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BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD NO. 1967/158

PUBLICATIONS AND INFORMATION STUDY TOUR OF U.S.A., CANADA, AND BRITAIN

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C O N T E N T S

SUMMARY

This Record has been prepared as the result of an official visit overseas by the author to the United States of America, Canada and Britain, to study the organizational structure and methods used in the fields of publication and information, by establishments with functions equivalent to those of the Bureau of Mineral Resources.

No single establishment could provide ideal solutions to the outstanding requirements of BMR in these fields. A combination of what are considered the best ideas, is put forward in the recommendations as a basis for improving the organization of and methods used by BMR.

A national geologic index and microfilm system is outlined and a strong recommendation is made that this system be introduced as a basic requirement to solve many of the needs for the storage and retrieval of information.

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INTRODUCTION

During May and June 1967 the author made an official visit to the United States of America, Canada and Britain to study the organizational structure and techniques used in the fields of publication and information, by organizations equivalent to the Bureau of Mineral Resources (BMR).

At all places visited a very friendly welcome and unlimited official help were given.

A brief description is given of the nature and structure of the organizations visited; this is necessary in order to appreciate the lines of approval and communication of each establishment.

The report is then divided under two main headings - Publications and Information; the former includes editorial and drafting services, the latter incorporates enquiries, open file systems, storage and retrieval of unpublished documents, libraries, photographic collections, microfilm and index systems.

Many of the impressions gained and opinions expressed are based on discussions with senior officers and are sometimes tinged with proposals which are not yet official and may not even be committed to paper. In many cases, official documents on recently developed systems or proposals are not available.

The conclusions and recommendations are offered as guide lines for the development of the Bureau of Mineral Resources in the fields of publication and information and are based on the systems in use or being proposed.

FOREIGN ORGANIZATIONS

Each of the organizations visited had been re-organized recently and further re-organization was under consideration. Some of the organizational charts received may not be final official documents; however, by their inclusion in this report they serve the purpose of explaining the variations within any one department.

UNITED STATES OF AMERICA

The United States Department of Interior covers many disciplines (see figure 1). The major arm of most interest to BMR is Mineral Resources and within this arm the Bureau of Mines and the Geological Survey (U.S.G.S.) carry out most of the functions that are performed by BMR.

The Bureau of Mines and the U.S.G.S. were the only groups visited in the United States; their total staff complements are about 5,000 and 8,500 respectively; see figures 2 and 3 for organizational structures. As far as publications and information are concerned they operate independently, with the result that quite different emphasis and techniques have evolved.

The Geologic Division, which is part of the U.S.G.S. has a total staff of 1850. Because the functions of this Division are the equivalent of most of the functions of BMR, it is reported on in more detail than is the U.S. Bureau of Mines. See figures 3 and 4 for the organizational structure of the Geologic Division.

The Office of Technical Reports within the Geologic Division is of particular interest for this report. See figure 5 for the organizational structure. The Chief of this Office has a status equivalent to the Assistant Chief Geologists and he has a staff of approximately 185; 95 of these are library staff. The remaining 90 staff are mainly geologists and draftsmen.

The Publications Division which is part of the U.S.G.S., has an establishment of about 520. Apart from the relatively few draftsmen in the Office of Technical Reports and a very few in some Branches, all the draftsmen are in the Publications Division. All formal publications of the U.S.G.S. are processed by the Division; maps are printed by them but text material is printed by the Government Printer. Note that the Topographic Division is part of the U.S.G.S.

The Bureau of Mines has a pyramidal structure similar to BMR, with Branch and Section heads closely directing the work and therefore the writing for publication. The Year Books which this Bureau publishes are the equivalent of the A.M.I. Reviews of BMR. In addition however, the U.S. Bureau pre-releases all information very promptly with a prodigious number of widely distributed statements, which are the equivalent of press statements.

The U.S. Bureau of Mines also carries out a great deal of mining research and investigation and when related to the staff of the Geologic Division of the U.S.G.S., this would appear by comparison to be an area that is neglected by the Commonwealth Government in Australia. The results of the mining research and investigations are published in series of the U.S. Bureau of Mines.

The U.S.G.S. structure is unique within the Department of Interior; its internal administrative arrangements differ greatly from the Bureau of Mines and in some respects resemble C.S.I.R.O. of Australia.

To generalize, each scientist of the U.S.G.S. works on a specific project; his one aim is to publish his results. His scientific opinion is subjected to review by fellow scientists who are selected by the author and his Branch Chief. Promotion is determined by performance in publication and ability to review the work of others.

Whilst there is a limit fixed by the government on the maximum number of positions for each grade within the U.S.G.S., there is no pyramidal structure for the professional staff.

All relevant administrative posts are filled on a rotation basis by scientists selected on their administrative and scientific ability and potential. The very senior posts are filled for a period of about five years and Branch Chiefs for a period of two years. Apart from staff training and distribution of administrative duties, a philosophy on rotation is that after a few years an officer has lost his initiative to enquire into and improve existing systems.

The Director of the U.S.G.S. is appointed by the Academy of Science, not the Civil Service, and the other administrative posts on selection within the U.S.G.S. The situation arises frequently where a Branch Chief is of junior financial rank to some members of his Branch, but publications under these circumstances still pass through the Branch Chief for approval.

Whilst occupying an administrative post, an officer continues with his interest in his particular project. Perhaps this is best illustrated by the example of the past Director of the U.S.G.S., Dr. T.B. Nolan, who continued to do two months field work each year on his Nevada project during his term of office; he now occupies "a room down the passage" in a Branch, from where presumably he devotes his whole time to his project.

The system and philosophy within the U.S.G.S. is the envy of many of the officers in the Bureau of Mines and the U.S.G.S. strongly defends its position from moves by the Civil Service to make it conform.

CANADA

The Department of Energy, Mines and Resources, Canada, carries out most, if not all, of the functions done by BMR. Related activities are undertaken by a number of Branches; see figures 6, 7, 8 and 9 for the organizational structures. Note for the purpose of subsequent discussion that a Branch in this Canadian Department is senior to a Division, followed by a Section. (There is a move to upgrade the Mineral Resources Division to a Branch).

Each Branch is based on a pyramidal structure and operates independently in the preparation of material for publication and the storage and retrieval of data and information.

A departmental office, Public Relations and Information Services, has been established in recent years and processes some of the publications from most of the Divisions, through the printers. The full functions of this office are still being developed.

BRITAIN

The Institute of Geological Sciences is undergoing a major reorganization. It is part of the Natural Environment Research Council which answers direct to the Minister for Education and Science.

An official organization chart was not made available, probably because of the proposed changes. Figure 10 gives a partial structure for the Institute but it was an oral communication and is known to be incomplete, e.g., the Atomic Energy Division is not included because at the time of writing, the line of authority to the Director of the Institute was not known by the author. The Overseas Geological Survey is likewise not included in the structure but it has now become part of it.

PUBLICATIONS

UNITED STATES GEOLOGICAL SURVEY

The publications procedures of the Geologic Division of the U.S.G.S. appear to be the most orderly and therefore best understood; they are reported in more detail than those of the other establishments.

The publications of the Geologic Division are:

BULLETINS - About 49 issued each year. Lexicons and bibliographies are in this series.

PROFESSIONAL PAPERS - About 45 issued each year. Annual Report is published in this series.

CIRCULARS - About 25 issued each year. These must be short papers, of temporary interest, or are produced for public relations. The author may produce the article from his own initiative or be prompted. They are produced quickly by offset from justified master.

PAMPHLETS - Are non-technical, issue is irregular and the author may be from anywhere.

GEOLOGIC QUADRANGLE MAPS - About 122 issued each year.

INVESTIGATIONS MAPS - (Including geophysical). About 32 issued each year.

GEOPHYSICAL ABSTRACTS - ABSTRACTS OF NORTH AMERICAN GEOLOGY: - Published monthly by offset process using a Friden punched paper tape and Photon Phototypesetter to produce photo-copy.

Virtually all technical information is published.

STYLE AND CONTENT

The U.S.G.S. publications are all good quality printing work, with text matter normally in letter press. In order to reduce delays, consideration is being given to doing more work by offset. With the improving offset methods, the quality of production should not differ greatly from letter press and by controlling the processes internally up to final photo master, delays should be reduced.

All printing, other than maps, is done by or through the Government Printer, where delays are considered to be excessive.

An interesting method for producing quality master copy is by use of a Photon optical setting machine. This is described in Appendix I. Geophysical Abstracts and Abstracts of North American Geology by the U.S.G.S. are prepared by this method.

House rules, style and general layout of publications are well documented in a U.S.G.S. style manual, Guide to Indexing Bibliographies and Abstract Journals of the U.S. Geological Survey, Suggestions to authors of the Reports of the U.S.G.S.

In the past, Professional Papers were considered the prestige scientific series of the Geologic Division of the U.S.G.S. and Bulletins played a secondary role, much the same as the Bulletins and Reports of the BMR. However, the latest development is to make no distinction in the content of the two major U.S.G.S. series but to determine the series in which a report is to be published by the convenience of the paper size to the content. This is mainly determined by the nature of the illustrations.

Another interesting development is the flexibility of design and quality of production within each series. Depending on the popularity and aim of a publication it can range from high quality, cloth bound, letter press, coloured illustrations, such as Professional Paper No. 541, "The Alaska Earthquake March 27, 1964 Investigations and Reconstruction", by Wallace R. Hansen et. al. to, in the other extreme, a soft covered offset production. Design of cover is also flexible, with an aim to make the more popular publications attractive with illustrations which may be coloured.

FLOW OF PUBLICATIONS

For this discussion refer to the flow diagram, figure 11.

Each scientist within the U.S.G.S. works on a personal project with the intention of publishing his results. When his manuscript, which may be in the form of a map, is ready he submits it to his Branch Chief and together they agree on two or more technical reviewers to whom copies of the manuscript are forwarded. Reviewers may be junior or senior in rank to the author and may even be outside the U.S.G.S.

The reviewers examine the manuscript promptly and critically and return a competent, written review to the author. Forms are used for this exercise. An officer's ability to review as well as to publish is taken into account for promotion.

On receipt of the reviews, the author must reconcile his report with any criticisms made or present convincing arguments as to why his opinion should prevail, and forward all to his Branch Chief for approval.

The manuscript, reviews, and Branch Chief's approval are then forwarded to the Office of Technical Reports. The staff of this Office are scientists and draftsmen and they scrutinize the manuscript and make it suitable for the Director's approval. This scrutiny is concerned with standards, names, abbreviations, references, bibliographies, illustrations. The Chief of the Office of Technical Reports makes the final decision as to the suitability of the manuscript for the series that has been originally recommended by the author.

When the manuscript has passed all tests it goes to the Director for approval. This involves a reading by a very knowledgeable, aged geologist for policy content. If he is unable to recommend a manuscript for approval it is read by the Associate Director and if necessary the Director. On the ultimate retirement of the Director's reader, his responsibility will probably pass to the Chief of the Office of Technical Reports.

When a manuscript, which is to go into one of the series of the U.S.G.S., is approved, it is forwarded to the Publications Division for preparation for the printer and processing through the printing stages. This involves a literary edit, fair drawing of illustrations and maps, lay-out and colour design, proofing and liaison with the printers. The Division prints its own maps, including topographic maps, and because they have developed skills in this regard they are recognized as the government printer for maps and do this work for other departments.

Amendments made to a manuscript anywhere along the line, are referred to the author for concurrence. The Office of Technical Reports is the liaison between the Publications Division and the author.

In general, work prior to printing is done at the Region Office where the author and his Branch Chief are located. Officers of the Office of Technical Reports and the Publications Division are at each Region Office. If an author is particularly difficult to deal with or if the work load does not permit, the preparatory work may be done at a remote Region.

When a manuscript is approved by the Director for publication outside the U.S.G.S. series, it is returned to the Office of Technical Reports where it is given a literary edit and illustrations and maps are prepared for reproduction. It is then returned to the author to make the necessary arrangements with the publisher.

The average time taken for a manuscript to be processed for the Director's approval, after it is first submitted by the author, is four to

five months. It takes an average of 12-18 months to publish after the Director's approval. This is a big improvement on the output of about five years ago when the time taken was four to five years to publish.

DRAFTING

It is significant to note that with very few exceptions there are no drafting officers in the field Branches. Time did not permit a visit to geophysical branches but it is reasonable to assume that they are similarly organized.

A field geologist is provided with a stable mylar base map with topographic detail printed in brown or green on the reverse side. The geology is noted on the top side of the map and if the field compilation is suitable, it is submitted to the Branch Chief. Otherwise the map is redrawn by the author when he returns to the Region Office.

The author also prepares a hand coloured map, recommending the colours to use.

After review and approvals, the manuscript goes to the Branch of Technical Illustrations, which is part of the Publications Division. The officers of this Branch are draftsmen and assistants and they do colour design, drafting and masking.

A three colour system is used, comments on which are given in Appendix II.

The average time taken to prepare a map for printing after Director's approval is six months.

Block diagrams and other illustrations are processed along the same channels as the maps.

PALAEONTOLOGICAL ILLUSTRATIONS

The U.S.G.S. no longer uses the collotype process for detailed photographic illustrations. This has been brought about by the long delays in getting collotype work done and also the improved offset processes. The 200 line screen is very good and the 300 line screen is considered by the U.S.G.S. to be as good as collotype.

Professional Papers Nos. 419 and 564 are samples of 200 and 300 line screen productions respectively.

