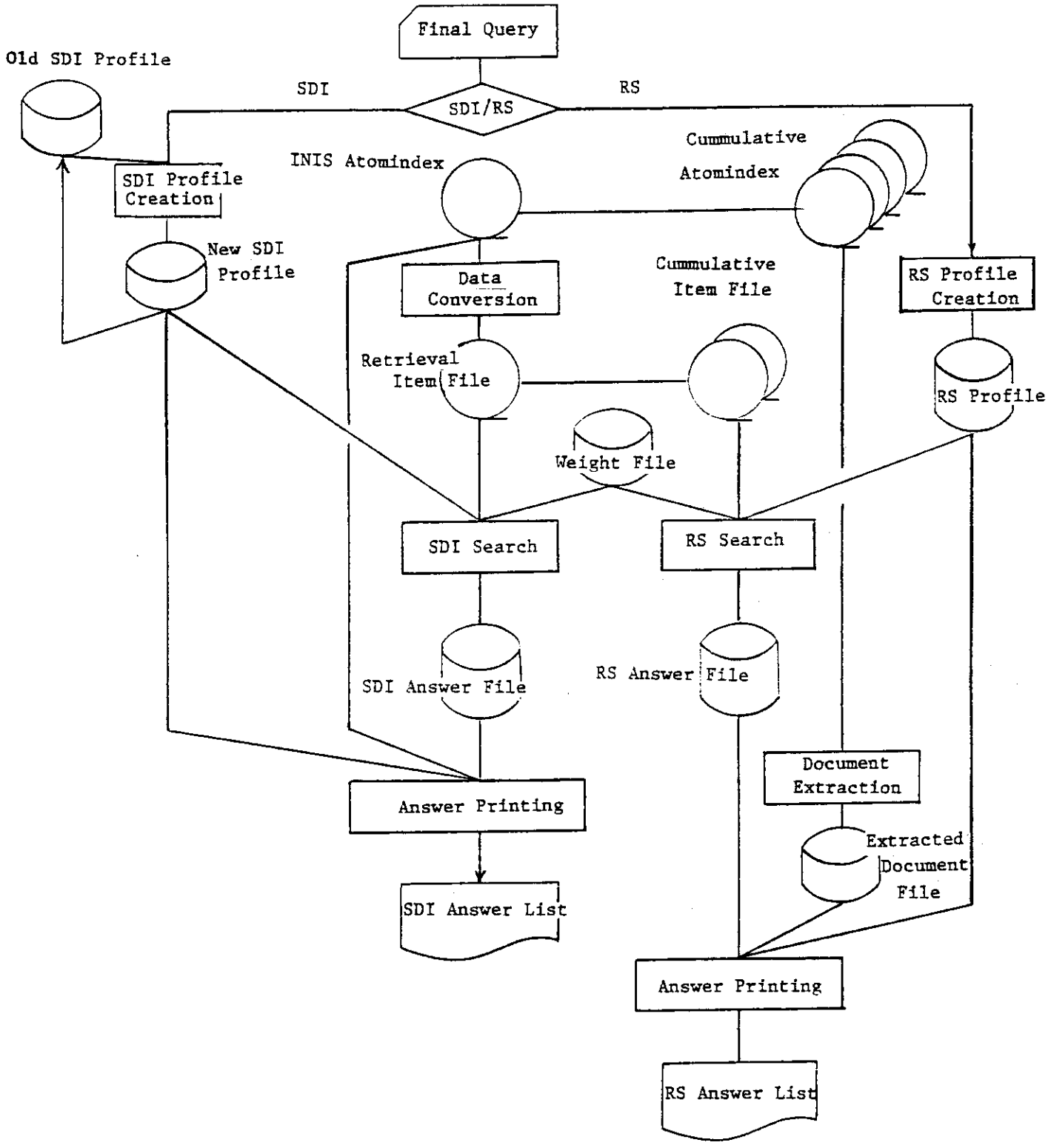

Fig. 5.4 Flow Chart for RS/SDI Operation

487036 - Swelling with inhomogeneous point defect production: a cascade diffusion theory. (B25;A14)
- Mansur, L.K.; Coghlan, W.A.; Brailsford, A.D.
- 1. topical meeting on fusion reactor materials. Miami Beach, FL, USA. 29 - 31 Jan 1979.
* CONF-790125--51. 1979. 17 p.
- Available from NTIS., PC A02/MF A01.

A theoretical method is described for evaluating the effects of spatially and temporally discrete production in collision cascades on point defect concentrations and swelling in materials during irradiation. The concentrations of vacancies and interstitials at a point which result from their diffusion from all cascades in the material are calculated. Large fluctuations occur with time in the vacancy concentration. The interstitial concentration is nearly always zero except for extremely large spikes of very short duration, corresponding to the occurrence of a cascade anywhere within the sphere beyond which all generated defects are absorbed by sinks before reaching the reference point. The growth rate of a void in this cascade diffusion theory is compared to that given by the more approximate rate theory. The difference is small but increases rapidly at high temperature. Implications of this work for void nucleation, irradiation creep, and analysis of pulsed irradiations are mentioned.

487037 - Advances in the theory of radiation effects in metals and alloys. (B25;A14)
- Mansur, L.K.; Yoo, M.H.
- 1. topical meeting on fusion reactor materials. Miami Beach, FL, USA. 29 - 31 Jan 1979.
* CONF-790125--52. 1979. 33 p.
- Available from NTIS., PC A03/MF A01.

Recent advances in the theory of swelling are reviewed. These include the development of a cascade diffusion theory to treat quantitatively the local fluctuations in point defect concentrations, the incorporation of mobile helium into the rate theory, and the spatial variation in swelling during charged particle bombardment.

487042 Description of the EBR-II irradiation of insulator materials. (B25;A14)
- Porter, D. (Argonne National Lab., IL).
- Special purpose materials. Annual progress report.
- Department of Energy, Washington, DC (USA). Office of Fusion Energy.
* DOE/ET--0095. May 1979. p. 91-99.

An EBR-II irradiation of insulator and coating materials has been planned and approved. Irradiation is scheduled to begin in early March at approx. 400 and 500°C.

487043 Irradiation-enhanced coarsening in Ni--12.8 at. % Al. (B25;E35;A14)
- Potter, D.I.; McCormick, A.W. (Argonne National Lab., IL).
* Acta Metall. (Jun 1979). v. 27(6) p. 933-941.

Precipitation of γ'-Ni_3Al in Ni--12.8 at. % Al was investigated during low-dose irradiation with 3.5 MeV $^{58}Ni^+$ ions at 450 to 700°C. Mean precipitate size, number density, and volume fraction were determined by transmission electron microscopy (TEM). At constant displacement rate, mean γ' size increased with the one-third power of irradiation dose at all temperatures investigated, consistent with a diffusion-controlled (Lifschitz-Slyozov-Wagner) model for precipitate coarsening during aging. The vol % of precipitate increased rapidly early in the irradiation, then reached and maintained a constant value consistent with coarsening during thermal aging. Log--log plots of precipitate number density vs dose are linear with slope approx. -1.0, as predicted by coarsening theory. The rate constants observed for irradiated samples were always greater than those observed at the same temperatures during thermal aging. The difference decreased at higher temperature (approx. 700°C). The rate constants reached a plateau between 500 and 600°C with K approx. = 10^5 A^3/h, close to the value observed during electron irradiation of this alloy. The significance of the similarity between the effects of heavy-ion and electron irradiation for cascade dissolution of precipitates is discussed. Agreement between observed and calculated rate constants is good, particularly in view of the changing sink structure with irradiation temperature.

