A MICROFILM LIBRARY ON AIR POLLUTION*

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INTRODUCTION. -- A microfilm information center on air pollution is now being maintained as a free public facility at the Bay Area Air Pollution Control District in San Francisco. Over 8,000 references are indexed by the Uniterm system.

PURPOSE. -- The library provides the available published answers to many engineering problems concerned with the measurement, effects, and control of air pollution. Because of its highly technical nature, the literature collection is used primarily by plant and consulting engineers, and other scientific specialists. Companies and institutions with operations under the Control District have access to this centralized file for data on control methods and equipment. The District technical personnel use the library resources regularly to develop various aspects of the agency's programs.

BACKGROUND. -- The District's Board of Directors, a regional legislative body, authorized a research project in the Fall of 1956, for the design and establishment of the information center which had been suggested and conceived by Benjamin Linsky, the District's Control Officer. The 7-month project was awarded to the Library Services Department of Stanford Research Institute in April, 1957. SRI's competence for the undertaking included the technical assistance of Institute specialists in documentation, microphotography, atmospheric chemical physics, and industrial air research, as well as a "Smog Bibliography" of several thousand edge-notched cards. The abstract cards had been accumulated by SRI during earlier work for sponsors concerned with air pollution control problems. These cards--and others added during the project--served as records for the acquisition, filming, and indexing of the complete literature references. When the project ended, the library of information was turned over to the District along with a Manual of Operation for continuing the work.[1]

CLASSIFICATION BY COORDINATE INDEXING. -- While microfilm saves shelf space, coordinate indexing saves space in the file of index cards. The air pollution literature is indexed by the Uniterm System for Coordinate Indexing--a method which has seen active use in documents collections since its introduction by Dr. Mortimer Taube a decade ago. Briefly, the system consists of cards for individual words or terms which must be compared visually in searching. When identical numbers appear on several term cards, it can be assumed that these numbers represent documents to be examined in connection with the search. For example, the following question might be asked: "Do we have polarographic data on aerosols formed from olefinic fuel?" A comparison of the columns of the uniterm cards (Fig. 1) for the most specific terms, i.e., POLAROGRAPH and OLEFIN yields three matching numbers, no. H-6150, no. H-6151, and no. 7601. The "H" prefixes on the first two numbers indicate that these items are among the thousand or so "hard copy" books and reports on the library stacks. Inspection of H-6150 and H-6151 discloses two progress reports in a series of studies on organics in urban atmospheres. Projection of the microfilm bearing the number 7601 reveals a journal article containing a polarogram of irradiated auto aerosols from an engine using a high olefinic fuel.

MICROFILMING. -- We do not do our own filming--the idea of purchasing a microfilm camera was discarded initially because of the high cost for a planetary model, and the lack of staff time to operate it. The first two years of trials with three commercial microfilming companies did not suit our needs. Recently we worked out a creditable arrangement with one of the six county members of our District. Our work is now being done in the Reproduction Department of the City and County of San Francisco, just three blocks away. Since we have regular courier service between our offices and City Hall, it is an easy task to have only a few hundred pages filmed at a time, during the week when they are needed, and normally at a lower cost than that charged by commercial microfilmers (who have minimum page requirements). The services of a local microfilming firm are utilized for the reproduction of security copies of our microfilmed articles and printing of

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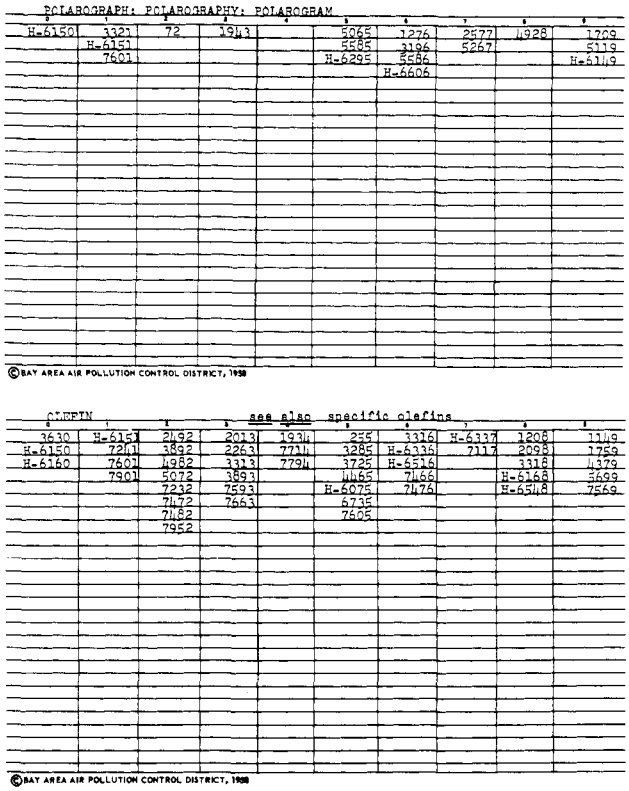