A difficulty had been experienced in the irregular reproduction within a plate of fossil illustrations. By accident it was discovered that there was a variation in the photographic paper used for the prints of individual specimens which go to make up a composite plate. Some of the paper is fluorescent and variations may occur within each packet of paper. All photographic paper is now sorted under black light and the paper showing fluorescence is discarded from use for this particular type of work.

UNITED STATES BUREAU OF MINES

The United States Bureau of Mines has a system of publications which is quite different from that of the U.S.G.S. In general, more emphasis has been given to the speed of production rather than the quality of printing.

The publications are effective and in most cases produced promptly by internal machinery. They are being reviewed with a view to improving the presentation.

The publications of the U.S. Bureau of Mines are:-

Bulletins - Reports on major investigations.

Reports of Investigation - contain new research work.

Information Circulars - contain no original material.

Minerals Year Book - 4 volumes, letter press.

Mineral Industry Surveys - virtually press statements at monthly, quarterly or annual intervals on all relevant commodities, as appropriate.

Preliminary Annual Statement - issued on 1 January from sampling of industry taken about November.

Foreign Mineral Reports

Special Publications - include abstracts of other publications.

As is the case with the U.S.G.S. virtually all technical information is published.

STYLE AND CONTENT

"Style Guide for Bureau of Mines Manuscripts" and "Illustration Guide for Bureau of Mines Publications" together with the Style Manual of the Government Printer are the reference documents for the U.S. Bureau of Mines Publications.

The Bureau aims to produce as many of its publications as possible within the Bureau and to this end it has established an offset printery at Pittsburgh, Pennsylvania. Exceptions are Bulletins, Minerals Year Books and possibly special reports, all of which are produced by letter press by or through the Government Printer. Dissatisfaction with the Government Printer is one reason why the offset system was established.

Electric typewriters are used for the production of the master photo copy. Proportional spaced type face is not normally used because of an apparent prejudice, but this may alter following a review that is being made. The right hand margin is not justified for off-set printing.

A fairly clean final copy of the manuscript for offset printing is submitted to Pittsburgh where an officer of the publications unit determines the lay out according to the style guide. An experienced typist types the master copy on a duplimat or on white paper for Xerox production of a duplimat.

Details of the content in each of the series is given in the introductory pages of the "List of Bureau of Mines Publications and Articles".

GEOLOGICAL SURVEY OF CANADA

The annual publications of the Geological Survey of Canada average:-

6 Memoirs	-	Letterpress	-	1500 copies
20 Bulletins	-	Letterpress	-	1500 copies
60 Papers	-	Offset	-	1350 copies

20-25 coloured Geological Maps

60 Preliminary Geological Maps.

In addition, 10 to 15 Topical Reports are issued annually. These are unpublished; about 50 copies are made and they are not sold.

The Papers, which are the main output of the Geological Survey, are not processed through the departmental Public Relations and Information Services office.

Two very popular papers are brought out annually; Paper 1967/1a and Paper 1966/1b are examples. Paper 1a is a report on field activities of interest. Manuscript and drawings are submitted to the Chief Scientific Editor by the end of October each year and the Paper is released with a press statement made in the first week of January. Paper 1b is published about July each year and contains short papers on the work of the laboratories; if significant, a field report could go in this Paper.

This system of reporting is strongly recommended by the Chief Scientific Editor.

SIMILAR TO U.S.G.S.

There are many similarities between the U.S.G.S. and the Canadian Geological Survey concerning publications. Significant similarities are:-

1. publication is of prime importance and is a factor in determining promotion.

2. almost all technical information is published.

3. a critical reader is nominated by the author's chief for all manuscripts submitted.

4. the technical editing staff and draftsmen are not in the field Divisions; Divisions are the equivalent of BMR Branches.

5. a literary edit and processing through the Queen's Printer is done, but not always, by a departmental group outside the Geological Survey.

6. because of unsatisfactory service from the Queen's Printer, offset reproduction with master copy produced within the Geological Survey, is being investigated.

7. a large publication takes about eighteen months to print.

STYLE AND CONTENT

No general guide lines are given but the Chief Scientific Editor controls the standards. He proposes moving to one series of publications but does not have firm ideas yet. Some thoughts are that the size would be about quarto; there would be a variety of material, both in size and content; reproduction would be by letter-press or offset and some may be double column; the number of copies and circulation would vary depending on the nature of the publication. The Chief Scientific Editor would prefer to downgrade the presentation in order to achieve quicker results; he virtually approves all manuscripts for the Director.

DRAFTING

With the exception of one draftsman who assists the Division of Exploration Geophysics, all draftsmen of the Geological Survey of Canada are in the Cartographic Section under the Chief Scientific Editor. See figure 8 for the structure of this Section.

Maps and illustrations from the geologists are processed through the Division Chief, critical readers, and scientific editors before they go to the Cartographic Section.

There are sixty draftsmen in the Section and they do the compilation and fair drawing of all official publications of the Geological Survey. This involves 20-25 coloured and 60 preliminary geological maps and 400 illustrations each year. Many of the illustrations are the equivalent of the coloured geological maps but because they are not in a numbered series they are not listed under maps. The Section does the colour separation and combines colour, but the three colour system of the U.S.G.S. is not used.

Map printing is done by the Surveys and Mapping Branch.

Illustrations for outside publications are done by contract.

The Cartographic Section is divided into compilers and draftsmen. The former classification was created to give the skilled officers an avenue of promotion.

When a map or illustration manuscript is received, the compilers prepare it by eliminating all possible problems which may arise. The Chief Draftsman then carries out the colour design, based on the author's recommendations and standard practices. Apart from the 1:1,000,000 scale maps, an age colour scheme is not used because most of the mapping is in Precambrian and the colour range would be too restricted.

If an author's copy is good enough it would be used for the preliminary geological map without further drafting.

Most of the final drawing is done by scribing techniques.

Apart from the photographic requirements for drafting, the Cartographic Section does not handle or control photographs. Aerial photographs are controlled by the Surveys and Mapping Branch.

The Cartographic Section prepares illustrations and slides for official talks if these cannot be done by contract.

Very little if any drafting is done by the Cartographic Section for the Division of Exploration Geophysics because the surveys are done by contract, which includes the printing of maps.

CANADIAN DOMINION OBSERVATORY

The Publications of the Dominion Observatory have evolved somewhat differently from other Branches of the Department of Energy, Mines and Resources.

They fall into three categories:

1. "Publications of the Dominion Observatory" contain papers on any subject, of any length and are on a certain paper size. They are issued irregularly but come out in order of number with the pages being consecutively numbered within a volume. Each volume is completed when the number of pages reaches a convenient size for binding.

2. "Contributions from the Dominion Observatory" are reprints from outside journals. They are bound in volumes and each volume is complete when a group of reprints reaches a convenient book size. The reprints are ordered with special covers and an additional page numbering to suit each volume, from the publisher of the journal.

The page size of "Contributions" is smaller than the "Publications" and if a reprint from an outside journal is on a paper size that is too large for the "Contributions", it is put into the "Publications" series.

3. Gravity maps at 1:500,000, with small booklets, are prepared by the Geophysical Division. Final drafting and printing is done by the Surveys and Mapping Branch of the Department, which takes one to two years.

   Authors prepare their own contour maps. Research is being carried out on contouring by computers and at present plotting is being done by computer output.

Though there are 70 professional officers in the Observatory, there is no formal editor and only three draftsmen who are mainly concerned with preparing illustrations.

Manuscripts for both "Publications" and "Contributions" are reviewed by specialists and technically edited by the Division Chiefs, before they are submitted to the Director of the Dominion Observatory for approval. The Director reads the manuscripts critically, if time permits, before he approves a paper.

"Publications" are then processed through the departmental Public Relations and Information Services office where they are rarely altered in any way before going on to the Queen's Printer for letterpress reproduction and distribution. Though a price is set on the "Publications" they are almost invariably given away as complimentary.

"Contributions" go from the Director to the publisher of the journal where they are further reviewed before publication.

MINES BRANCH - CANADA

Publications of the Canadian Mines Branch are:-

Monographs - one published in 1965.

Research Reports - 30 published in 1965.

Technical Bulletins - 16 published in 1965.

Information Circulars - 10 published in 1965.

Papers in Scientific Journals - 82 published in 1965.

The Branch has a staff of over 200 professional officers, about 50 of whom are authors. It has many traditional systems for publications and does not process any through the departmental Public Relations and Information Services office.

In general, all reporting is first produced as a Divisional Report with a limited distribution and numbering system similar to BMR Records. If suitable, a Divisional Report is processed further as a manuscript for publication in the series of the Mines Branch or in an outside journal.

Whilst the flow of a manuscript through its editorial and approval stages is rather informal, each manuscript is examined by technical reviewers before it goes to the Division Chief for approval. It is then edited by a non-technical Branch editor before going to the Branch Director for approval, where it is read by a senior officer for the Director. Whilst this final reader is mainly concerned with policy content, he finds it necessary to carry out a certain amount of editorial work.

The master copy of the manuscript is then typed, using an electric typewriter, for offset reproduction by the Queen's Printer.

The senior officer who reads manuscripts for the Director's approval recommended the IBM Executive Electric Typewriter for final copy. He advised that one of the last issues of their Abstracts was manually justified in double columns but because of the problems encountered, they will revert to unjustified, single column. He also considers a more formal procedure for processing manuscripts will need to be introduced but he does not favour too many approval steps.

Mines Branch Admin Report ADM 62-1 "Directive for the Preparation of Mines Branch Publications" is the style guide.

MINERAL RESOURCES DIVISION (BRANCH)

The Mineral Resources Division has some functions similar to those of BMR but it is a separate arm of the Department, see figure 6.

The structure of the Division is given in figure 9. It has a staff of about 85, with professional and support staff equally divided.

Publications of the Division are:-

Operators Lists.

Mineral Information Bulletins.

Mineral Surveys.

Mineral Reports.

Annual Preliminary Mineral Reviews.

Internal Reports.

Field Investigation Reports.

Mineral Maps

Miscellaneous Mineral Industry Publications

The Minerals Year Book, which is the equivalent to the AMI, fits into the Mineral Report Series. Whilst this Series is normally letterpress, the 1965 Year Book was done by offset with an unjustified right hand margin. This was done because of the delays in letterpress and also because the Division Chief wished to retain control of copy to the final photo-stage, within the Division.

The flow chart of the Minerals Year Book is given in figure 12. Note the editorial role taken by senior personnel.

Two other aspects for early release of the information contained in the Minerals Year Book are of interest. In relation to the 1965 Year Book, they are:-

1. "Canadian Mineral Industry in 1965" was finalized by December 1965, was printed privately by the Journal which published it in their February 1966 issue but was previously released in January-February 1966 as an Information Bulletin of the Division.

2. Chapters of the Minerals Year Book were printed and released as separates between April and October 1966, and subject to final corrections they return to the Queen's Printer to come out in the bound Minerals Year Book by May 1967. In this way the Canadians have copied the U.S. Bureau of Mines.

   The separate chapters have a wide distribution and are sold.

Mineral Resources Internal Reports MRI 25/58 "Directive for the Preparation of Mineral Resources Division Publications" is the style guide.

INSTITUTE OF GEOLOGICAL SCIENCES - BRITAIN

Publications of the Institute are:-

Memoirs - These may now have coloured photographs and maps.

Regional Handbooks - These are revised about every ten years and are mainly used by students.

Bulletins - These contain a number of papers and may now have coloured photographs. One or two Bulletins are published each year and are edited by an Assistant Director, each taking his turn

Annual Report - This is prepared by the District Geologists and in the past has been compiled by the Director.

Geophysical Papers - This series was started because of the delays in completing papers for a Bulletin; so far one issue has been published.

Well Catalogues

Research Reports

Professional Monographs - Very occasional.

Almost all of the publications from the authors are published in the official series though publication in outside journals is not discouraged. There was a general dissatisfaction expressed at the lack of publication

There are 120-140 scientific officers in the Home Survey of the Institute and there has been no formal editor. The past Director undertook final editing himself.

There appears to be a great deal of informality in the processing of publications and because the extensive re-organisation that is at present being undertaken is bringing several groups together, which have hitherto operated independently with regard to publications, a Publications Committee has been formed. One of the aims of the Committee is to standardize publications by preparing a manual of house rules.

The Overseas Geological Survey, which is now linked with the Home Survey, has had an editorial group and it would appear that an editorial group for the Institute will grow from this.

Apart from the fact that it was rather difficult to assess the varying approaches to publication, little could be gained in discussing many of them as they are recognized as partly unsatisfactory. Some details considered to be of interest are given below.

GEOLOGICAL MAPPING

A programme of 1-mile geological mapping is at present being undertaken. England and Scotland have a total of 360 national grid 1-mile sheets and about 240 sheets are geologically mapped at this scale. Two to three geologists work on a 1-mile sheet so that within any one District there are two parties, each working on a separate sheet. Refer to figure 10 which includes the detailed structure for the staff of one District Geologist.

Each geologist does an average of 25 square miles of detailed mapping in a season. He works on a 6" = 1 mile sheet, each sheet is about 9" x 12" (1½ miles x 2 miles) and there are from 35 to 45 of these 6" = 1 mile sheets in any one 1-mile sheet.

Each geologist does his own drawing and colouring and writes his notes, possibly on the back of the sheet. He calls on the experimental officers of his group to collect samples, and palaeontologists, hydrologists and other specialists and a photographer from the Specialist Services Division for relevant services.

At the end of the field season each geologist marks the area he has completed by colouring on a progress 1-mile sheet for the information of his District Geologist and Assistant Director.