487044 Defect microstructures in Al_2O_3 and Y_2O_3 subjected to ion irradiation. (B25;A14)
- Sechtin, M. (Argonne National Lab., IL).
- Special purpose materials. Annual progress report.
- Department of Energy, Washington, DC (USA). Office of Fusion Energy.
* DOE/ET--0095. May 1979. p. 77-94.

Transmission electron microscopy was used to monitor the changes in the microstructures of Y_2O_3 and Al_2O_3 induced by light ion irradiations conducted at temperatures between 500 and 1250 K. Results on Y_2O_3 were highlighted by the relative low defect density, the isotropic nature of the damage, and the precipitation of a metastable phase during irradiation. In alumina, pore arrays are formed in much the same manner as has been observed after neutron bombardment. These arrays were found to be aligned along the c axis of the material. Strong synergistic effects between helium and point defects were observed.

487054 Irradiation change of graphite properties in a wide range of temperatures and neutron fluences. (In Russian). (B25)
- Virgil'ev, Yu.S.; Kalyagina, I.P.; Makarchenko, V.G.
- For English translation see the journal Soviet Journal of Atomic Energy (USA).
* At. Energ. (Mar 1979). v. 46(3) p. 180-182.

Dose dependences of radiation changes of graphite properties in a wide temperature range (70-800 deg C) are built on the basis of experimental data. Presented are the dependences of relative changes in crystal lattice parameter, sample sizes, strength limit, elasticity module and electrical resistance on the neutron fluence.

487055 - Direct observation of the vacancy structure of depleted zones in tungsten ion irradiated at 10°K. (B25;B22)
- Wei, C.Y.; Seidman, D.N.
* COO--3158-70. Dec 1978. 13 p.
- Available from NTIS., PC A02/MF A01.

The structure of depleted zones (DZs) created by the in-situ irradiation of tungsten specimens, at 10°K, with 30 keV W^+, Mo^+ or Cr^+ ions has been studied by field-ion microscopy. As the mass of the 30 keV ion was decreased the following observations were made: (1) the spatial extent of the DZs increased; (2) the vacancy concentration within the DZs decreased; (3) the fraction of isolated monovacancies increased; and (4) subcascades formed within the DZs.

488107 - Residual stress, strain, and strength measurements in Peach Bottom fuel test elements. (E33;B25)
- Wellroth, C.F.; Miller, C.H.; Saurwein, J.J.
- International conference on structural mechanics in reactor technology. Berlin, F.R. Germany. 13 - 17 Aug 1979.
* GA-A--14704. May 1979. 21 p.
- Available from NTIS., PC A02/MF A01.

An experimental program measuring residual stress, strain, and strength distributions in H-327 graphite teledial fuel bodies irradiated to fast neutron fluences up to 4.2 x 10^{25} n/m^2 (E > 29 fJ)/sub HTGR/ in the Peach Bottom High-Temperature Gas-Cooled Reactor has been completed. The techniques employed included dimensional change measurements on intact fuel bodies, pressure bursting of fuel holes, diametral compression tests, ring cutting, strip cutting, and four-point bend tests. In all, 3500 tests were performed, 2200 of which were on irradiated material. The results obtained from irradiated samples were compared with measurements on unirradiated control specimens to estimate irradiation-induced changes in material properties. Irradiation conditions were obtained from computer simulation of the reactor operating history and have been verified by gamma spectroscopy and in-pile thermocouple readings. Experimental results were compared with analytical predictions, when available.

Fig. 5.5 Example of "SDI Answer List"

6. The Effect of Posting upon a Retrieval System which employs Descriptors

By S. Hino

6.1 Introduction

Automatic posting, originally developed by EURATOM, is employed in the INIS subject indexing system. Although it is already known as a recall device, there still seems to be a space for evaluating its role in the actual INIS data base.

6.2 Experimental Section

Data from the Atomindex Vol.5, No.5 to No.20, 1974, was gathered together in a single test file. It included 43, 132 items of literature and 47, 021 linked groups, from RN 100, 729 to 143, 884. And from the data file, 2 index files were prepared, i.e. with and without posting. These index files were searched by 41 profiles, each being used for the in-house SDI service for a couple of years, and the results were compared. Hit/noise discrimination was done by one of the present authors having 7 years' experience in the subject analysis of nuclear documents, aided by users' request forms and the past responses.

As the present study tries to evaluate the role of posting, variation of retrieval effectiveness between 2 index files is calculated for each profiles and averaged to appraise the role of posting, regardless of the specific characteristics of test profiles.

As for recall, quasi-recall ratio are measured by essential term (mostly one term) search only for 10 profiles. As the maximum number of the relevant documents for a profile is always equivalent to both index files, the variation of recall ratio is always equal to the variation of the number of hits. For example, if the normal file yields 60 hits and the no-posting file 50 hits, then posting brings 20 % increase of recall.

The results are shown in the tables and figs.

6.3 Discussion

The results clearly show that posting increases hits and recall without scarcely sacrificing precision and the retrieval efficiency measures of θ and e. The followings should be noted.

1) For the posting system to work properly, it is necessary to maintain

a) the sophisticated structure of the thesaurus, b) computer programs, c) storage of almost doubled index terms.

2) The profiles used are made by searchers assuming the presence of posting procedure, and this is also the case with index terms assignment. Thus test profiles may yield somewhat different output for no-posting index file. Indexers may also assign different set of descriptors if posting is not provided.
3) The present posting feature is satisfactorily effective since it facilitates profile preparation and gains substantial recall without sacrificing other factors.

References

1) Hino, S. and Ishikawa, M.: The effect of link and posting upon a retrieval system which employs descriptors, Proc. 12th National Convention for the Study on Information and Documentation, 215-223 (1975)

Table 6.1 The Average Performance of the Retrieval Experiments

	Normal	No Upposting
Relevance Ratio : ρ	63.1	60.5
Recall Ratio : τ	74.0	45.2
Silence	12.7	28.8

Table 6.2 The Effect of the Upposting on the Retrieval Efficiency

	Normal	No Upposting
EURATOM's 'θ'	68.1	51.7
Meadow's 'e'	68.1	52.2

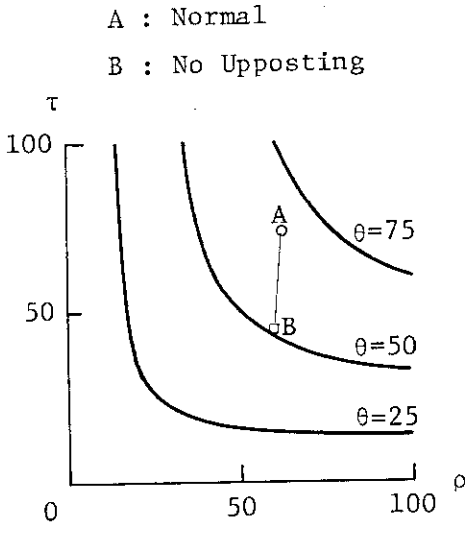

Fig. 6.1 The ρ-τ chart for Table 1.