POLAROGRAPH; POLAROGRAPHY; POLAROGRAM

H-6150	3321	72	1943		5065	1276	2577	4928	1709
	H-6151				5585	3196	5267		5119
	7601				H-6295	5586			H-6149
						H-6606			

OLEFIN — see also specific olefins

3630	H-6151	2492	2013	1934	255	3316	H-6337	1208	1149
H-6150	7201	3892	2263	7714	3285	H-6336	7117	2098	1759
H-6160	7602	4982	3313	7794	3725	H-6516		3318	4379
	7901	5072	3893		4465	7466		H-6168	5699
		7232	7593		H-6075	7476		H-6548	7569
		7472	7663		6735				
		7482			7605				
		7952							

ACCESS NO. 7601

MF REEL NO.

AUTHOR Mayrsohn, H. and P. P. Mader

TITLE Polarographic properties of smog aerosols

EDITION

PUBLISHER

PLACE Presented at ACS, 136th (1959) meeting Atlantic City

DATE

PAGES

PERIODICAL Intern. J. Air Pollution

VOL. 2 NO. 3 PAGES 283-290

DATE March, 1960

AEROSOL
ANALYSIS
ATMOSPHERE
CITY
EXHAUST GASES
GASOLINE
INSTRUMENT
LEAD
MOTOR VEHICLE
NITROGEN OXIDES
OLEFIN
OXIDANT
POLAROGRAPHY
SMOG
AM. CHEMICAL SOC.

Fig. 1—A comparison of the two uniterm cards yields three matching numbers, two in hard copy form and one on film. The bottom card is the accession card for the filmed article.

index cards, discussed further below.

EQUIPMENT AND STORAGE. -- The components of the "micro" library--the index and the majority of the 6,500 accessions from the SRI project--were housed originally in just one seven-drawer filing cabinet. "Hard copy" material occupied about four shelves of divider shelving. Floor space of 379 sq. ft. has been ample for additions in literature holdings, furniture, and equipment acquired in the last three years. The "micro" library now requires one cabinet for the index cards and one for the microfilm (in film jackets). Shelf space has grown to three sections of wall shelving for books and reports, and five sections of double shelving for periodicals.

When a length of 100 ft. of negative film is reached, positive and Ozalid copies are made and the original negative reel is sent to the vault service of Western Atomic Storage Co., in the Santa Cruz Mountains. The positive film is cut into strips and mounted in acetate jackets for our active files.[2] The duplicate negative reel is kept in a humidified cabinet. The decision to keep an additional negative film on the premises was made originally as a safeguard in case a film jacket were lost. This precaution proved to be unwarranted. We have suffered no losses, and a color-coding system signals misfiled jackets. However, the extra negative is now proving its value for another reason. Our microfilm reader is 3-M's "Filmac 100," which prints page-size enlargements from the film at the touch of a button.[3] Occasionally we have difficulty obtaining good clear prints with our reader-printer from positive film mounted in acetate jackets. Quick prints resembling photostats can be made from the jackets, but much better black-on-white prints can be printed from the negative film. Some disparity of focus may also be blamed on the acetate jackets. For printing out very long articles, we usually take a few extra minutes to select a numbered container from the humidified cabinet, and crank the 100-ft. reel around to the correct article on negative film. This gives clear positive prints for the patron's use. A Copease Book-Copier is used to photocopy pages from full-size material.[4]

LITERATURE SOURCES. -- In addition to purchasing newly published books in full-size form we also acquire reports, reprints, proceedings of meetings, and abstracting bulletins from many national, state, and local agencies. Air Pollution Control Association Abstracts and Public Health Engineering Abstracts inform us of recent publications in our field of interest. We subscribe to approximately 60 technical journals, and receive about as many free periodicals and newsletters from other agencies and industrial organizations, and from staff members who belong to professional societies.