When a 1-mile sheet has been completed, the geologist who has done most of the work is called on to compile the notes and he becomes the senior author. He must achieve agreement with all the authors before the manuscript goes to the District Geologist who edits the map and report.

The District Geologist in turn submits the manuscript to specialists i.e., palaeontologists, petrologists, hydrologists, of his equivalent rank and obtains their approval. This is done formally using a printed form. The manuscript is then forwarded to the Assistant Director for approval; his Drawing Office then does the fair drawings of maps and illustrations before the manuscript is submitted to the Director for final approval. Masking and printing is done in the Ordnance Division of another Department.

AUTOMATIC TYPE SETTING

The Seismological Centre at Edinburgh, Scotland prepares the details for the "Bibliography of Seismology" and the "Bulletin of the International Seismological Centre" on centre-punched cards.

The Centre has a fair amount of sophisticated IBM card punch, verifying, repeat and sorting equipment for processing the work and preparing copy for a local printer. In the near future they intend to send their manuscript in the form of magnetic tapes to a type-setter in Birmingham, where 250 pages of type-set copy will be done by automatic process overnight and returned to the Centre for offset reproduction by some other printer.

MACHINE OUTPUT

The Royal Greenwich Observatory at Hailsham has an interesting process for preparing copy, for publication in a tabulated form.

The figures for the tables are the output from a computer and though the computer can be programmed to give print-out in the form required, the appearance of the output is not acceptable. The output is therefore in the form of a punched paper tape which is processed through an IBM 870 to give photo-copy for offset reproduction.

The output from the IBM 870 is onto a very good quality paper using a "grey" mylar based typing ribbon once only. The cross and vertical lines are ruled later.

The reproduction is very good quality and it is interesting to note that this additional and relatively slow process is used to achieve a better looking publication.

INFORMATION

This section of the report is given under subject headings. As there is a wide diversity in the methods used within each organization and by the different countries; brief comments are made only on those ideas that appear relevant or are of interest.

ENQUIRIES

To get to the core of the organization for answering enquiries was not simple in most places and particularly in the United States of America, because of the size of the organizations. However, the impression was gained, and this was very obvious in some places, that the handling of public enquiries is taken very seriously.

The U.S. Bureau of Mines regards the complete answering of each enquiry as an obligation. Because much of their information is published and free, many enquiries are satisfied by hand-out material. In general, any publication which sells for 45c or less is given away free to a mail request. Requests for other saleable publications are referred back to the enquirer for purchase from the Government Printer.

Enquiries which do not require research into technical literature are either addressed to the Pittsburg office or may be sent there by the other offices. The staff at Pittsburg for this type of work is six non-professional officers and they maintain a store of hand-out literature. One of the two senior staff, they are both female, opens the mail and determines the action to be taken. This is noted on the letter by nominating the publication to be sent or the type of reply to be made and the address is typed on a stick-on label. All is then passed to other officers who arrange despatch.

No letters are filed. The enquiry letter is returned to the sender with the publications or the reply.

Very rarely is a letter typed. A set of nine cards is used to cover almost every type of enquiry which reaches Pittsburg. See Xerox copies of the cards in figures 13, 14 and 15.

If a reply is pending, it is filed loosely under company or author or in a folder for a particular publication if it is in press, and ultimately returned to the sender when the last action is taken.

Letters for any enquiries that are unsolved after six months of the last action taken, are thrown out.

The system used by the U.S. Bureau of Mines for this type of enquiry is by far the most effective seen.

Time did not permit the investigation of details for handling enquiries at many places and particularly as sections within each organization treated the matter differently. Some significant observations are given below.

Information services are usually within the organizational structure which incorporates editorial or library services or both. See figure 5 for the Geologic Division, U.S.G.S. and figure 7 for the Geological Survey of Canada.

The group in the Office of Technical Reports of the Geologic Division, U.S.G.S. handles most of the public enquiries of a general nature concerning geology; some letters requiring special knowledge or information are sent to the Branch most qualified to supply the answers.

The Administrative Officer of the Canadian Mineral Resources Division sees all incoming mail and directs it to the action officer; this duty is considered a high level responsibility. This Division follows the pattern of the U.S. Bureau of Mines by returning the request letter with the reply and finds it most satisfactory.

In general, enquiries requiring technical knowledge or research are directed to the appropriate officer qualified in the particular field. Action taken under these circumstances undoubtedly varies from officer to officer but the impression was gained that the duty is considered important and is executed promptly. In fact, at least some officers in the U.K. Geological Survey made this the first duty each day and visitors are not encouraged before 10 a.m.

OPEN FILE

The Open File systems at the organizations visited are not as effective as that of BMR. The probable reason for this is that by comparison, the other organizations publish most of the type of material that BMR puts on open file and the need to develop an effective system does not exist to the same extent.

The term "Open File" is widely used.

Recent legislation in the United States of America and Canada states that unclassified technical information on government files is to be made available to the public. This appears to be interpreted differently by different officers and in its extreme could become rather difficult to administer. It would be wise to anticipate the introduction of similar legislation in Australia.

The Institute of Geological Sciences, Britain on the other hand has, by legislation, received all company geological reports concerning Britain. It was policy to keep this information confidential for 50 years but recent legislation has reduced this period to 30 years. Making this information available to the public is recognized as a problem and the solution is not obvious.

The Librarian of the U.S.G.S. considers their Open File system is not completely satisfactory. The reports do not fit into a series and when a number of reports become a certain size they are bound into a single volume and given a number which is peculiar to their Washington office; the librarians do not consider this satisfactory. The Chief Librarian considered a microfilm, indexed system would be a good system.

The definition of "published" is officially unresolved within the U.S.G.S. but the Chief Librarian considers that Open File material is legally published though it is not given recognition.

The U.S. Bureau of Mines has very little material on open file and, as is the case with the U.S.G.S., there is very little demand for the information. Each Area Office of the Bureau of Mines seems to operate its own Open File system and this relates to the one Area only.

The California Division of Mines and Geology (State Survey) places University Theses, U.S.G.S. papers of interest and company reports on open file. Most of their own work is published.

The Geological Survey of Canada had nothing on open file at the time of visiting but were about to start. The Chief Geologist advised that he had just issued an instruction that a copy was to be made of unpublished information on technical files and this was to be placed in the library and listed on the cards that are circulated advising of new publications. Because there is not much material in this category he did not foresee any problems.

In Britain, the District Geologist is responsible for releasing information from his Area on open file and must get a written clearance from the company or organization concerned. A marked degree of informality and absence of standards between Districts was noted, but this does not appear to cause any problems. With the increasing number of company reports now becoming available and the demand for these by university staff in particular, the administration of the Open File system in Britain is reported by one Assistant Director as becoming a problem.

The following information goes on open file in Britain:-

1. Water supply bore hole data.

2. 6" = 1 mile coloured geological map "field slips" - this is a spare clean copy of the small 9" x 12" maps which have been prepared, complete with notes, by the field geologist. The copy is made by draftsmen and lodged in the library where the public may inspect and make a tracing or buy a black and white photo copy.

3. Unrestricted company information which is held by the field units. A summary of this information may be published but the full report would not be published.

STORAGE AND RETRIEVAL OF UNPUBLISHED DOCUMENTS

In general, the storage and retrieval of unpublished material is recognized as a serious and expanding problem. Many of the places visited did not have an effective solution and little can be gained by reporting on these. On the other hand, a few of the units had started on systems which appear to have an application to BMR.

The Geological Survey of Canada is working on the preliminary stages of a National Geologic Index and this would appear to be the most useful system. Even so, the method of storing and retrieving the information, apart from by the Index, does not seem to be defined in any detail. This National Index is the basis for part of a proposal in Appendix III of this report.

The Canadian Mineral Resources Division is operating independently on a Mineral Occurrence Index. This is a revival of a system that was commenced a few decades ago. A 10" x 12" card is used for each mineral occurrence and an abstract of each published and unpublished article relating to a particular occurrence is entered on its card. Two officers are employed on the work of the Index, and they estimate that there are 50,000 mineral occurrences in Canada. Each officer does two to three occurrences daily and to date have completed 10,000. At this rate they will take about 30 years to catch up on the present information. On the surface it would appear that the information would lend itself to the National Geologic Index which the Geological Survey is working on.

The Director of the Institute of Geological Sciences, Britain, recently announced that all the unrestricted geological information held by the Institute would be made available, on line from a computer, to the public. This is an ambitious project which will be difficult to achieve. A Committee has been formed to investigate the problems involved and at the time of visiting, each section was trying to devise suitable methods for handling its own particular set of information.

The U.S.G.S. is investigating the storage of information in computer form and having it accessible on line to offices throughout the United States.

The most efficient, traditional storage of information noted is at the headquarters of the Alaskan Survey at San Francisco. The success of this system is due in part to the enthusiasm of the two officers who operate it and also to the fact that the work in the area has only been done in recent years and is almost exclusively the work of the U.S.G.S. In essence, all relevant data is collected and stored in one area. Field books are given serial numbers, indexed and filed under the author's name, microfilmed by contract with each page occupying a 33 mm frame and costing 5 cents; the film is stored at Denver, for safe keeping. All unpublished maps and confidential company reports are stored but not microfilmed (this seems inconsistent). Relevant publications are held also and the open file material for Alaska is loaned to copying companies for customers, for copying at the customers' expense.

A similar system was started for another State in America but it was not practicable because of the volume of material; no other comparable system was observed.

Other than for the Alaskan data, the library of the Denver Office of the U.S.G.S. is the storage centre for unpublished data. In theory, all field note books, maps etc. are forwarded to Denver where they are filed under an allotted number. Field books are stored in 4-drawer steel cabinets, small plans are stacked vertically in cardboard folders about 2 feet by 2 feet with flaps, and large plans are stored flat in metal drawers which have a vinyl cover buttoned down over them. The system occupies a floor space about 25 feet x 40 feet and is operated by a staff of four.

The Canadian Oceanographic Data Centre, Ottawa has a staff of 17 actively working on the recording of data for computer operation. The officer in charge considers that one main reason for the success of the Centre is that it is remote from other work of the oceanographic sciences. Extensive use is made of microfilm. Details of the computer usage were not investigated because the data are somewhat different from geologic data, but the locality indexing and microfilming techniques were of interest and are referred to later.

LIBRARIES

In each of the countries visited, the libraries of the Geological Surveys have the main collection of geological literature, but none of these collections is recognized officially as the national geological library. This was considered a matter of some concern by the officers concerned with the administration of the libraries.

The Library of Congress, Washington D.C. is the National Library of America but a national status has been granted to other organizations for some of the faculties. Medicine is one that was quoted.

Time did not permit a detailed study of the libraries at the centres visited. A few notes of general interest are given.

The library of the U.S.G.S. comes under the direct control of the Chief, Technical Report Unit, a geologist. A map librarian is part of the library staff at the U.S.G.S., Washington D.C. The staff totals 95.

The library of the U.S. Bureau of Mines is part of the Department of Interior Library which includes Indian Affairs, National Parks, Fish and Wild Life etc. Officers of the Bureau questioned about this arrangement were not happy with it and considered their library should be amalgamated with the library of the U.S.G.S. It is probable that the U.S.G.S. will move to another building outside Washington and the Bureau of Mines may go with them; this will present difficulties in the distribution of the existing library which is used by the Bureau.

There are no computer oriented libraries in the places visited. The Chief, Technical Report Unit, U.S.G.S. hopes to modernize their library at some future date. A new Chief Librarian of the U.S. Department of Interior has wide experience of computer techniques; he spoke of feeding the individual requirements of all users of the library into the computer as well as data from the literature and as a result presenting each officer with the literature that he should read each week.

The U.S.G.S. library at Menlo Park displays all new accessions for one month or until the next issue arrives, whichever is the shorter, before circulation. There is no automatic circulation of periodicals. Selection of new material and weeding is done by the librarian but she would welcome selection to be made where necessary by the existing library committee. Open file loan copies are through inter-library loan action only.

The U.S.G.S. library at Denver has no qualified geologists on the staff. Bibliographical lists are not prepared and no research is undertaken by the library staff.

The U.S.G.S. library at Washington D.C. occupies 22,000 square feet of floor space and it is not sufficient. No microfilming has been done for the library.

The library staff of the Geological Survey of Canada comes directly under the Staff Geologist. This is a recent change as it previously answered to the Administrative Officer. It operates independently of other libraries of the Department and answers to no other library authority. The Staff Geologist is Chairman of the Library Committee which has respresentatives for each discipline.

The staff of the library comprises a Chief Librarian, one Librarian Cataloguer, one Reference Librarian, two Technical Officers, four Clerks and four students during the summer vacation. The Reference Librarian does no research, except of an historical nature into the literature of the Geological Survey of Canada. Her main duties are to process translations, exchanges and answering queries. The Cutter classification is used; this pre-dates the Library of Congress classification which is the system used by the U.S.G.S.

Geologists do their own research or employ their students during vacation.

The library of the Institute of Geological Sciences, Britain, answers administratively to the Museum Curator, an old tradition, and financially to the Assistant Director, Specialist Services. By tradition also the Institute does not employ librarians but has experimental officers with a B.Sc.

Selection of material for the Edinburgh and Leeds libraries is done by their own staffs, but it is ordered through London. There is no separate library financial vote; expenses are absorbed in a common vote.

Apart from "field slips" which are mentioned earlier, the libraries hold very little unpublished material.

The London library of the Institute has an extensive collection of maps. Each map is mounted on linen with the maps cut into standard rectangle sections which are separated by a gap of about ⅛" where the linen is folded. The maps are in excellent condition and stand vertically on shelves from which they can be easily removed.