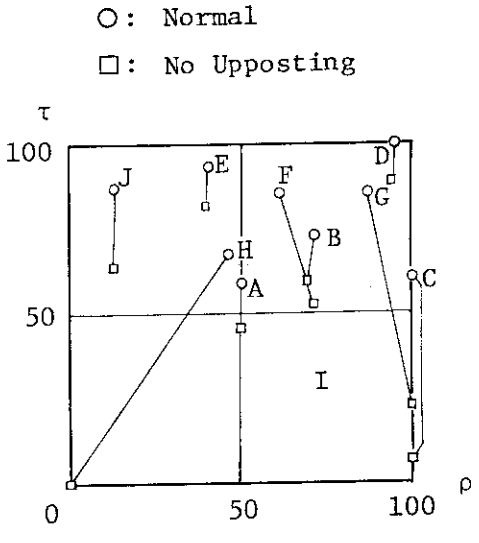

Fig. 6.2 Effects of posting on 10 profiles.

7. Search Effectiveness of INIS

By Y. Ebinuma

7.1 Introduction

A series of tests was made on search effectiveness of the subject index to a printed version and of machine retrieval on a magnetic tape of the INIS Atomindex. These details are described in the references written in Japanese but their summaries are presented here.

7.2 Methodology

7.2.1 A subset of data base and search requests

(1) 33,614 items in Vol.8, Nos.11-22 for half a year in 1977

(2) 10 search requests

7.2.2 Manual search on the Subject Index

(1) Selection of headings

Three or four important terms were extracted from a statement of each search request and complemented systematically by addition of alternative descriptors. Three or four groups of these descriptors were ranked in decending order of importance as a→b→c→d and linked as the following.

Search modes (M: main heading, Q: qualifier)

1) M:Q search

A	a:d
B	a:(b+c+d)
C	a:(b+c+d)+b:(a+c+d)+c:(a+b+d)+d:(a+b+c)

2) M search

D	a
E	a+b
F	a+b+c+d

(2) An example of headings

1) Search request: Fabrication of fuel pellet for thermonuclear fuel by laser implosion.

2) heading groups

a group

thermonuclear fuels

b group
coatings
configuration
containers
fuel pellets
layers
microspheres
spherical configuration
targets

c group
implosions
lasers
laser implosions
laser-produced plasma

d group
chemical preparation
efficiency
electroplating
fabrication
feasibility studies
machining
performance
performance testing
production
specifications
testing

3) Search modes
M:Q search ..... A,B,C
M search ..... D,E,F

7.2.3 Machine search on the INIS tape

(1) Preparation of queries

Five query formulas were prepared for each search request as the following. Q1 is capable of getting the recall ratio of 100 % with the lowest precision and Q5 the precision ratio of 100 % with the lowest recall.

Symbol	Type	Logic
Q1	loosest	a
Q2	looser	a*(b+c)
Q3	normal	a*b
Q4	tighter	a*b*c
Q5	tightest	$a_i*b_j*c_k*d_l$

$a = a_1+a_2+a_3+$ ....., and so on.

* AND operator, + OR operator

(2) An example of query formulation

1) Search request: Fabrication of fuel pellet for thermonuclear fuel by laser implosion.

2) Retrieval terms

a group
thermonuclear fuels

b group
configuration
containers
fuel pellets
layers
microspheres
targets

c group
implosions
lasers
laser-produced plasma

d group
chemical preparation
efficiency
electroplating
fabrication
feasibility studies
machining
performance
production
specifications
testing

3) Queries

Q1, Q2, Q3, Q4, Q5 = a*b*c*d

7.2.4 Evaluation method

Although precision-recall pairs are got individually for search requests, it is convenient to present averaged values of the pairs at each level over the ten search requests. The averaging is done in two ways.

(1) Microevaluation is taken over m search requests from a document oriented viewpoint and then defined as

$$\text{Average microrecall} = \frac{\sum_{i=1}^{m} c_i}{\sum_{i=1}^{m} (b_i + c_i)}$$

$$\text{Average microprecision} = \frac{\sum_{i=1}^{m} c_i}{\sum_{i=1}^{m} (c_i + d_i)}$$

where b_i, c_i and d_i are respectively, the number of documents relevant but not retrieved, the number of relevant and retrieved, and the number irrelevant but retrieved pertaining to the i'th query.

(2) Macroevaluation is taken over m search requests from a query oriented viewpoint and then defined as

$$\text{Average macrorecall} = \frac{1}{m} \sum_{i=1}^{m} \frac{c_i}{b_i + c_i}$$

$$\text{Average macroprecision} = \frac{1}{m} \sum_{i=1}^{m} \frac{c_i}{c_i + d_i}$$

7.3 Results

7.3.1 Manual search

Fig. 7.1 shows the relationship among micro-recall, micro-precision and the task time normalized. M:Q search gets the recall ratios of 15-53 % with the precision ratios of 50-20 %. It is hard to achieve recall ratios of above 53 % but the M search gets the recall ratios of 48-77 % with the precision ratios of 19-4 %. The M:Q search may be suitable for obtaining recall ratios of bellow 40 %, because the search-

ing time is shorter than the time for the M search. Recall ratios of 50-80 % should depend upon the M search in spite of the long task time.

7.3.2 Machine search

Fig. 7.2 shows average micro- and macro-retrieval effectiveness curves for manual and machine searches over the ten search requests. These curves reveal definitely that search effectiveness of the machine is extremely better than that of the manual.

7.4 Discussion

7.4.1 Manual search

Table 7.1 shows distribution of the number of documents by main headings and qualifiers respectively. It is the point that 46 % of the total is the number of documents with one main heading and 39 % of the total is the number of documents with none or a pair of main heading-qualifier. If it would be possible to label to a document two main headings and two qualifiers to a main heading at a minimum, higher recall ratios would be obtained by the previous search modes.

7.4.2 Machine search

Table 7.2 shows the reasons for recall and precision failures examined on the retrieval results by the queries of Q2, Q3 and Q4 for five search requests of the ten. Q3, the normal query generates 50 % of the silences by each of indexing and searching but does 50 % of the noises by indexing, 20 % by searching and 30 % by system imperfection.

It would be inevitable that the broader a query, it acquires lower precision in contrast with higher recall for the reasons clarified and the converse is true for levels of query. It would be expected however, to change this attribute a little by ranking the documents retrieved in decreasing order of their scores calculated on a weighting scheme to the index terms assigned. Fig. 7.3 shows that ranking performance on the documents retrieved by the Q2 is slightly better than the retrieval effectiveness gained by the queries of the Q2-Q4 without reformulation of the Q2. A cut-off value is left to judgement of the user's.