ABSTRACT BULLETIN FOR LIBRARY ACQUISITIONS. -- Technical staff members help to compile a bi-weekly listing of library acquisitions in the following manner: Technical journals received in the library are immediately delivered to staff subject specialists, e.g., Refuse Removal Journal and Combustion to our principal engineer in charge of refuse disposal and incinerators, Analytical Chemistry to the chief chemist, etc. These "experts" fill out a review form listing 2 or 3-line summaries of all the air pollution articles in a particular magazine, and note which articles are worthy of indexing. Twice a month the review sheets are edited, titles of new books and a few reports are added, and the information is typed as a 1 to 3-page abstract bulletin containing approximately 8

abstracts per page. There are four periodicals which deal specifically with air pollution, the monthlies Journal of the Air Pollution Association and Air Engineering, and the quarterlies International Journal of Air Pollution and Smokeless Air (London). These are not reviewed but are merely listed as "must see" upon their arrival in the library. Copies of the bulletin, called Library Briefs, are distributed to the District's staff, Hearing Board, and members of the Advisory Council (a 20-member panel of citizens who represent major industries and community activities of the Bay Area). In this way persons who are directly responsible for the effective operation of the six-county agency are kept informed of current happenings in air pollution science and technology.

Just after Library Briefs is delivered to the office mail baskets there is a noticeable increase in visits to the library by our staff of 44. They look up the articles which were brought to their attention, and often request photocopies or loans for more detailed reading. A phone call or mail request from a Hearing Board or Advisory Council member is honored by a photocopy of the requested article, or the loan of a book, in his next day's mail.

Library Briefs is intended for internal distribution only. In addition to its "announcement" value, it serves the library staff as a checklist for articles to be filmed and indexed.

The District also has a free monthly publication called Air Currents, which has a distribution of 3,800 throughout the United States. It gives news of the operation of the air pollution agency and is directed mainly to Bay Area industries. Five to eight titles a month are selected from Library Briefs for inclusion in a "What's New in the Library" column in Air Currents. This is the District's way of informing the general public of new air pollution writings.

DISPOSITION OF PERIODICALS. -- At the end of the year the Uniterm index is checked against Library Briefs, and filming is completed before the magazines are either discarded or bound. By discarding most of the magazines after air pollution articles are added to our film library, and binding only those journals which are specifically devoted to the scientific disciplines of air pollution, we are able to make the most efficient use of our limited shelf space. The periodicals we keep as bound volumes are: Air Engineering, Journal of the Air Pollution Control Association, American Industrial Hygiene Association Journal, Analytical Chemistry, Archives of Environmental Health, Industrial and Engineering Chemistry, International Journal of Air Pollution, and Meteorological and Geoastrophysical Abstracts. Except for the abstracting journal, these periodicals provided 60% of the articles indexed from our library subscriptions during the years 1958, 1959, and 1960.

This practice of binding seems somewhat paradoxical to the scheme advanced by University Microfilms, Inc.--to substitute microfilm subscriptions for the cost of binding.[5] It should be remembered that our index is keyed to microfilm. Because each filmed item is specifically indexed, it can be located quickly with the Uniterm cards. The film is our "reference" copy which never leaves the library. The bound volumes of periodicals, containing articles which have once been filmed, can be removed--and are bulky enough so that they are not easily misplaced. This duplication insures the availability of frequently used material for reading or reproduction purposes.

EXTERNAL SOURCES OF MICROFILM. -- At the present time we are trying an acquisition method which may prove to be our largest single source of non-District material. We pay the University of California an annual fee for a "special" library card with stack privileges. When numerous requests for outside material have accumulated, a day is spent on campus selecting journals and reports to be filmed by the University's Photoduplication Services. The microfilmer is supplied with the District's identification target and a set of numbers. He then films our assigned accession number before each separate article, at our prescribed 17 to 1 reduction ratio. We have also obtained microfilm from other photoduplication services throughout the United States.

SERVICES

LOCAL SERVICE. -- The main services provided by our library have been mentioned: the abstract bulletin announces newly acquired air pollution literature, and the Uniterm index allows for retrieval of film and hard cover items already incorporated into our storage system. The library staff provides ready reference service to the public, but District employees do their own literature searching. Most of the staff scientists have specialty fields in which they must keep well informed. Some of them keep blank term cards which list the matching numbers for certain term headings. Occasionally these men visit the library to check their record cards against the library cards for new additions.