A modified Dewey classification is used and their work is fairly well up to date. They have no microfilm and no film readers. They have no plans for computer storage.

PHOTOGRAPHIC COLLECTIONS

The most efficient library of photographs that came to the author's notice was that of the U.S.G.S. It is located at the Denver office and comprises about 140,000 negatives which are filed in individual envelopes in an author's number sequence, in an airconditioned room.

Prints are pasted by a dry process, two to a page, into separate albums for each author. Each print is in order of its consecutive number which is the same as that used for the negatives e.g. Brown 1, Brown 2....., Smith 1, Smith 2 ..... Whenever a photograph is used in a publication it is identified in print by the same number.

Standard author, subject(s), locality, library indexing is used with cross reference to the negative (and album number).

Prints can be located in a matter of seconds.

Colour transparencies are stored in refrigerators in order of an author number and are indexed in the same manner as the black and white negatives and prints.

A staff of four maintains the system; they do no photographic work; and come under the Librarian at Denver. They consider their system is ideal.

The Geological Survey of Canada makes an IBM punched card for each negative and uses an IBM sorter and print-out equipment to list negatives under various headings or "concepts", author and locality. Albums of prints are not kept but prints are usually stored with the negatives.

The Institute of Geological Sciences, Britain does not identify photographs with the geologist doing the work in the area. This is probably because the geologist calls on the services of a photographer from the Sepcialists Services Division, and also does not use a camera himself.

Albums of all photos kept in a consecutive numbering order are maintained with an associated library subject and locality index.

MICROFILM

The most significant observation regarding microfilming is that it is virtually not used by the Geological Surveys and Mines Departments that were visited. All officers with whom the subject was discussed agreed that, because of the increasing volume of information, there was a pressing need for microfilming and that something should be done.

The only practical application in the Geologic Division of the U.S.G.S. that came to notice was the microfilming of the field note books of the Alaskan Survey, reported on earlier. The Chief of the Office of Technical Reports advised that he was interested in installing a microfilm system associated with the library. He was considering microfiche because it was becoming widely used but considered the potential of aperture cards as a means of supplying copies by film and hard copy most interesting.

The only application of microfilm in the U.S. Bureau of Mines is proposed by the Chief of the Division of Minerals Year Book. He has ordered a 3M 2000 Camera for the automatic production of aperture cards, and considers that once his system is operating, many other sections of the Bureau will appreciate the value of a similar system for their own needs.

The U.S. Patents Office uses aperture cards.

Enquiries did not reveal the use of microfilm anywhere in the Department of Energy, Mines and Resources, Canada.

Only one application of microfilm was noted at the Institute of Geological Sciences, Britain. A 3M 2000 Camera was being used to record all water records on aperture cards. There are about 150,000 records to be done and the average rate is 360 per day, working 2 x 4 hourly shifts. It will take 2½ years to complete the present records. It is proposed to punch information into the cards and sort them for

retrieval, but at the time of visiting a system had not been devised. Roll film systems and microfiche were considered before the decision was made to use aperture cards.

The most systematized application of microfilm examined is at the National Oceanographic Data Centre, Ottawa, Canada. Whilst roll film and microfiche are used, aperture cards are used more extensively. The camera for producing the aperture cards is a 3M 2000, which was reported as being satisfactory. Regular resolution checks using a test card and a microscope for reading, indicate that the camera retains its quality.

The Chief of the Centre advised that the diazo prints of the aperture cards could be safely sorted by a machine because the image is in the film rather than on a surface as it is with the silver halide original. He recommends a consecutive numbering system punched into the cards and machine sorting to preserve the cards. If a manual sort is used, heavier cards should be used. His comment on archival quality was that only time can prove this; if the original silver halide film is not archival, the diazo copy is - a statement which was challenged when subsequently referred to a photographic representative.

INDEX SYSTEMS

Enquiries were made of the indexing systems used by the organizations visited with the aim of getting the details of a satisfactorily operating system that could be of interest to BMR.

Very few practical systems were encountered and these had limitations.

The "Geophysical Abstracts" and "Abstracts of North American Geology", which are produced by the U.S.G.S. is a successful system. However, it employs a staff of seven professional officers, two punch-tape operators, and three assistants whose main functions are proof reading and literary editing. In addition, about 100 specialists throughout the U.S.G.S. prepare abstracts on specific topics.

Each entry is confined to 999 tape characters; some of these characters are used for type-face change instructions. Additional index titles or "concepts" are punched at the end of each abstract; they are used for computer sorting of the index and are not printed in the "Abstracts".

The officer in charge of the preparation of the "Abstracts" said that his system was the first and only computer storage of information by the U.S.G.S. It should be noted that unpublished information is not included in these Abstracts. Unpublished information is the main problem in BMR.

The National Geologic Index, which is being given a pilot run by the Geological Survey of Canada, would appear to be very close to the requirements of BMR and Australia. The Canadian system is described in an "Interim Report of the Committee on Storage and Retrieval of Geological Data in Canada".

In practice, the pilot study is being done on the technical information of the Survey by a geologist and two assistants. A defined list of "concepts" is to be used but this list is by no means finalized. In fact, a copy of the interim list was not made available as a guide for BMR because of its apparent unsatisfactory state at the time of visiting. This list of "concepts" is based on a list prepared for Imperial Oil Limited whose list has some 40,000 "concepts" and could only be effective in an elaborate computer search programme.

The only other aspect that is considered of interest is that of locality. The author had hopes of getting a definition of a suitable method of recording locations and areas, one parameter of an index which would be universally acceptable and convenient for exchange of data. However the systems used by the three countries visited varied widely and without considerable conversion were not compatible.

The U.S.G.S. system is based on town and county areas. The Canadian system works on a national grid which is similar to the 1:250,000 grid used by BMR but has a different set of numbers. The Oceanographic Data Centre uses the Marsden Grid which is an antiquated grid used by oceanographers and appears to be unrelated to any numbering system for land areas. The Institute of Geological Sciences uses traditional grids that do not relate to any grid outside the British Isles. In fact, all sections within the Institute do not use the same grid.

All officers who were spoken to about the locality index systems expressed the need for a standard form of specifying locality and considered a decimalized latitute and longitude would be logical. An international meeting on this subject was held in New York during May 1967 and a representative of the U.S.G.S. attended. It is understood that a five decimal point latitude and longitude system was proposed but not finalized; a definition of the system was not available.

CONCLUSIONS

Many of the difficulties experienced in obtaining ideal ways of handling the growing problems of publication and the storage and retrieval of information are common to the Geological Surveys and Mines Branches of America, Canada, Britain and Australia. Human nature would appear to be a major cause of many of the difficulties that are experienced. Successfully operating systems could usually be attributed to the enthusiasm and efficiency of an individual or group of individuals.

In general, there appears to be a greater degree of efficiency and co-ordination, more clearly defined aims and more confidence in the operating systems in the U.S.G.S. and U.S. Branch of Mines than in Canada and Britain,

Organization, delegation and accepted rotation of relevant top administrative posts of the U.S.G.S. makes this establishment the most ideal to emulate in these respects.

PUBLICATIONS

The Geological Surveys and Mines Branches of America and Canada give more prominence to the role of publications than does the BMR. Relatively little of their public information is in a form similar to our unpublished Records.

At each of the places visited, the responsibility of editing is at a high level, giving the impression that publication is of prime importance.

The practice of formalized technical review prior to editorial treatment, is common to all establishments. Ability to review is one of the criteria for promotion in the U.S.G.S.; publication is a criterion common to all.

Dissatisfaction with the time taken to print, and in particular by the Government Printers, was expressed at all establishments that are dependent on outside printers. The trend in the U.S.G.S. and Canada is to produce as many manuscripts as practicable in a final form for offset masters. Reviews are being carried out to further this practice, even at the expense of quality of reproduction.

Fewer series and greater flexibility of quality and content is another trend that is developing; this is particularly the case in the U.S.G.S.

DRAFTING

The drafting services of the U.S.G.S. and the Geological Survey of Canada are centralized, with virtually no representatives in the field Branches. All fair drawing and art work for official publications are done by the drawing offices; only maps and illustrations for outside journals by Canadian authors are done by contract.

The organization of the Institute of Geological Sciences, Britain is somewhat different from the other Geological Surveys but even so the drafting services are centralized within each of the three Areas.

INFORMATION

Public enquiries are handled with varying degrees of efficiency but in general, detailed replies are considered an obligation.

Open file systems operate to some extent at all places visited. There does not seem to be any system better than that of BMR, but because other establishments have little unpublished public information, the need is not as great.

Storage and retrieval of unpublished documents is an unresolved problem to a very large extent.

Libraries are mainly satisfactory with no firm proposals for computerized systems anywhere.

The control and administration of each of the geological libraries is supervised by professional officers.

The library of the U.S. Mines Branch is integrated with other disciplines but the users questioned about this arrangement did not consider it satisfactory.

Photographic and map collections are maintained as parts of the geological libraries; standard library indexing methods are used for retrieval.

Microfilm is virtually unused by the Geological Surveys and Mines Branches although the need for such a system is well recognized.

The most satisfactory indexing system for geological information is being given a pilot run by the Geological Survey of Canada. The only other established system is that in use by the U.S.G.S. for the preparation of the geological and geophysical abstracts of published material.

There is a great divergence of locality indexing methods in all three countries visited and a common desire for a universal system.

RECOMMENDATIONS

The following recommendations to amend or add to the existing BMR systems are based on the better ideas that are used by equivalent organizations to BMR in the United States of America, Canada and Britain.

PUBLICATIONS

The Bureau should publish most of the information which is at present contained in Records.

The publication series of BMR should be along the following lines.

Bulletins. The main criteria for this series should be the page size e.g. B5. The content should be those reports whose illustrations are best suited to this page size.

Reports. The main criteria for this series should also be the page size e.g. A4. The content should be those reports whose illustrations are best suited to this page size.

Records. Could remain an unpublished series at size A4 but be confined to restricted, confidential and internal-use-only reports.

P.S.S.A. Publications. Could remain unaltered as they are a temporary series only.

Explanatory Notes, Geological Maps and Geophysical Maps. Could continue as at present.

AMI Annual and Quarterly Reviews. Could continue as at present but with pre-release of all the information contained in them. In this regard the systems used by the U.S. Bureau of Mines and the Canadian Mineral Resources Division could be copied. Basically, each chapter of Mineral Year Books is printed as soon as possible after it is written and issued as a separate. The final compilation and release of the Year Book may be up to nine months after the release of some chapters.

Another example is the issue on the 1st January each year of a Preliminary Annual Statement of the United States mineral industry; it is based on a sampling of the industry made in previous November.

Booklets. In addition to the existing booklets which in most cases have a short life, consideration should be given to the publication of a range of popular publications on geology.

PUBLICATION OF PAPERS

Short papers by BMR authors should be published regularly in either the Bulletin or Report series. The successful bi-annual Papers 1a and 1b of the Geological Survey of Canada could be copied.

PRESENTATION

The cover, quality of print, number of copies printed and distribution of Bulletins and Reports should be flexible and determined by the demand that each publication is aimed to meet. The range could be from a hard cover depicting a coloured illustration, letterpress, good quality paper and coloured illustrations for a popular publication, to a soft covered, unjustified right hand margin, offset reproduction with sufficient copies to meet a limited demand only.

The only feature that would be predetermined would be the page size.

PREPARATION OF COPY

Steps should be taken to prepare good quality camera-ready copy within the Bureau for offset reproduction. Proportional spaced electric typewriters should be the minimum requirement, with the aim for an automatic system, such as the Photon Phototypesetter as outlined in Appendix I. Such a system is letterpress quality and could be used for Explanatory Notes, AMI Reviews, as well as those Bulletins, Reports, and other publications which justify this treatment.

BMR STYLE MANUAL

A BMR Style Manual should be prepared for the guidance of authors, editors and the publications processing group. In addition to any ideas that may be adopted from the foregoing recommendations, the use of illustrations larger than page size should be discouraged.

TECHNICAL REVIEW

The formal system of technical review which is standard practice in almost every organization visited, should be introduced.

DRAFTING

All draftsmen should operate under a central control and aim to do all fairdrawing of maps and illustrations for BMR publication. Scribing techniques should be used as much as practicable; semi-skilled staff should be employed for this purpose.

Authors should produce copy suitable for the draftsmen to work on with a minimum of liaison.

ORGANIZATION FOR PUBLICATION

Editors, draftsmen, staff to process for publication, release, distribute and sell should operate as a single unit.

MAIL ENQUIRIES

All incoming mail requesting technical information should be examined by a senior officer who is competent to assess the type of reply required.

Technical enquiries requiring a special knowledge would be directed to the appropriate specialist, nominating a direct or draft reply, if the information section could not handle it; the present filing system would be used for this purpose.

Enquiries that can be replied to with a standard letter, or satisfied by the sale or hand-out of a publication would be returned to the sender with the reply and no further record would be kept. Standard letters or cards along the lines used by the U.S. Bureau of Mines should be prepared for this purpose. The senior officer who examines the mail would either nominate the type of reply or hand all this type of mail loose to a subordinate officer for detail action.

Any enquiry that is not resolved after six months and for which there is no intermediate correspondence, would be destroyed (with certain reservations).

RELEASE OF INFORMATION

Short news items on the mineral industry and preprints of the chapters of the AMI Reviews should be issued promptly and widely distributed by the Director of BMR. The short items could be printed by offset on a designed BMR headed paper. The system used by the U.S. Bureau of Mines should be copied fairly closely.