References

1) Ebinuma, Y.: Use of INIS Atomindex, J. At. Ener. Soc. Jpn., 20[11] 796-803 (1978)

2) Ebinuma, Y.: Comparative analysis of two modes of manual searching on the INIS Atomindex, Dokumenteshon Kenkyu, 29[1] 2-11 (1979)

3) Ebinuma, Y.: Effect of main headings and qualifiers on manual searching in printed subject index, Dokumenteshon Kenkyu, 29[8] 315-323 (1979)

4) Ebinuma, Y.: Affinity between information retrieval system and search topic, Joho Kanri, 22[4] 311-319 (1979)

5) Ebinuma, Y.: Retrieval efficiency and cause of search failures in some INIS profiles, Joho Kanri, 21[10] 762-770 (1979)

6) Ebinuma, Y.: Evaluation of an automatic weighting in a Boolean retrieval system with thesaurus, I. Weighting of index terms, Dokumenteshon Kenkyu, 30[6] 247-253 (1980)

7) Ebinuma, Y.: Evaluation of an automatic weighting in a Boolean retrieval system with thesaurus, II. Weighting of search terms and comparison of retrieval performances between the two weighting schemes, Dokumenteshon Kenkyu, 30[7] 293-300 (1980)

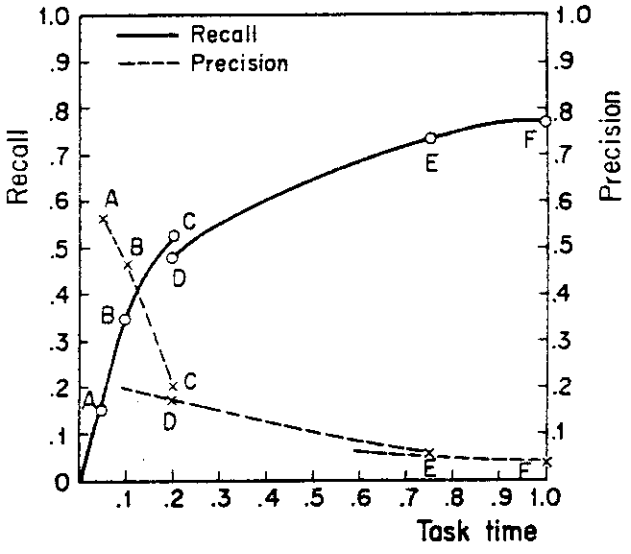

Fig. 7.1 Relationship between search effectiveness and task time over 10 requests.

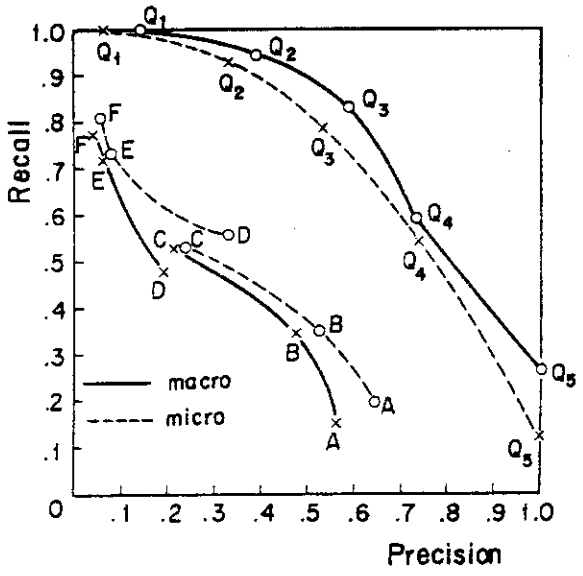

Fig. 7.2 Average precision-recall curves over 10 requests.

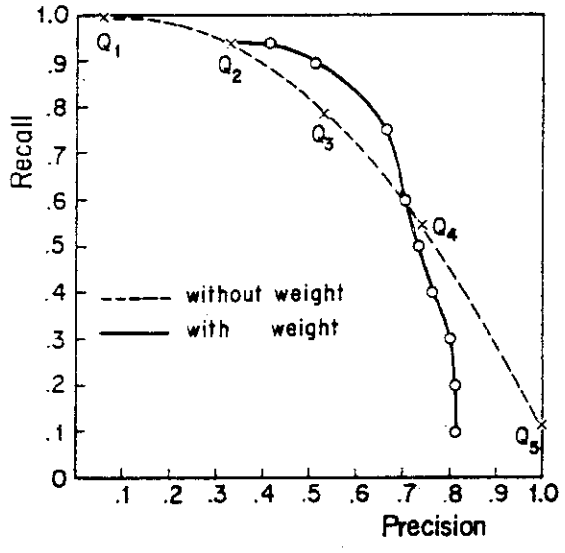

Fig. 7.3 Average micro-ranking performance curve on retrieval results by Q_2 over 10 requests.

Table 7.1a Distribution of main headings in Atomindex Vol.8.

The number of M	1	2	3	over 4	total
%	46	34	13	7	100

Table 7.1b Distribution of M-Q pairs in Atomindex Vol.8.

The number of pairs	0	1	2	3	4	5	6	over 7	total
%	2	37	37	13	6	2	1	2	100

Table 7.2 Reasons for recall and precision failures

Source of failure	Silence, %			Noise, %		
	Q2	Q3	Q4	Q2	Q3	Q4
Indexing						
Use of broader term	7	5	1			
Use of narrower term						
Insufficiently exhaustive	10	7	2			
Exhaustive indexing				7	30	29
Omit of important concept	29	18	5			
Use of inappropriate term	29	18	5	5	20	24
(Indexing totals)	(75)	(48)	(13)	(12)	(50)	(53)
Searching						
Use of broader term						
Use of narrower term						
Formulation too exhaustive				78	20	
Formulation too specific			62			
Lack of appropriate terms	20	49	24			
Use and combination of inappropriate terms	5	3	1			
(Searching totals)	(25)	(52)	(87)	(78)	(20)	
System imperfection						
Lack of appropriate specific terms				1	3	6
Unessential combination of terms				7	21	28
Others				2	6	13
(System imperfection totals)				(10)	(30)	(47)
totals	100	100	100	100	100	100

8. Users' Evaluation of the SDI using INIS Magnetic Tape

By A. Shimizu

8.1 Questionnairing

INIS-SDI service was carried out for two years from 1975 in cooperation with scientists and engineers within the JAERI. Questionnaires were sent twice during the period to those people who received the service for over five months. The purpose was to find out state of INIS-SDI usage, their evaluation and views on it. Table 8.1 summarizes the INIS-SDI service, and Table 8.2 shows the scale of survey. Flow chart for SDI service is shown in Fig. 8.1. Following are the items of questionnaire.