SUBSCRIPTION SERVICES. -- Our library service does not stop at the boundaries of the six Bay Area counties. A subscription service has been initiated which provides distant agencies with the searching facilities of the San Francisco information center. At the present time there are two duplicates of this library's index in the country. In 1959, a copy of the card catalog was sold to one national agency, the U. S. Public Health Service, and in 1960 another copy to one state agency, the Air Pollution Control Board of the New York State Department of Health. The following method was used to supply them with

cards. First, the complete index was microfilmed; thus providing us with the additional benefit of a fire insurance copy for our remote storage vault. The filming was done by a commercial microfilmer according to the requirements of a Xerox Copyflo Printer.[6] Next, the film was fed into the Copyflo and a card set was printed electrostatically for only a few pennies per card. When the second order for an index was processed a few months later, there was no need to disturb the index cards. The film was sent to the Copyflo and approximately 17,000 printed cards were ready for delivery in a day's time. Since our two "branch" libraries were set up we have supplied them with additional index cards at six month intervals. When the number of items indexed begins to pick up, this service may change to a quarterly basis. Libraries enrolled in our service are sent new accession cards and any newly generated term cards. They are expected to "post" the terms from the new accession cards onto their existing term cards. Posting duties are alleviated somewhat because the shipments also include up-to-date reproductions of many heavily-used term cards.

Agencies wishing to join our subscription service would be charged approximately $2,000 for the basic index and the extra cards added to January, 1961. Thereafter, they would join our other subscribers in paying 20¢ per card for additions in July, 1961, and in subsequent shipments. This cost for copies is nominal compared to the cost of the initial library. Including the $39,000 project at Stanford Research Institute, it is estimated that well over $50,000 has gone into the organization of this material. Quick calculation will show that the price of a copy of our library index is only around 4% of the cost of the original library.

It should be emphasized that a copy of the index will merely allow our subscribers to conduct literature searches and display lists of references. Their next step is to obtain the documents from their own libraries or from nearby libraries. We cannot, of course, provide our film as we have our index cards, because of copyright restrictions on most published materials.

The New York air pollution agency has obtained microfilm and has acquired most of the hard copy items in our collection. Our Public Health Service subscriber, the Robert A. Taft Sanitary Engineering Center, relies on the extensive holdings of its technical library for the indexed literature. Occasionally we are called upon to furnish printouts for some accessions not readily available in the Center's Cincinnati area. We receive regularly technical reports generated by these two subscribing agencies, and index them into our collection.

FUTURE IMPLICATIONS. -- Several papers at the 1960 Annual Meeting of the American Documentation Institute discussed the future of centralized information services. Knox[7] stated that centralized programs are under way in groups such as the American Society for Metals, the Institute of Paper Chemistry, the Institute of Gas Technology, and the American Petroleum Institute. Schultz[8] discussed this trend toward specialization and "personalized" representation of the literature, and suggested an information center of the future which would coordinate the data from many of the existing literature services, such as Biological Abstracts, Chemical Abstracts, and Index Medicus. Fry[9] mentioned the inventory of specialized information services being conducted by Battelle Memorial Institute for the National Science Foundation. He emphasized that one objective of the Foundation is to develop ways of coordinating the special data centers into a national system for serving the needs of the entire science community.

Information on air pollution can be found in several special and public libraries in the United States,[10] but our collection seems to have the built-in features to be the most comprehensive and most accessible of them all.[11] This agency's efforts can become a significant part of some future national system of information centers for the coordinated processing of scientific literature.

ADVANTAGES AND DISADVANTAGES. -- Almost every article on coordinate indexing mentions some advantages and/or disadvantages of the system. Costello has summarized the inadequacies of Uniterm indexing in seven categories.[12] Since solutions already have been given for most of these problems, the following remarks are confined to the air pollution information center as a whole; the combination of Uniterms, film, and hard copy.

There is a possibility that our agency will establish branch offices in each of the member counties of the District. A major advantage of the present library is the fact that the index and filmed articles can be reproduced inexpensively for such future offices.

The Uniterm method is easy to maintain and easy to search, particularly in areas which require deep indexing with special terminology. Consistency of indexing, in our case, is achieved by employing a thesaurus of air pollution terms.

The non-significant accession number readily locates the material in the file, whether it be film or book. However, one of the disadvantages of this factor is the loss of "brows-ability." Books on similar topics were grouped together when the original collection was indexed, but now they must be added to the stacks in the order that they are received. A scientist, led by matching of term cards to a certain accession on microfilm, may wish to scan other articles published in the same periodical on related subjects. If the journal is one of the seven we have chosen to retain, the researcher may select the bound

volume from the periodical stacks for a synoptic perusal. He may then take this full-size material to another location for checking with other files, instruments, or persons.