LIBRARY

The BMR Library should retain its identity as a geological library and aim to be officially recognized as the national geological collection. In line with the Geological Surveys of the other countries visited, it should remain under the administrative control of the scientific staff.

PHOTOGRAPHIC COLLECTION

Official photographs should be treated as a library collection, with standard library classification and controlled by the librarian, as a parallel function to the book collection.

MAP COLLECTION

Maps should be treated as a library collection with standard library classification and controlled by the librarian as a parallel function to the book collection.

NATIONAL GEOLOGIC INDEX AND APERTURE CARD SYSTEM

It is strongly recommended that work should start on this system at an early date.

Details for the introduction of the system are given in Appendix III of this report.

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U.S. Geological Survey, Publications Division, Branch of Technical Illustrations - Technical Standards for the Preparation of Geologic and Hydrologic Maps and Illustrations.

United States Government Printing Office - 1967 - Style Manual.

A copy of each of these references is held by K.M. Kennedy.

Appendix I

Method of Producing Camera-Ready Copy of Text for Publication by Offset Process

The main purpose of this Appendix is to outline a method for obtaining high-quality, camera-ready copy of text, including tables, for publication. It is based on a system that is being successfully used by the United States Geological Survey for the production of "Abstracts of North American Geology", "Geophysical Abstracts", "Bibliography of North American Geology" and Specialized Bibliographies.

The equipment required is an automatic electric typewriter with punched paper tape output and a phototypesetting machine. The models in use by the U.S.G.S. are a Friden Flexowriter and Photon Phototypesetter. Alternate models by other manufacturers may be available but for the purpose of this report the names of these two models will be used.

The advantages of the proposed system are:

(a) Control of copy to the final stages within BMR.

(b) Resultant allocation of priority.

(c) Reduced proof reading.

(d) Reduced time to complete printing process.

(e) Quality of printing comparable with letterpress and good range of type faces and sizes. The right hand margin is automatically justified.

The steps outlined below for the flow of a manuscript start after it has been approved by the Director and the assumption is made that the system of technical review, as recommended in this Record, has been instituted and that the editorial work is still to be done.

Stages for Flow of Manuscript

1. Copy is typed on the Flexowriter; a punched tape (i) is prepared and a double-spaced copy simultaneously produced.

2. The tape (i) is stored and copy (i) passed to the editor.

3. Copy (i) is edited for scientific accuracy, consistency, style and literary correctness. At the same time, the editor proof reads from the original manuscript, with assistance as required.

4. If the corrections are considerable, another copy (ii) is automatically retyped from the stored tape (i) and corrections are made to give a corrected double-spaced copy and a corrected tape (ii).

5. Tape (i) is destroyed, tape (ii) is stored and copies (i) and (ii) passed to the editor.

6. The editor checks that the corrections are properly made and then copy (i) may be destroyed.

7. The corrected copy (i), or copy (ii) if steps (4), (5) and (6) were necessary, is then marked up in a machine language form for instructions to the Photon Phototypesetter. This work may be done by the editor or more appropriately by a technical officer, with a BMR style guide for reference.

8. The stored tape (i) or (ii) is then retyped on the Flexowriter with the marked up copy used for insertion of the machine instructions. A new tape (iii) is punched and a copy (iii) simultaneously typed. The machine instructions are in the form of a special code punched in the tape which types out from the Flexowriter as certain, otherwise unused, recognizable symbols e.g.,)(could mean "go to 12 point caps bold".

9. Tape (iii) is stored and previous ones destroyed.

10. Copies (ii) and (iii) pass to the editor (or technical officer) who checks that copy (iii) has been correctly prepared.

11. Subject to corrections being made, tape (iii) is now fed to the Photon Phototypesetter and camera-ready copy is produced.

12. The editor (or technical officer) checks the Photon output copy against copy (iii) to ensure that it is correct.

13. Corrections at this stage can be achieved by reproducing one line from a new tape fed through the Photon Phototypesetter and the corrected line inserted in the place of the old one.

14. The stages from here on involve the preparation of a Xerox duplimat and multilith printing as is presently done for BMR Reports and P.S.S.A. Publications.

A reaction to the stages outlined may be that a great deal of proof reading is still done. This is true, but if the Flexowriter is operating satisfactorily, it is only necessary to proof the corrections and machine instructions.

Appendix II

Three Colour System for Map Production

The United States Geological Survey uses a three colour system for the printing of geological maps. It is known as the Colortrol System and it is claimed by the operators of the system that it is completely satisfactory.

There is very little literature on the system and it would appear that it has been developed by the U.S.G.S. and is still being refined by them. This appendix gives a skimpy outline of the system for the benefit of those in BMR who may be interested.

The system implies a flow arrangement of information from the author to machine proof stage which is quite different from that used by BMR and it is not suggested that the system be adopted by BMR.

The stages of the system are as follows.

1. The base map used by the author in the field is a mylar based cronoflex with the topographic detail reverse printed in green or black.

2. The author sketches the geology on the front side of the cronoflex and provides a "coloured out" copy on paper or cronoflex. He gets as many cronoflex base maps as he requires.

3. The map is subjected to technical review and is approved by the author's Branch Chief before it is submitted to the Office of Technical Reports and subsequently to the Director for approval. This stage is the same as that followed for manuscripts for book publications or papers for outside journals.

4. The map then passes to the Branch of Technical Illustrations which is in the Publications Division, where fair drawing is done.

5. Experienced draftsmen do the colour design and prepare the peel coat instructions, based on the colours recommended by the author on his "coloured out" copy, adjacent geological maps, and experience. The colours do not normally differ from the author's recommendations.

6. The geological information is photographically reproduced onto a negative with the green topographic detail being filtered off.

7. The geology is then printed onto "scribe coat" in any colour from the negative and the topographic detail is printed onto the same coat in another colour from the original base negative.

8. The geology colour separation lines are then scribed, together with any other line detail involving colours i.e. blocks or sections around the edges.

9. Peel coat copies are photographically prepared.

10. Peel coats are peeled and screens applied according to the design instructions (5).

11. All other line work is scribed i.e. faults and symbols.

12. Type overlays in the form of waxed back film positives are prepared and applied.

13. A check is made that all is ready for a proof.

14. A proof is made which is very close to the final colours.

15. The proof is reviewed by officers of the Branch of Technical Illustrations.

16. The proof goes to the author for review.

17. The proof is returned to the Branch of Technical Illustrations, corrections are made and if necessary another proof prepared.

18. The peeled coats (with screens) go to the Washington Office for printing, where they are used for making the aluminium plates by direct contact.

Up to 27 peel coats may be prepared for one map.

The time taken for a map to be processed from the Director's approval (3) to ready for printing (18) averages six months.

By using scribing methods, staff can be trained in a very short time and they do not need to be draftsmen.

To maintain colour consistency, specified inks are always purchased from the same supplier.

Many techniques have been developed for the preparation of peel coats, the application of screens, and the making of proof copies, e.g. a certain red canvas paint from one supplier only is used because it does not crack; the whole sheet is painted rather than just painting

out the lines, before peeling. The ragged edges of the paint left when the coat is peeled are covered in the final map by the overprinted black lines.

The equipment for producing proofs is large but rather simple. A "painting on" by a pad method is preferred to the "whirl" coat.

Ready offers were made to provide details of the dyes and bases that are used.

The system is impressive and the technical people operating it are most enthusiastic. If any use of the system is envisaged by BMR, it is recommended that a draftsman examine the U.S.G.S. system at first hand.

Appendix III

National Geologic Index - Microfilm Proposal

There is an undeniable need for a comprehensive index of information related to the geology and mineral industry of Australia. Library indexes are generally concerned only with the published information that is lodged in each particular library.

The storage and retrieval of unpublished information is a rapidly growing problem. A microfilm system would overcome most of the problem as well as provide a security measure for the unpublished material.

The proposal made in this Appendix for a combined national geologic index and microfilm system, envisages a co-operative effort by the Bureau of Mineral Resources, the State Mines Departments, the exploration companies and the mineral industry. The proposal is based on the National Geologic Index of Canada and an aperture card microfilm system.

Briefly the index involves the recording of all published and unpublished classified and unclassified information on centre punched cards in terms of the title, author, size, locality, relevant concepts, and availability. The cards would be computer sorted by concepts to give a printed output suitable for offset reproduction of a book index under concept headings. The book index would be made available at all co-operating establishments and could also be lodged in reference libraries.

The microfilm system involves the recording of selected unpublished material on to aperture cards by an automatic camera process. The aperture cards would be consecutively numbered, manually retrieved, lodged in relevant centres and copies made available, if unclassified, on request at the customer's expense. When an item is microfilmed it would be recorded by number, as the form of availability, in the national geologic index.

The details below are not proposed as the final method but are given as a basis for discussion.

National Geologic Index

Details of the thinking that has gone into the formation of the National Geologic Index of Canada is well documented in "Storage and Retrieval of Geological Data in Canada" compiled by S.C. Robinson and "A National System for Storage and Retrieval of Geological Data in Canada" a Report by the Ad Hoc Committee on Storage and Retrieval of Geological Data in Canada, S.C. Robinson, Chairman, April 25th, 1967.

Appendix III

Using the Canadian system, which is at present having a pilot run in the Geological Survey of Canada, as a guide, the form of the punched card could be as follows:

Field 1. Consecutive number of card

Field 2. Author(s)

Field 3. Title and size of document

Field 4. Availability

Field 5. Locality

Field 6. Concepts.

Fields 2, 3 and 4 only would be typed out in the index.

Field 5 is a special concept which may be convenient for simple computer sorting.

Each entry would be entered under every concept, including author and locality, to which it refers.

The need for each field is discussed in more detail.

Field 1 is for sorting of the card into numerical order as each entry will occupy several cards. In its simplest form this can be a consecutive numbering of the cards as they are introduced into the system.

Field 2. The author(s), or originating organization if no personal author is mentioned, would be entered in this field. Whilst this field is printed with the title in the index, it is also used for listing as a concept heading.

Field 3. The title is an obvious field. The size would be an abbreviated note of the number of pages and plates.

Field 4. A coded system could be devised for availability e.g. c = confidential, r = restricted, p = published, M 5649 = aperture card of this number, B = at BMR etc. Only relevant comments would be made e.g. 'p' for published would have no further comment.

Field 5. A universal code for locality does not appear to exist for the geological sciences. Any system adopted would need to be capable of indicating point locations and areas to varying degrees of specified accuracy. Whilst a system copied from an overseas geological organization could assist in the exchange of information, it would most likely be confined to one discipline and one source of exchange information. The obvious solution would be to accept a system which is likely to

have universal recognition in some sphere of activity and with this in mind, consideration should be given to the Geographic Reference System (GEOREF). This system is described in Military Engineering Volume XIII, Part XII - Cartography, Section 36.

Field 6. The term "Concepts" is used by the Canadians in preference to "key words" which normally refer to words contained in the title of an article. It is necessary to define a list of "concepts" or thesaurus.

Preparation of and agreement on the thesaurus is probably the most difficult to finalize. The list must be comprehensive enough to serve as a useful index and yet be short enough to be manageable as a printed index. An unlimited thesaurus could be useful if each question was answered by computer action, but this is not the proposal. As an indication of the difficulties that may be encountered in the preparation of a thesaurus, a Canadian oil company has a list of about 40,000 concepts; as each concept represents a heading for the index, a book of headings only would be about 800 pages. The Geological Survey had not finalized their list of concepts by June 1967, after considerable effort.

The concepts which are punched into Field 6 of the card for each entry would be all those that are relevant to the information contained in the document in question.

Relationship to Automatic Data Processing

The proposed index complements and in no way duplicates the computer manipulation of data. The index will have as an entry under each relevant concept, a reference to each data bank and its availability.

Microfilm

Aperture cards are recommended as the method of storing and retrieving appropriate unpublished information.

Suitable cameras which are simple to operate are available. Readers and reproduction equipment are available for any system. Further argument in favour of aperture cards would necessarily involve the description of other systems and this is not the aim of this Appendix.

Operation of the aperture card system is set out below.

1. Information in the form of unpublished maps and reports would be selected by all interested participants and forwarded with instructions in an established format on author, title, locality, concepts, and classification to a camera centre - one centre would be at BMR.

2. The document would be microfilmed and a centre punched card prepared for the national geologic index and the document returned.

3. The punched cards would be integrated with others prepared for information that is not to be microfilmed and the lot used to produce the index book.

4. Search for the microfilm would be by the index and location of the aperture card would be by manual operation, using the allocated card number which is printed in the index.

5. Requests for copies of the aperture cards or hard copy would be met by the reference centres at a cost to the customer.

6. All or relevant aperture cards and reader/printers would be located at any centre offering to provide the service e.g. the State Geological Surveys as well as BMR.

7. The aperture cards for classified information could be kept separate from the main stack or integrated with a significantly coloured card. Access to the reference stack of aperture cards, under any circumstances, would only be available through the staff controlling the system at each centre.

Action Required

The recommended actions required to get the proposed index - aperture card system operational are set out below.

1. Approval in principle to start such a system.

2. Formation of a committee within BMR with members to represent each of the disciplines concerned; one member could represent more than one discipline.

3. Committee to consider proposal and advise if it meets the intended requirements or make amendments as appropriate. Prepare a thesaurus.

4. Approach each State Mines Department to inform them of the system and seek their co-operation.

5. Approach a sample representation of the mineral industry to assess their reaction to the proposal.

6. Formation of a national advisory committee with representatives from BMR, State Mines Departments and the mineral industry.