(1) purpose asking for INIS-SDI, manner of choosing the subjects of search, and attainment of the purpose,
(2) finding of the novel references, and percentage of particularly useful references,
(3) accessibility to the literature retrieved, and usage of the INIS-SDI list,
(4) time/labor saving aspects of literature search, due to the INIS-SDI service,
(5) other data bases used than the INIS file,
(6) general view toward the INIS-SDI service and the wish for its continuation,
(7) comments on information retrieval service.

8.2 Evaluation of INIS-SDI and its Usage

INIS-SDI as a new information service is very well accepted among the people, a majority of users indicating its usefulness. Of the total answering to the questionnaire, eighty percent recognizes its usefulness: 70 % says the service reduced their labor time for literature search. And, 85 % says that more half the references retrieved are 'novel' for them. 74 % of the people chose the search subjects directly related to their research.

Concerning data bases for machine retrieval service, 55 % say the INIS file is quite enough. 24 % needs Chemical Abstracts file in addition. Of the total, 90 % wishes continuation of the INIS-SDI service.

(1) Time/labor saving in literature search

As indicated in Fig. 8.2, the INIS-SDI serves to reduce the time and labor of users in literature search.

(2) Attainment of the purpose for INIS-SDI service

Attainment of the purpose intended for the INIS-SDI service may vary with individual users. Results of the survey, however, disclosed that the purpose was attained for 67 % of people.

- 67 % ..... Purpose attained almost
- 14 % ..... Attainment insufficient
- 19 % ..... No definite yet

The relatively high percentage 19 % above of 'no definite yet' may be unavoidable, since the duration of INIS-SDI service is short yet. An analysis of the 'attainment insufficient' for 20 users reveals the following: ① the useful references are a few, or useless ones are many (7 users), ② the references corresponding to the search-subjects are a few or there are missing ones (5 users), ③ the data base is not sufficient, i.e. the scope is insufficient or the information is not rapid enough (5 users), ④ the retrieval system using keywords is no adequate (1 users), and ⑤ unknown (2 users).

Further questioning after the survey showed most of the users in ① ∿ ③ are not fully aware of characteristics of the INIS file and SDI itself. Finally these users went on as follows: 14 receiving the service after modification of their search-subjects, 3 receiving the service after the query formula altered, 1 not receiving it any longer, and 2 receiving the service as before. After all, the percentage of 67 % for 'purpose attained almost' is not so bad. This result may be reasonable, considering that the INIS-SDI is new for both the users and the seachers.

(3) Finding of Novel References

A salient feature of the INIS-SDI service may be finding of those literature heretofore not obtainable. As seen in Fig. 8.3, 85 % of users says that more than half the references retrieved are 'new' for them.

In the questionnaire, the users were asked to point out advantage of the INIS-SDI. The results are as follows:

About 30 % users ..... deficiency in manual literature search could be eliminated
30 % ..... search for literature not close at hand is possible
20 % ..... literature search is regularly possible
20 % ..... literature in European countries are now accessible

10 % ..... conference papers and patent documents are available

Many of the users say that their scope of literature search could be widened, so that the literature not close to hand are now available. The percentages of particularly sueful references in the SDI lists are shown in Fig. 8.4.

(4) Data Bases Utilized other than INIS File

Forty seven percent of the users in radiation chemistry and 38 % of the users in radioisotopes production/utilization wish to use the Chemical Abstracts file for retrieval in addition to the INIS file as shown in Fig. 8.5. The percentages utilizing Chemical Abstracts file also are thus fairly high in fundamental chemistry. This tendency also appears in the manner of choosing the subjects for search, as described more fully later. The INIS file is of course well usable for those engaged in chemistry of the nuclear field. It is to be noted, however, that the Chemical Abstracts file is also essential for literature search in the boundary of applied and fundamental aspects.

The present survey therefore discloses that about 80 % of the requirement of data bases can be fulfilled with the Chemical Abstracts file as an addition. By emergence of the INIS file as a major information source in the nuclear field, the requests for information by users can be largely granted by complementing one or two data bases appropriate for the respective user groups.

(5) Manner of Choosing Search-Subjects and Usage of the INIS-SDI

Of the search subjects chosen, 74 % is directly related to the research of individual users. The corresponding percentage is somewhat lower in chemistry, such as radiation chemistry and radioisotopes production/utilization. These areas of chemistry, as already described, also wish to use Chemical Abstracts file in addition to the INIS file. Then, their dependency on the INIS file is relatively low, which is reflected in the manner of choosing the search-subjects.

Following is the usage of the INIS-SDI for literature search. The dependency on it was strong unexpectedly. For those people directly associated with reactor operation etc., the INIS-SDI service seems to be very convenient. It is pleasing to the side providing the information service. It must be remembered, however, that in order to carry out the literature search systematically, it is necessary to first decide

on a certain 'core' system and then choose its peripheral subsystems complementing the former; i.e. not to depend only on a single data base. In this sense, the evaluation of the INIS-SDI service by the users is right and to the point.

Subjects for search chosen for the INIS-SDI service:

- 74 % ..... subjects directly related to users' research
- 22 % ..... subjects related to peripheral areas
- 4 % ..... others

Usage of INIS-SDI service:

- 51 % ..... complementing the users' literature search
- 33 % ..... regular literature search
- 16 % ..... filling up the shortage in literature search

(6) Usage of the SDI List

The INIS-SDI list is used by a group, rather than by an individual person as following. In some cases, the group leader lets his staff know contents of the list. This usage of INIS-SDI list is desirable as highly efficient.

Usage of the INIS-SDI list:

- 40 % ..... for a whole group
- 29 % ..... for the group leader letting his staff know contents or circulating the list
- 29 % ..... for an individual researcher
- 2 % ..... others

(7) Access to the Literature

60 % of the users obtains re-copies of the references judged to be "of interest" after confirmation of the contents in such a library as ours. The cases of failing to obtain the references and the types of such documents are indicated in Fig. 8.6.

References

1) Shimizu, A. and Komatsubara, Y.: User's Evaluation to Selective Dissemination of Information Based on INIS Magnetic Tape, J. At. Energy Soc. Jpn., 20, 497-504 (1978).

Table 8.1 Summary of INIS-SDI

• Number of total items for search (per month)	6,000 ~ 7,000
• SDI frequency	once each month
• References retrieved per search subjects	17.3/month
• Profiles for SDI per person	1.3
• Precision ratio (average)	74.8 %
• Recall ratio (average)	75.0 %

Table 8.2 Questionnairing

Year	People questioned	People answered	Recovery
1976	68	61	89.7 %
1977	90	83	92.2 %
Total	158	144	91.1 %