The binding of chemical and health journals has been particularly helpful to our chemists. They often have short-term interests in certain methods of analysis that may not have been chosen for library indexing at the time of original review of the journal.

We must recognize that it is much more comfortable to curl up with a good book than to sit erect in front of a reader screen with one hand on the focusing lens and the other hand moving the film to the next frame. However, even with these minor distractions, our staff members have adapted to the use of microfilm with amazing alacrity. The search in Fig. 1 took only three minutes, from matching terms to checking accession cards to scanning the film jacket on the reader. Searches in more general subject areas usually take longer. Another advantage of the Uniterm system lies in the ease of converting to machine retrieval.

The disadvantages of printing enlargements from the positive film in jackets have been discussed. It has been suggested that the pleasure of reading black-on-white film could be traded for the advantage of printing positive copies from negative film. This would reduce our film expenditures for two negatives and a positive to the cost of just two negatives (one mounted in film jackets).

We have looked with interest upon the development of a new reader-printer introduced within the last year, the "Documat."[13] This machine has a larger reading screen than the "Filmac," and makes prints of excellent contrast. However, the reading stage is designed primarily for film reels or aperture cards. It will accept only two chambers of our three-chamber 5" x 8" film jackets. The projection head must be rotated 180 degrees, and the jacket re-inserted, before the third strip of film can be read.

ACKNOWLEDGMENT. -- Appreciation is expressed to Benjamin Linsky for his helpful suggestions in the preparation of this paper.

SUMMARY

The Bay Area Air Pollution Control District now has an information center which represents a world-wide coverage of the air pollution literature. A coordinate indexing system was carefully chosen because of the ease of retrieval. The microfilm storage was chosen for its space-saving and reproducibility qualities, and because it was the only practical way of securing old material and random articles from hundreds of different journals published in several different languages. Continuance of the library involves searching and indexing the current literature, entering it into the Uniterm system, and filming and storing the references.

Our agency is presently giving "answering service" to the smog queries of San Francisco Bay Area scientists and other citizens. There are about 30 air pollution agencies in the United States which have good-sized complements of technical and administrative personnel. It is possible that many of these groups will wish to partake of our centralized cataloging service as our work becomes more widely known. With the cooperation and support of the Public Health Service, the Air Pollution Control Association, and other groups, we can envision an expansion from two subscribers to a broad communications network that could feasibly include the majority of the air pollution agencies in the world.

REFERENCES

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(2) "NB Notched Microfilm File Jacket" (Manufacturer's Bulletin), NB Jackets Corp., 31-31 31st St., Long Island City 6, N. Y.
(3) "Thermo-Fax Microfilm Reader-Printer" (Manufacturer's Bulletin), Minnesota Mining and Manufacturing Co., Saint Paul 6, Minn.
(4) "Copease Duplex Book Copier" (Manufacturer's Bulletin), Copease Corp., 425 Park Ave., New York 22, N. Y.
(5) "Unesco Bulletin for Libraries," 11, 53 (1957).
(6) "Xerox Copyflo Continuous Printers" (Manufacturer's Bulletin). Xerox Corp., Dept. X-300, Rochester 3, N. Y.
(7) B. H. Weil, et al., Am. Document, 12, 56 (1961).
(8) Claire K. Schultz and Clayton A. Shepherd, "Directions in the Retrieval of Scientific Information: A Discussion of the Evolutionary Trends within Secondary Sources," paper presented at the American Documentation Institute Annual Meeting, Berkeley, Calif., Oct., 1960.
(9) Bernard M. Fry, "The Role of the National Science Foundation in in the Coordination of Documentation Research and Information Services," paper presented at the American Documentation Institute Annual Meeting, Berkeley, Calif., Oct., 1960.
(10) Benjamin Linsky and Gloria Smith" Proc. National Conf. on Air Pollution," Washington, D. C., Nov., 1958.
(11) Two Southern California air pollution groups have tried coordinate indexing, but no organized effort is being made to keep their Uniterm systems up to date on the over-all aspect of air pollution. The Air Pollution Foundation, with a Uniterm collection of about 3,000 items, will cease operation in May, 1961. The Air Pollution Control District of Los Angeles County has a small specialized Uniterm collection located in the Research Division, but the agency's technical library is cataloged on the Dewey system.
(12) J. C. Costello, Jr., Am. Document., 12, 20 (1961).
(13) "Documat Microfilm Reader-Printer" (Manufacturer's Bulletin). Documat, Inc., 75 East 55th St., New York 22, N. Y.