7. Purchase of equipment by BMR.

8. Carry out pilot study within BMR on BMR data.

9. Service to enquiries.

10. Expansion to include data from all sources.

Equipment Requirements

The equipment required for a pilot study within BMR is:

1. Microfilm Camera - 3M 2000 recommended.

2. Readers and Reader/Printers.

3. Aperture card reproducer.

4. Card punch equipment.

5. Appropriate card storage cabinets.

An allowance for this equipment is on the 67/68 Estimates of BMR.

Staff Requirement

The minimum staff required for the initial stage, which would include the pilot study, would be:

1 professional officer in charge.

1 camera operator (not photographer)

1 card punch operator.

If the system develops along the lines of the proposal, the staff could be trebled and would include the subsequent service to enquiries.

In addition to the nominated staff above, the BMR committee would be responsible for the preparation of the thesaurus for the pilot study and agreement on the details of the system.

All professional officers of BMR would be expected to contribute by preparing and forwarding details of information which is to be included in the index and aperture card system.

The printing and distribution of the book index would be a normal function for the Publications and Information Section.

Appendix IV

Relevant BMR Statistics

Relevant statistics of the Bureau of Mineral Resources are given in this Appendix for comparison with the foregoing report.

Staff - 30.6.67

Professional (potential authors)	290
Draftsmen	80
Support	218
Total	588

Organization

Geological Branch

2 Editors

38 Draftsmen - responsible to Senior Branch Editor

5 Photographic and Filing Staff - responsible to Chief Branch Draftsman

Geophysical Branch

2 Editors

37 Draftsmen - responsible to Senior Branch Editor

4 Plan Printing Staff - responsible to Chief Branch Draftsman

Petroleum Exploration Branch

1 Editor

5 Draftsmen - responsible to Branch Editor

Mineral Resources Branch

No formal editors or draftsmen

Operations Branch

Publications and Information Section

4 Professional Officers

1 Clerk

Appendix IV

Library - responsible to O.I.C. Publications and Information Section

2 Librarians

1 Library Officer

4 Assistants

Administrative Section

2 Clerical Assistants - stock control, sales and distribution

A considerable amount of proof reading and fair drawing is done by contract.

Mailing list distribution is mostly done on overtime.

Publications

Publications delivered during the twelve months 1.7.66 to 30.6.67 are listed below:

9 Bulletins - letterpress

11 Reports - offset

12 P.S.S.A. Publications - offset

11 Explanatory Notes - letterpress

29 Geological Maps

17 Preliminary Geological Maps

2 Petroleum Titles Maps

11 Aeromagnetic Maps

1 A.M.I. Annual Review - letterpress

3 A.M.I. Quarterly Reviews - letterpress

4 Petroleum Newsletters - offset

17 Booklets - offset

1 Pictorial Index

There were no gravity maps printed during this year but the programmed annual output of these maps is 30.

In addition to the formal publications above, a number of unpublished Records are also issued. During the calendar year 1966, 230 Records were issued.

Appendix V

Officers Contacted

The officers listed below are those who were personally contacted and gave assistance to the author.

CALIFORNIA, U.S.A.

Geologic Division
U.S.G.S.,
345 Middlefield Road,
MENLO PARK. 94025

Gates, George O. - Assistant Chief Geologist, O.I.C.

Boardman, Bob - geologist, escort for the day

Bergs, Henry - geologist, in charge of Technical Report Unit

Kennedy, Mrs. - 2IC, Alaskan Technical Data Section

Publications Division,
U.S.G.S.,
345 Middlefield Road,
MENLO PARK. 94025

Stanovic, Sam - offered advice on colortrol map printing system

Area VI Mineral Resource Office,
U.S. Bureau of Mines,
450 Golden Gate Avenue,
SAN FRANCISCO. 94111

Irving, Donald R. - Area Director

Division of Mines and Geology,
Department of Conservation,
Ferry Building,
SAN FRANCISCO. 94111

Gay, Jr., Thomas E. - Manager, Information and Educational Services

Appendix V

COLORADO, U.S.A.

Geologic Division,
U.S.G.S.,
Denver Federal Center,
DENVER.

Hendricks, Tom A. - Assistant Chief Geologist, O.I.C.

Raup, Robert B. - geologist, O.I.C. Technical Report Unit

Shultz, (Mr.) - Librarian in charge

Topographic Division,
U.S.G.S.,
Denver Federal Center,
DENVER.

Moore, Roland H. - Regional Topographic Engineer and Chairman of the Field Center Committee

Cummins, Tom - Assistant Regional Engineer

Publications Division,
U.S.G.S.,
Denver Federal Center,
DENVER.

Kuehling, (Mr.) - O.I.C. Branch of Technical Illustrations

Area V Mineral Resource Office,
U.S. Bureau of Mines,
Denver Federal Center,
DENVER.

Geehan, Robert W. - Area Director

Salsbury, M.H. - Supervising Mining Engineer, project co-ordinator

Stewart, Jr., H.C. - Management Officer, river-basin co-ordinator, project co-ordinator

Mullen, Donald H. - Physical Science Administrator - project co-ordinator

Christensen, Theodore A. - Chief, Western Administrative Office

Appendix V

PENNSYLVANIA, U.S.A.

Pittsburgh Research Center,
Area I Mineral Resource Office,
U.S. Bureau of Mines,
4800 Forbes Avenue
PITTSBURGH

Josephson, G. - Area Director

Julian, Arlow L. - Chief, Eastern Administrative Office

Reiness, M. - Production and Distribution Division (including films)

Fell, Miss Adeline L. - Chief, Publications Distribution Section

WASHINGTON, D.C.

U.S.G.S.,
Department of the Interior,
WASHINGTON, D.C. 20242

Baker, Arthur A. - Associate Director

Geologic Division

Becraft, George E. - Chief, Office of Technical Reports

Clarke, James - O.I.C. preparation of geological and geophysical abstracts

Newman, Bill - preparation of pamphlets

Heers, W.R. - Librarian

Kinney, Doug - Map Editor, representative on Geological Map of World Committee

Miser, - Director's reader for approval of publications

Publications Division

Moravetz, Robert L. - Chief

Eric, John - Assistant Chief

Hanes, M.E. "Mel", - Chief, Branch of Technical Illustrations

Dilonardo, A.L. "Pete", - Assistant Chief, Branch of Technical Illustrations

Appendix V

U.S. Bureau of Mines,
Department of the Interior,
WASHINGTON, D.C. 20240

Martin, Miles J. - Chief, Office of Mineral Information (temporary until November 1967)

Swenarton, Robert O. - Chief, Division of Public Information and 2IC to M.J. Martin

Willing, Robert P. - Chief, Division of Technical Reports, control of mailing list

Schreck, Albert E. - Chief, Division of Minerals Year Book

Morrell, L. - author of Foreign Minerals Year Book for Pacific

Bromberg, Erik - Librarian

OTTAWA, CANADA

Department of Energy, Mines and Resources

Harrison, J.M. - Assistant Deputy Minister (Mines and Geosciences)

Public Relations and Information Services

Chiasson, Gilles E. - Director

Shenston, Doug

McBride, Vincent

Geological Survey of Canada

Fortier, Y.O. - Director

Lord - Chief Geologist

Harker, Peter - Chief Scientific Editor, Head of Manuscript and Cartography Section

Daughtry, Gordon - Chief Draftsman

Sutherland, Mrs. - Chief Librarian

Robinson, S.G. - Chief, Division of Geochemistry, Mineralogy and Economic Geology

Dawson, Ken - in charge of pilot study on National Geologic Index

Morley, L.W. - Chief, Division of Exploration Geophysics

Appendix V

Observatories Branch

Hodgson, J.H. - Director

Gibb, Richard A. - Gravity Division, ex BMR

Tanner, Jim - Gravity Division

Mines Branch

Rabbitts, F.T. - duties include approvals for publication

Twidale - engineer

Shannon, Peter - literary editor

Mineral Resources

Buck, W. Keith - Director

Toombs, Ralf - Assistant Director

Ewing, K.A. - in charge of Mineral Occurrence Index

Hawkes, V.N. - Administrative Officer

Canadian Oceanographic Data Centre

Sauer, C.D. - O.I.C.

BRITAIN

Institute of Geological Sciences,
Exhibition Road,
SOUTH KENSINGTON. LONDON.

Dunham, K.C. - Director

Wilson, Vernon - Area Director, Southern England

Gray, David - hydrologist, O.I.C. Water Branch

Bullerwill, W. - Chief Geophysicist

Sabine - O.I.C., Petrology Branch

Hawkes, J.R. - Petrology Branch

Bowie, S.H.U. - Head, Geochemical Division

Martin, E.L. - Chief Librarian, Experimental Officer

Bunt - Librarian, Experimental Officer

Simpson - O.I.C. editorial group of Overseas Geological Survey

Appendix V

Edinburgh, Scotland

Robbie, J.A. - Area Director, Scotland

Willmore, P.L. - O.I.C., International Seismological Centre

Scott-Barrett, Mrs. - prepares Bibliography of Seismology and Bulletin of the International Seismological Centre

Royal Greenwich Observatory,
HAILSHAM, SUSSEX

Leaton, B.R. - O.I.C. Magnetic Observatory

6/29/67 (Release No. 958)
Replaces 2/3/67 (Release No. 921)

ORGANIZATION OF THE DEPARTMENT OF THE INTERIOR U.S.A.

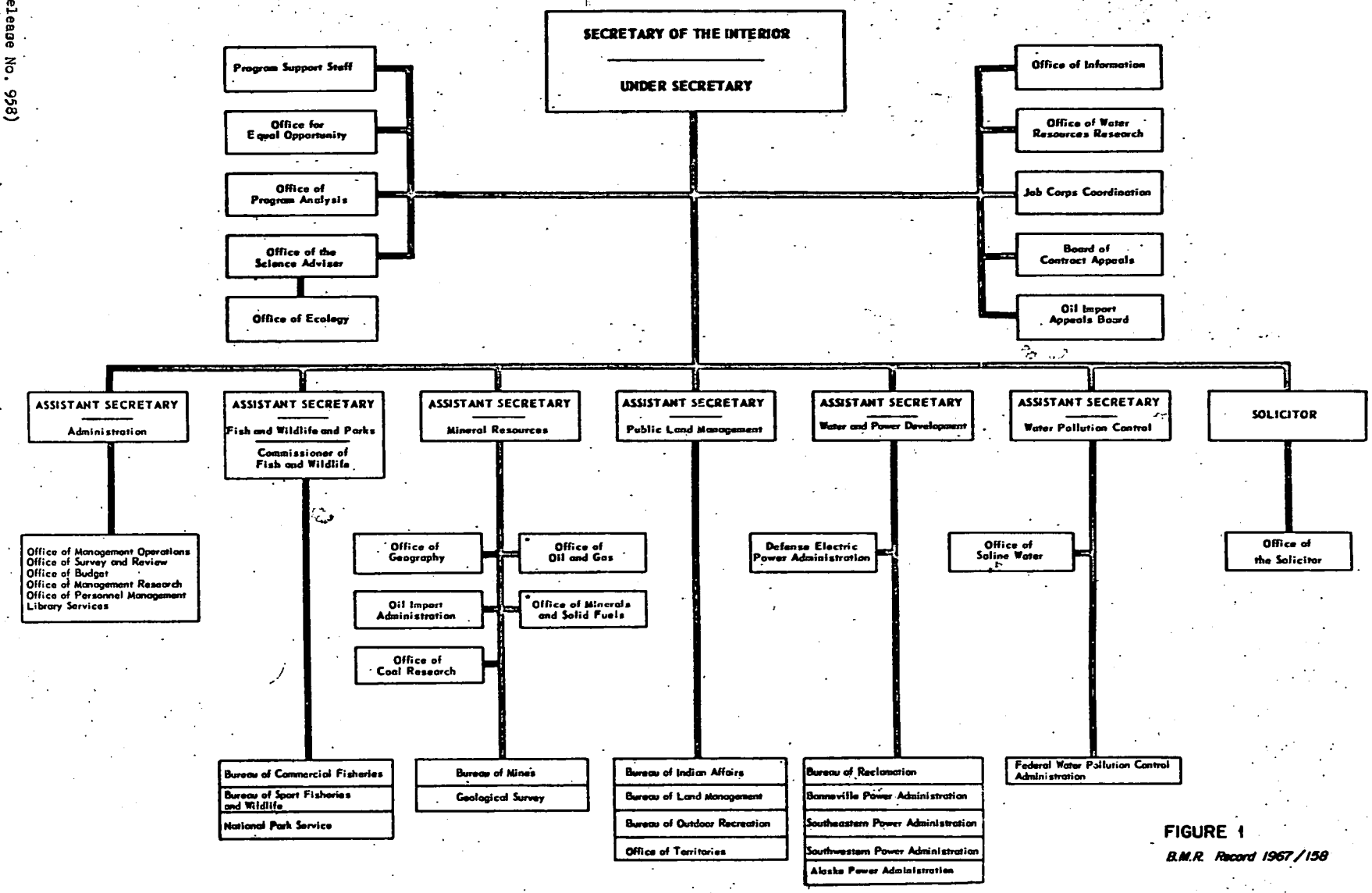


FIGURE 1

B.M.R. Record 1967/158

ORGANIZATION CHART OF THE BUREAU OF MINES U.S.A.