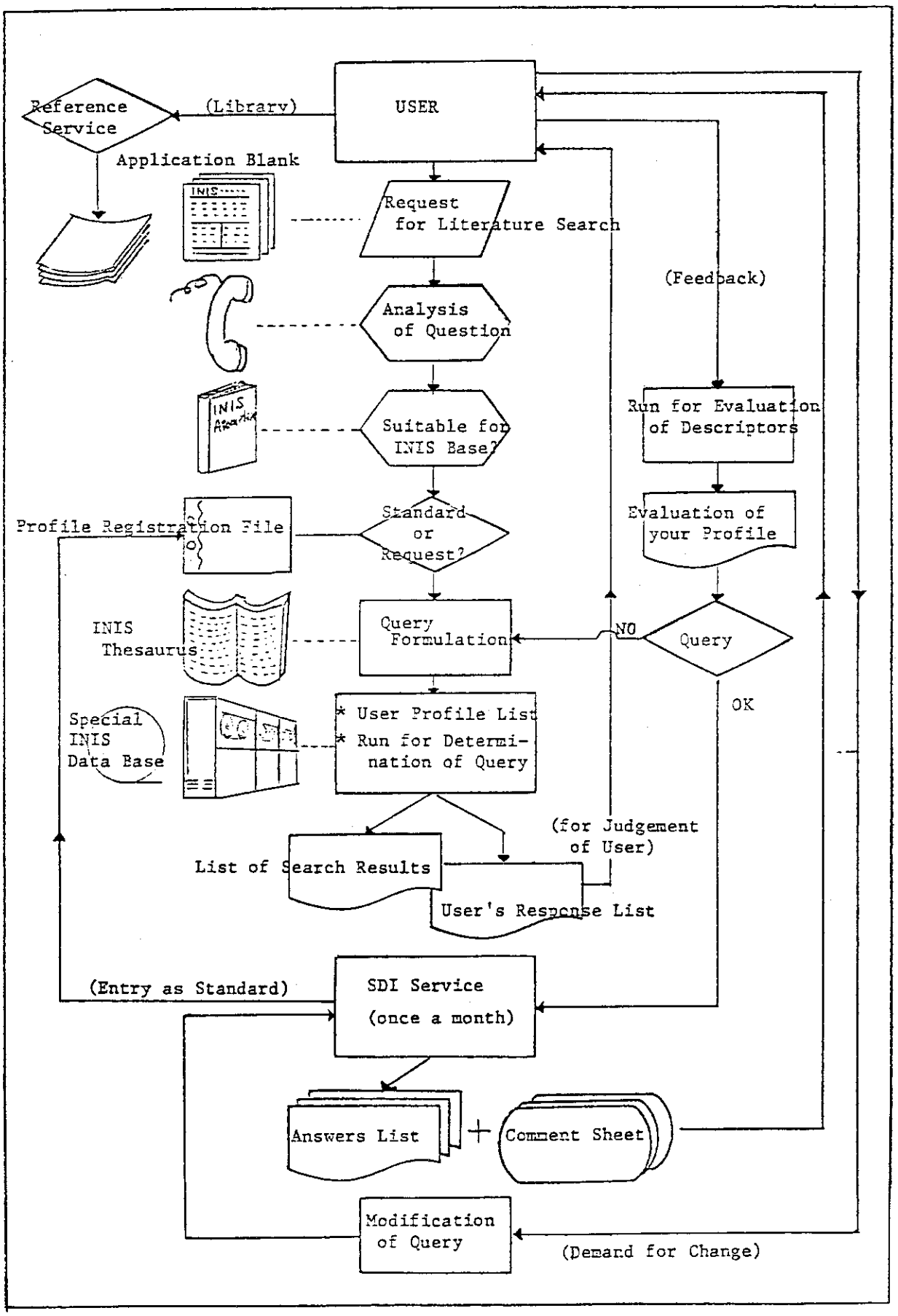

Fig. 8.1 Flow Chart for SDI Service in the JAERI

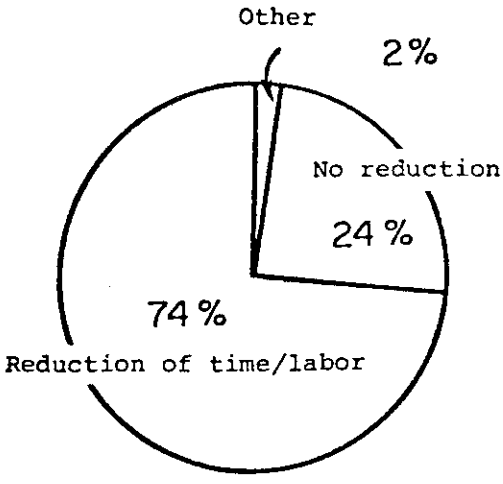

Fig. 8.2 Time/labor saving in literature search.

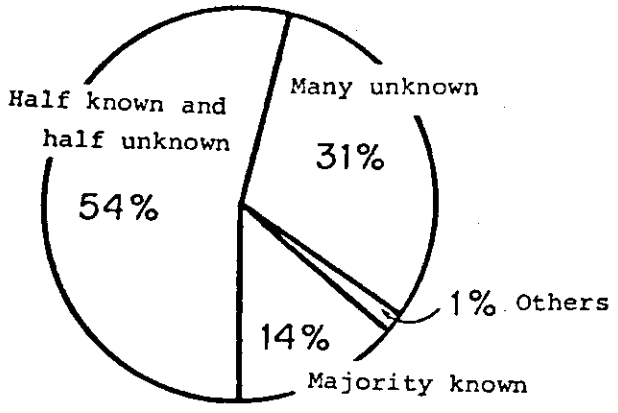

Fig. 8.3 Finding of novel literature.

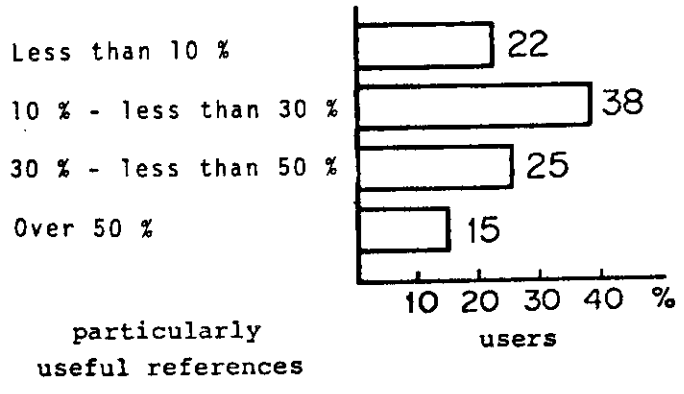

Fig. 8.4 Percentages of particularly useful references.