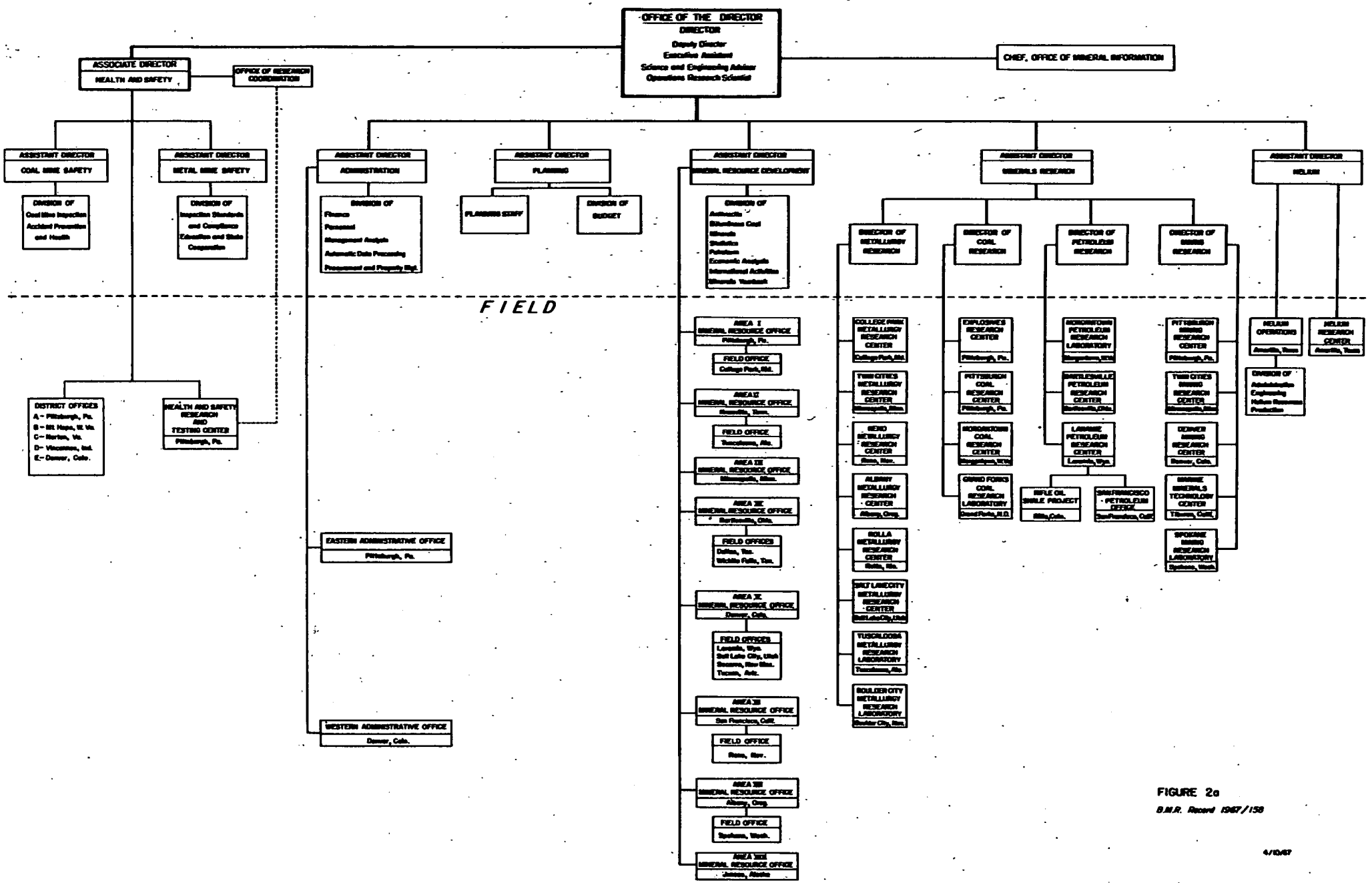
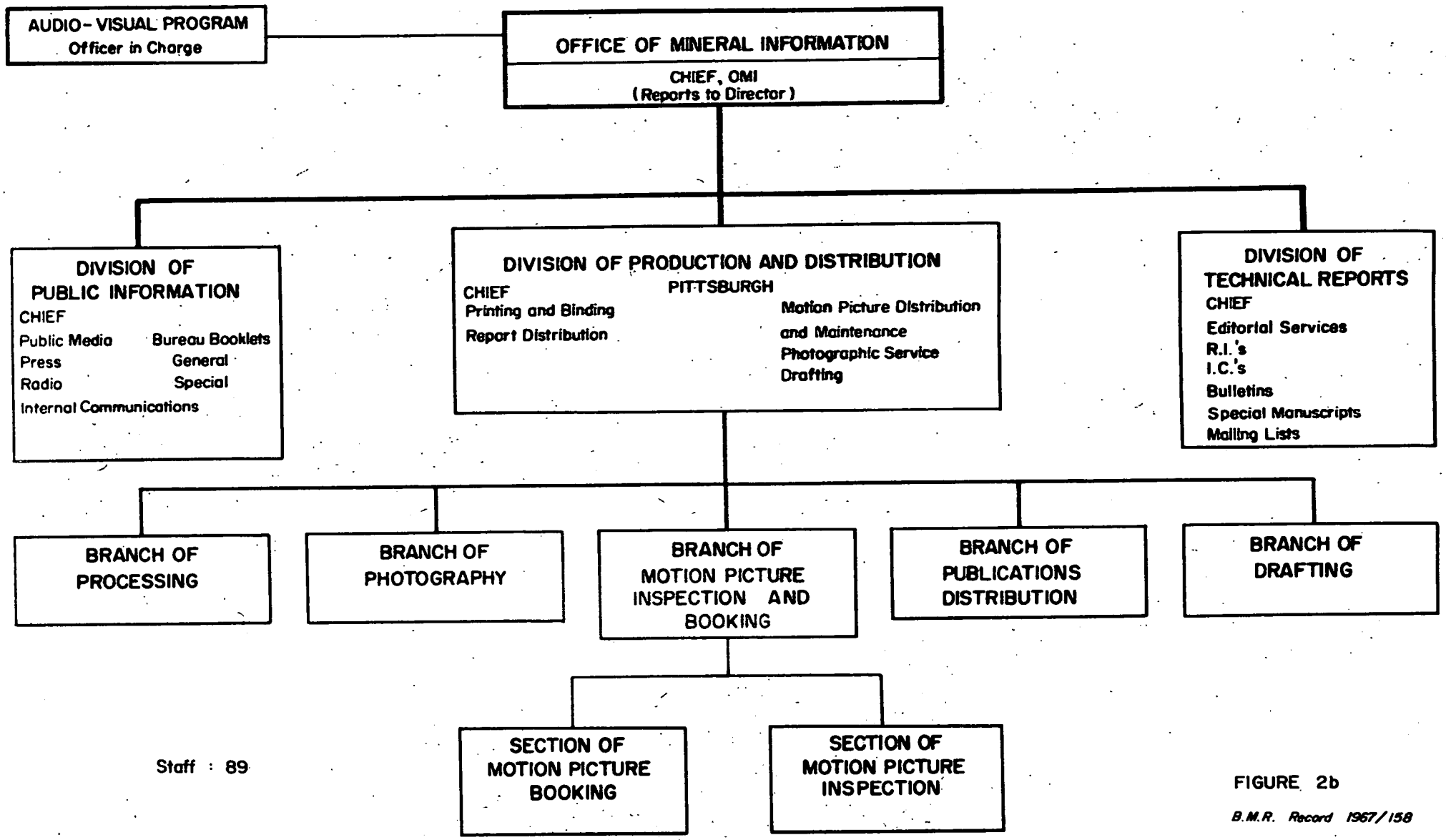


FIGURE 2a

B.M.R. Record 1967/158

4/10/67

ORGANIZATION CHART OF OMI BUREAU OF MINES, U.S.A.



Staff : 89

FIGURE 2b

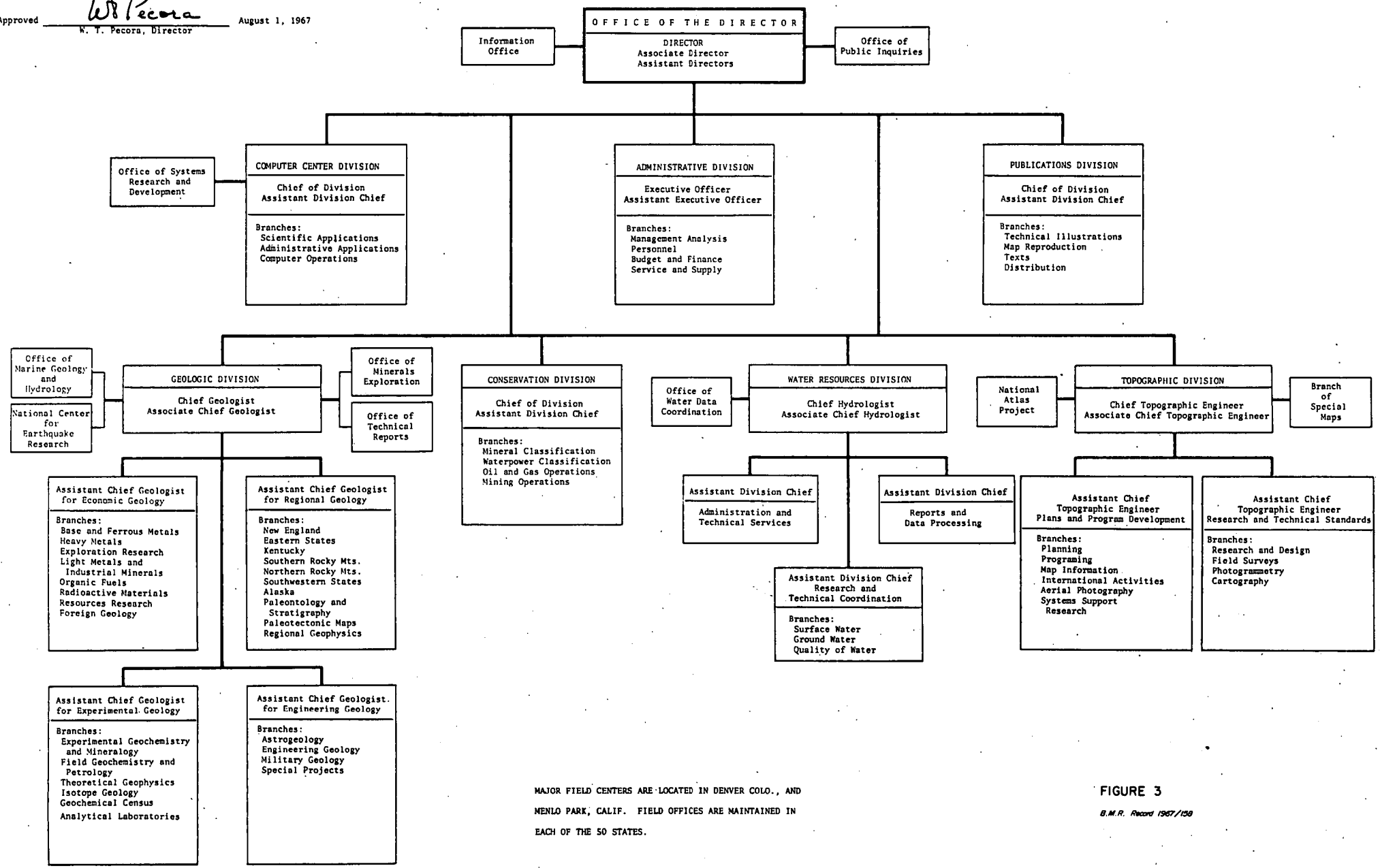
B.M.R. Record 1967/158

ORGANIZATION OF THE GEOLOGICAL SURVEY – U.S.G.S.

DEPARTMENT OF THE INTERIOR

U.S.A.

Approved W. T. Pecora, Director August 1, 1967



MAJOR FIELD CENTERS ARE LOCATED IN DENVER COLO., AND MENLO PARK, CALIF. FIELD OFFICES ARE MAINTAINED IN EACH OF THE 50 STATES.

FIGURE 3

B.M.R. Record 1967/158

FIGURE 4

GEOLOGIC DIVISION – U.S.G.S.