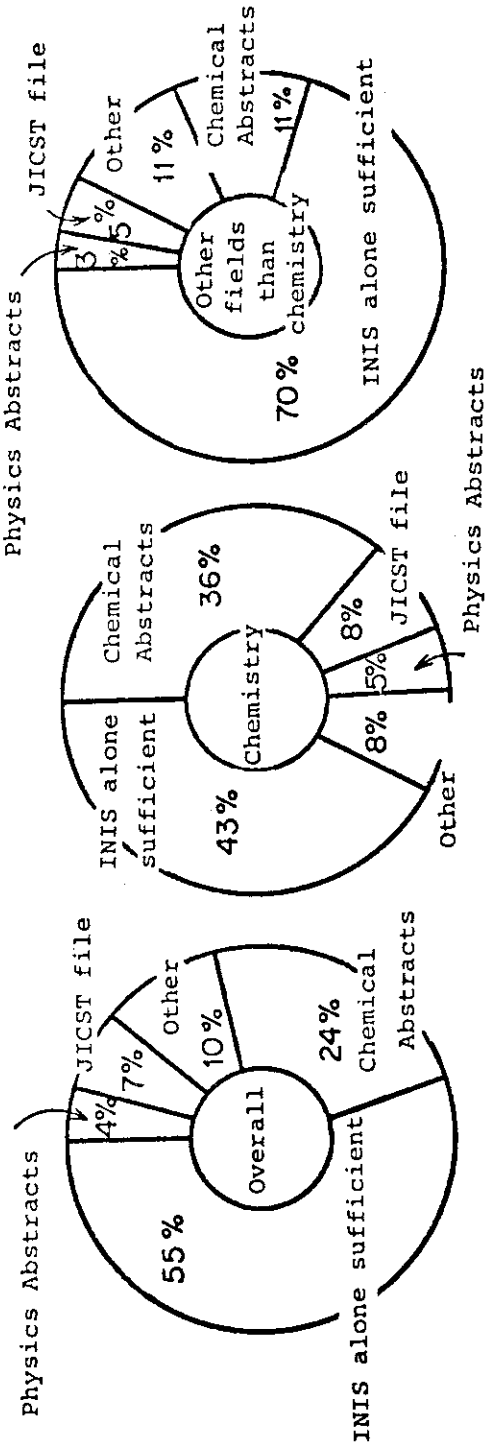

Fig. 8.5 Other data bases used than INIS file.

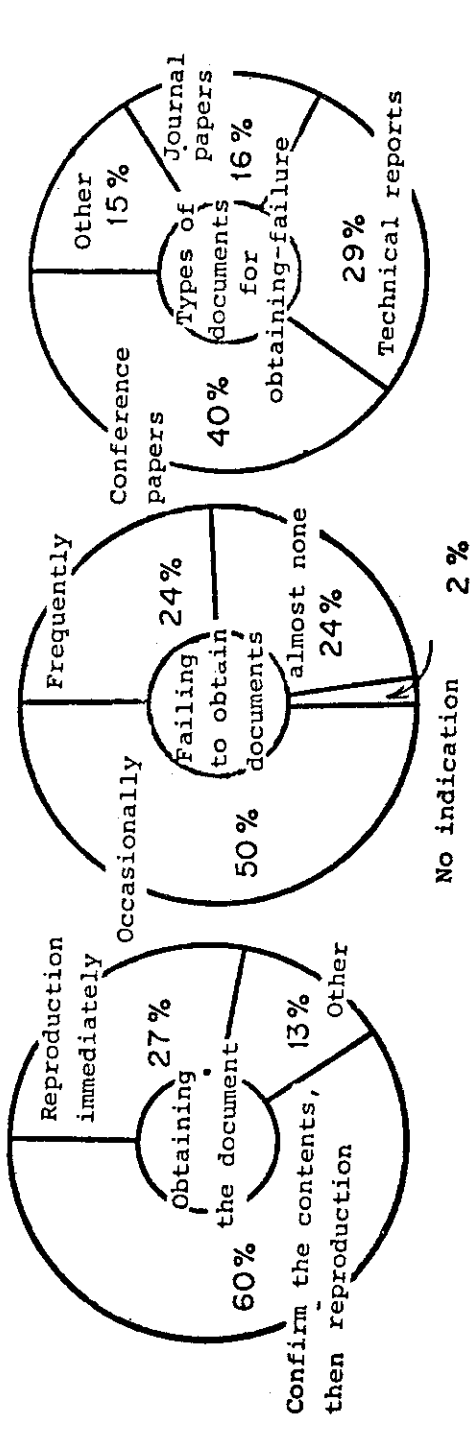

Fig. 8.6 Accessibility to the literature.

Appendix: A List of Publications on INIS by the Division's Staff

By N. Tsuda

0. Nuclear Information

Furuya, M., Hino, S. and Tanabe, T.: Features of the Japanese nuclear literature revealed in the preparation of Nuclear Science Abstracts of Japan, IAEA-SM-128/18 (1970)

Habara, T. and Narui, S.: Oral communication of nuclear energy research and developments in Japan, Preprint of 10th Japanese Documentation Symposium, 35-39 (1980)

Okumura, K., Yamamoto, E. and Habu, T.: Trend of contribution of nuclear papers originated in Japan to foreign periodicals, preprint of 10th Japanese Documentation Symposium, 30-34 (1980)

Habu, T., Hiramatsu, N. and Ebinuma, Y.: Report on survey of contribution to foreign journals among the Japanese nuclear scientists and engineers, "Proc. 17th National Convention for the Study on Information and Documentation", 29-39 (1980)

1. INIS

Nagayama, T.: INIS, Joho Kanri, 12, 70-79 (1969)

Furuya, M.: Status of INIS, Genshiryoku Kogyo, 17(1), 50-53 (1971)

Shibata, N.: INIS, Radioisotopes, 23(1), 39-45 (1973)

Furuya, M.: INIS, Kagaku Gijutsu Bunken Sabisu, No.35, 1-8 (1973)

Ohmori, E. and Furuya, M.: INIS : New world-wide nuclear information system --- NSA will be superseded by Atomindex, Genshiryoku Kogyo, 22(4), 42-48 (1976)

Tsuda, N.: INIS in 10th Anniversary, Genshiryoku Kogyo, 27(2), 68-73 (1981)

Division of Technical Information: Progress report on the INIS operation, No.1, JAERI-M-4649 (1971)
" No.2, JAERI-M-5379 (1973)
" No.3, JAERI-M-6197 (1975)
" No.4, JAERI-M-7176 (1977)

2. Input

Komatsubara, Y. et al.: Analysis of the errors in inputting of bibliographical data, "Proc. 8th National Convention for the Study on Information and Documentation", 311-317 (1971)

Inami, Y. and Furuya, M.: The computer systems and programs for INIS in JAERI, IAEA-156, 101-110 (1973)

Narui, S.: Analysis on the productivity records of journals in Nuclear Science Abstracts by the Bradford Method and selection of journal titles, Dokumenteshon Kenkyu, 25, 435-444 (1975)

Ohmori, E.: Developments of the mechanized information processing systems in Japan for INIS, presented at 1975 Consultative Meeting of INIS Liaison Officers

Takahashi, S. and Furuya, M.: Features of abstracts in nuclear documents, "Proc. 12th National Convention for the Study on Information and Documentation", 29-34 (1975)

Narui, S., Koike, K., Izawa, M. et al.: Features of the INIS input system and problems in Japanese information input, Dokumenteshon Kenkyu, 28, 439-447 (1978)

Narui, S., Koike, K., Izawa, M. et al.: Analysis of processing time phases in INIS input in Japan, "Proc. 16th National Convention for the Study on Information and Documentation", 31-40 (1979)

Narui, S., Izawa, M., Naramoto, M. et al.: English presentation of each data element of articles in serial publications in Japan, "Proc. 17th National Convention for the Study on Information and Documentation", 41-49 (1980)

2.1 Cataloguing

Komatsubara, Y. et al.: Standard for description of bibliographical information; bibliographical description of reference materials, "Proc. 12th National Convention for the Study on Information and Documentation", 21-28 (1975)

Komatsubara, Y. et al.: Standard for bibliographic reference, "Proc. 13th National Convention for the Study on Information and Documentation", 95-103 (1976)

Narui, S., Yokoo, H., Izawa, M. et al.: Analysis of the errors detected during the processing of bibliographic and indexing records, "Proc. 13th National Convention for the Study on Information and Documentation", 111-119 (1976)

2.2 Indexing

Hino, S.: Author index and representation of Japanese names, Dokumenteshon Kenkyu, 20, 271-278 (1970)

Hino, S.: INIS thesaurus and correction routine for descriptor file, Dokumenteshon Kenkyu, 21, 145-151 (1971)

Komatsubara, Y.: Statistical analysis on indexing depth in INIS, Dokumenteshon Kenkyu, 23, 287-293 (1973)

Hino, S.: Preparation of subject index using INIS descriptors in place of subject headings, Dokumenteshon Kenkyu, 24, 419-423 (1974)

Komatsubara, Y.: Trial for automatic correction of miss-spelled descriptors, Dokumenteshon Kenkyu, 25, 157-165 (1975)

Hino, S. and Ishikawa, M.: The effect of link and posting upon a retrieval system which employs descriptors, "Proc. 12th National Convention for the Study on Information and Documentation", 215-223 (1975)

Ebinuma, Y. et al.: Effect of keywords assignment on secondary information processing and notice on their selection and description, J. At. Ener. Soc. Jpn., 18, 760-766 (1976)

Yokoo, H., Takahashi, S. and Habara, T.: Effectiveness of author-assigned keywords to INIS indexing -- for journal articles of the Atomic Energy Society of Japan, Dokumenteshon Kenkyu, 27, 45-54 (1977)

Hino, S.: INIS thesaurus, Joho Kanri, 20, 297-304 (1977)

Ebinuma, Y.: ERDA thesaurus, Joho Kanri, 20, 376-387 (1977)

Ebinuma, Y.: Exhortation toward assigning of keywords in free terms to papers by their authors, Hoken Butsuri, 12, 127-134 (1977)

Komatsubara, Y. et al.: Automatic correction program for miss-spelled descriptor, "Proc. 14th National Convention for the Study on Information and Documentation", 193-201 (1977)

Ebinuma, Y. and Yokoo, H.: Keyword assignment rules in scientific journal and technical reports in Japan, Dokumenteshon Kenkyu, 28, 2-10 (1978)

Yokoo, H. and Takahashi, S.: Implementation of data flagging in INIS, Dokumenteshon Kenkyu, 29, 267-274 (1979)

2.3 Microfiche

Habara, T. and Okawa, T.: Preparation of technical reports in microfiche; Microfiche system in JAERI, (1), "Proc. 8th National Convention for the Study on Information and Documentation", 219-226 (1971)

Hino, S., Hasegawa, Y. and Habara, T.: Preparation of the heading for microfiche; Microfiche system in JAERI, (2), "Proc. 8th National Convention for the Study on Information and Documentation", 227-233 (1971)

Narui, S., Habara, T. and Habu, T.: Services for atomic energy reports in microfiche; Microfiche system in JAERI, (3), "Proc. 8th National Convention for the Study on Information and Documentation", 235-242 (1971)

Habara, T. and Tsuda, N. : Preparation and use of microform documents in JAERI, Maikuro Syashin, 16/7, 14-24 (1977)

Habara, T.: Status and prospects of utilization of microfiche in nuclear documentation, Senmon Toshokan, No.74 , 79-85 (1978)

Habara, T., Narui, S. and Koike, K. : Mounting the cutting mark on the microfiche. Its resolution at the National INIS Center in Japan, Maikuro Syashin, 18/9, 28-31 (1979)

Furuya, M., Koike, K., Matsuda, K. et al.: Influence of interfiled silver-gelatin and diazo microfiches, "Proc. 17th National Convention for the Study on Information and Documentation", 95-103 (1980)

3. Output Utilization

Furuya, M. and Hino, S.: Current awareness service for the conference papers with INIS output tapes, Dokumenteshon Kenkyu, 24, 343-348 (1974)

Special Sub-committee for Dissemination of Nuclear Information : Methodical cooperation in developing machine literature search service system on the INIS, J. At. Energy Soc. Jpn., 19, 159-160 (1977)

Special Sub-committee for Dissemination of Nuclear Information : Report on survey of utilization of nuclear information among members of the Atomic Energy Society of Japan, J. At. Energy Soc. Jpn., 19, 98-101 (1977)

Shimizu, A. and Komatsubara, Y.: User's evaluation to selective dissemination of information based on INIS magnetic tape, J. At. Energy Soc. Jpn., 20, 497-504 (1978)

Ebinuma, Y.: Use of INIS atomindex, J. At. Energy Soc. Jpn., 20, 796-803 (1978)

Shimizu, A. and Hiramatsu, N.: Sales point of our information services 8. The harmonious system between primary and secondary information services at JAERI, Dokumenteshon Kenkyu, 30, 33-39 (1980)

3.1 Searching

Komatsubara, Y., Takahashi, S. and Hino, S.: Use of profile evaluation list for query formulation, "Proc. 13th National Convention for the Study on Information and Documentation", 83-93 (1976)

Ebinuma, Y.: Invitation to use of INIS for subject search, Hoshasen Kagaku, 19, 106-112 (1976)

Komatsubara, Y. and Shimizu, A.: INIS-SDI system in JAERI, Joho Kanri, 21, 573-585 (1978)

Sasaki, Y.: Automatic query adjustment in document retrieval, Dokumenteshon Kenkyu, 28, 175-187 (1978), translated from Information processing & management, 13, 339-353 (1977)

Ebinuma, Y.: Retrieval efficiency and cause of search failures in some INIS profiles, Joho Kanri, 21, 762-770 (1979)

Ebinuma, Y.: Affinity between information retrieval system and search topic, Joho Kanri, 22, 311-319 (1979)

Komatsubara, Y.: An information retrieval system using weighted descriptors generated by automatic frequency counting, Joho Kanri, 22, 700-709 (1979)

Ebinuma, Y.: Comparative analysis of two modes of manual searching on the INIS Atomindex, Dokumenteshon Kenkyu, 29, 2-11 (1979)

Ebinuma, Y.: Effect of main headings and qualifiers on manual searching in printed subject index, Dokumenteshon Kenkyu, 29, 315-323 (1979)

Ebinuma, Y.: Evaluation of automatic weighting in a Boolean retrieval system with thesaurus.
I. Weighting of index term, Dokumenteshon Kenkyu, 30, 247-253 (1980)

Ebinuma, Y.: Evaluation of automatic weighting in a Boolean retrieval system with thesaurus.
II. Weighting of search terms and comparison of retrieval performances between the two weighting schemes, Dokumenteshon Kenkyu, 30, 293-300 (1980)