September 1, 1967

9200 OFFICE OF THE CHIEF GEOLOGIST
9200 H. L. James, Chief Geologist
9200 M. R. Klepper, Associate Chief Geologist
9201 W. D. Carter, RESECS
9202 D. H. Dow, Program Officer
9203 W. B. Roberts III, Administrative Officer
9204 G. E. Becraft, Chief, Office of Technical Reports
9208 W. H. Heers, Librarian

T. A. Hendricks
Assistant Chief Geologist
Denver, Colorado

G. O. Gates
Assistant Chief Geologist
Menlo Park, California

9300 - O. Tweto
Assistant Chief Geologist for Economic Geology
H. D. Gower - Deputy Assistant
F. S. Simons - Deputy Assistant

Branches
9310- Base & Ferrous Metals
Chief: H. T. Morris
9320- Lt. Metals & Indus. Min.
Chief: G. I. Smith
9330- Exploration Research
Chief: R. L. Erickson
9340- Organic Fuels
Chief: R. P. Sheldon
9350- Heavy Metals
Chief: S. C. Creasey
9360- Radioactive Materials
Chief: J. C. Olson
9380- Resources Research
Chief: T. H. Kiilsgaard
9390- Foreign Geology
Chief: J. A. Reinemund

9500 - J. T. Hack
Assistant Chief Geologist for Regional Geology
G. L. Snyder - Deputy Assistant

Branches
9510- New England
L. R. Page
9520- Eastern States
Chief: J. C. Reed
9530- Kentucky
Chief: P. W. Richards
9540- Northern Rocky Mountains
Chief: A. B. Campbell
9550- Southern Rocky Mountains
Chief: J. F. Smith
9560- Southwestern States
Chief: M. Crittenden
9570- Pacific Coast States
Chief: A. Grantz
9580- Alaska
Chief: G. Gryc
9590- Regional Geophysics
Chief: D. R. Mabey
9610- Paleontology & Stratigraphy
Chief: T. J. Dutro
9620- Paleotectonic Maps
Chief: L. C. Craig

9700 - D. L. Peck
Assistant Chief Geologist for Experimental Geology
M. A. Lanphere - Deputy Assistant

Branches
9710- Exp. Geochem. & Min.
Chief: P. Toulmin
9720- Field Geochem. & Petrology
Chief: P. C. Bateman
9730- Theoretical Geophysics
Chief: R. R. Doell
9740- Isotope Geology
Chief: R. G. Coleman
9760- Geochemical Census
Act. Chief: A. T. Miesch
9770- Analytical Laboratories
Chief: F. S. Grimaldi

9900 - D. M. Lemmon
Assistant Chief Geologist for Engineering Geology
H. W. Coulter - Deputy Assistant
9902 - A. H. Chidester - Deputy Asst. for Astrogeology

Branches
9940- Military Geology
Chief: L. D. Bonham
9950- Special Projects
Chief: W. S. Twenhofel
9970- Engineering Geology
Chief: J. T. McGill
9920- Astrogeologic Studies
Chief: H. Masursky
9930- Surface Planetary Exploration
Chief: A. L. Brokaw

9206-
9207- Office of Marine Geology and Hydrology
Chief: P. E. Snavely

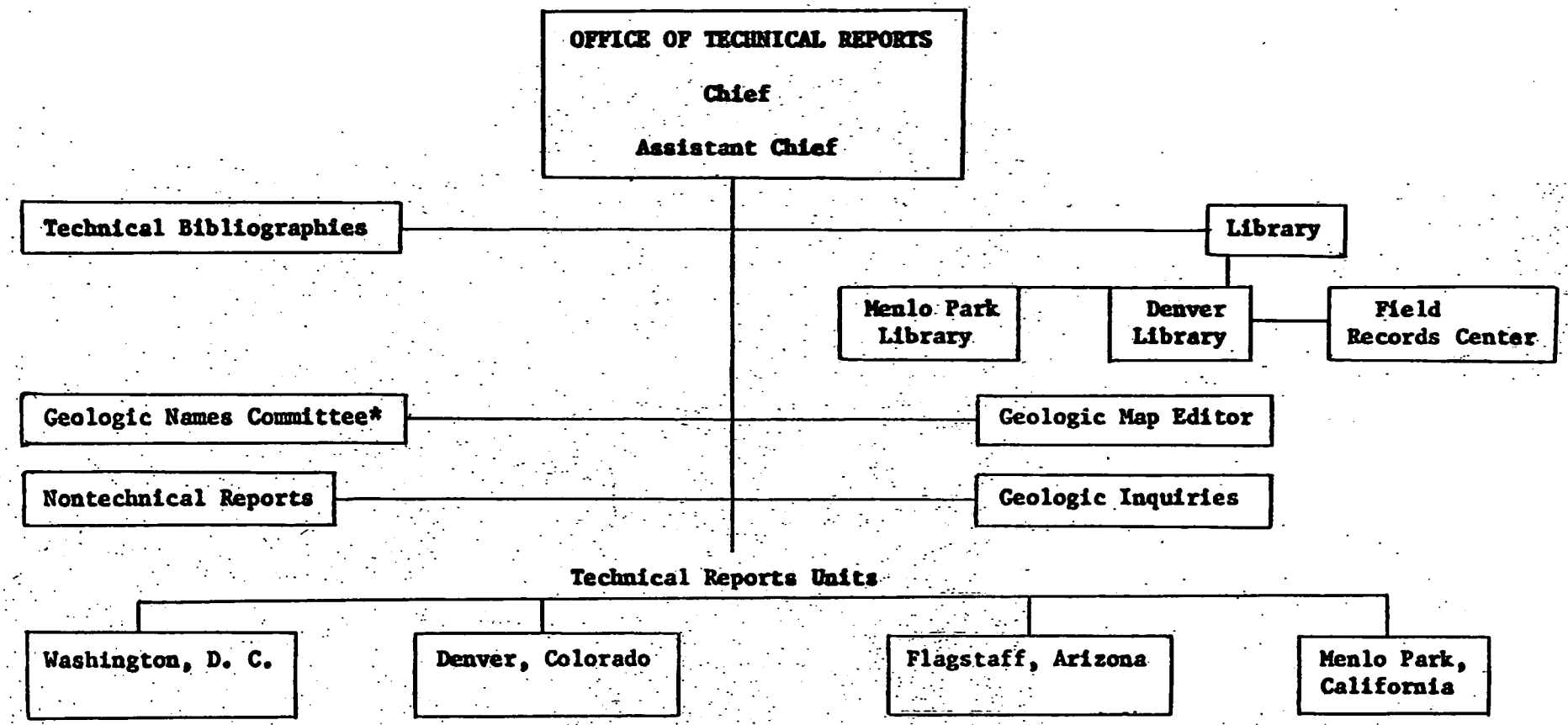
9780- National Center for Earthquake Research
9205- Office of Earthquake Research and Crustal Studies
Chief: L. C. Pakiser

9209- Office of Mineral Exploration
Chief: F. E. Johnson

OFFICE OF TECHNICAL REPORTS

GEOLOGIC DIVISION

-U.S.G.S.



*For administrative purposes only. The Geologic Names Committee reports directly to the Chief Geologist.

FIGURE 5

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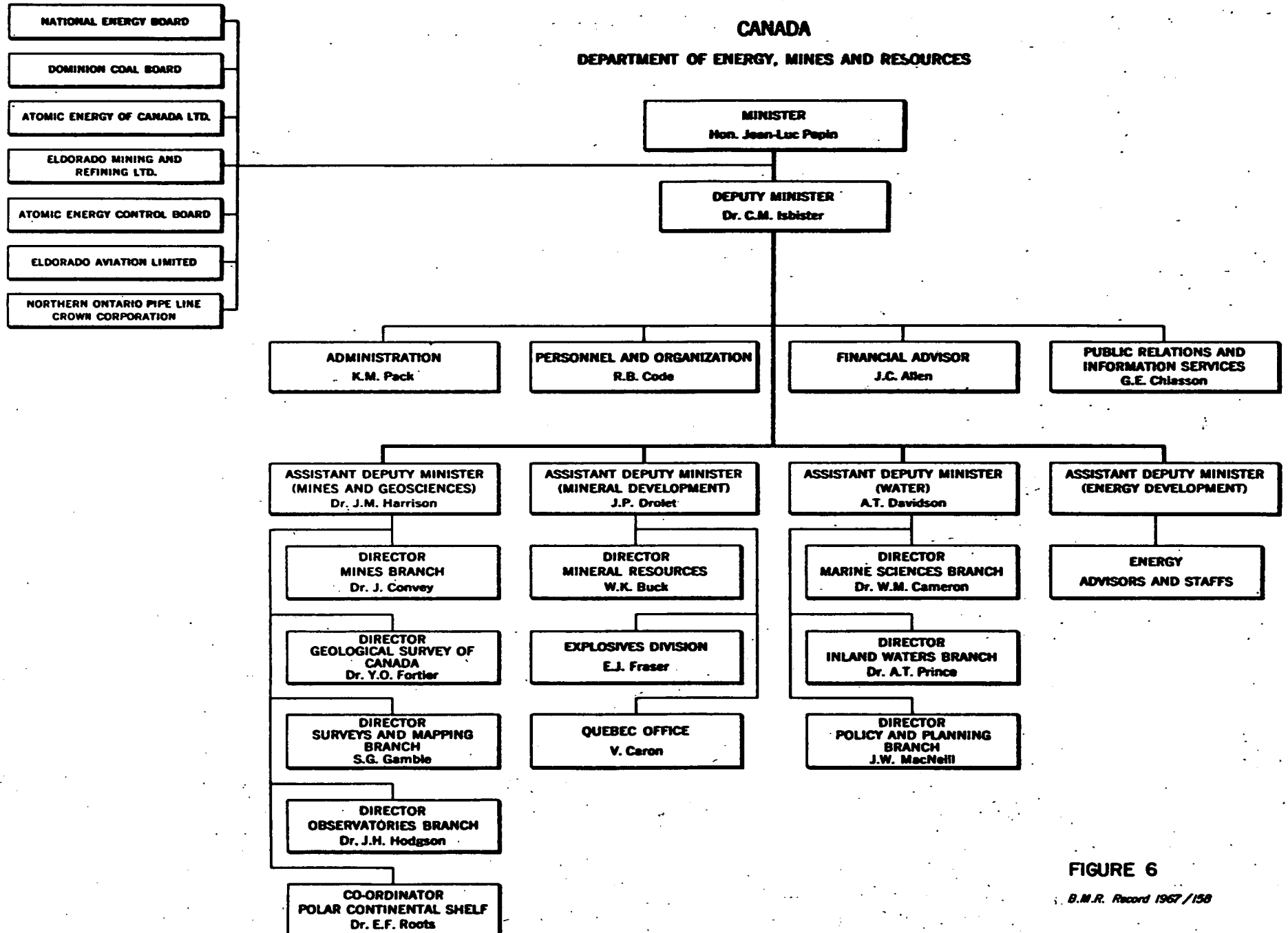

FIGURE 6

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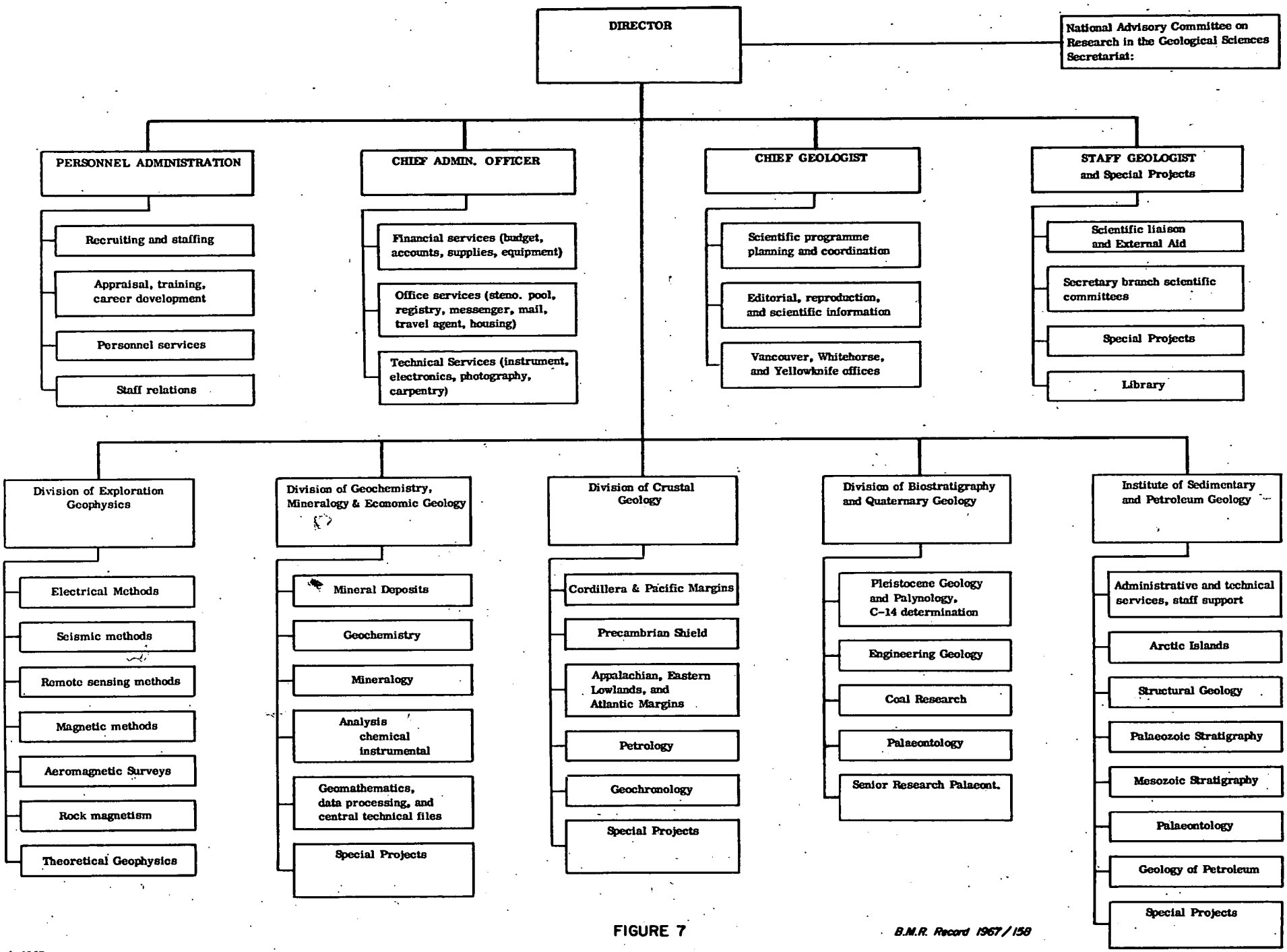
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FIGURE 7

CARTOGRAPHIC SECTION
GEOLOGICAL SURVEY OF CANADA

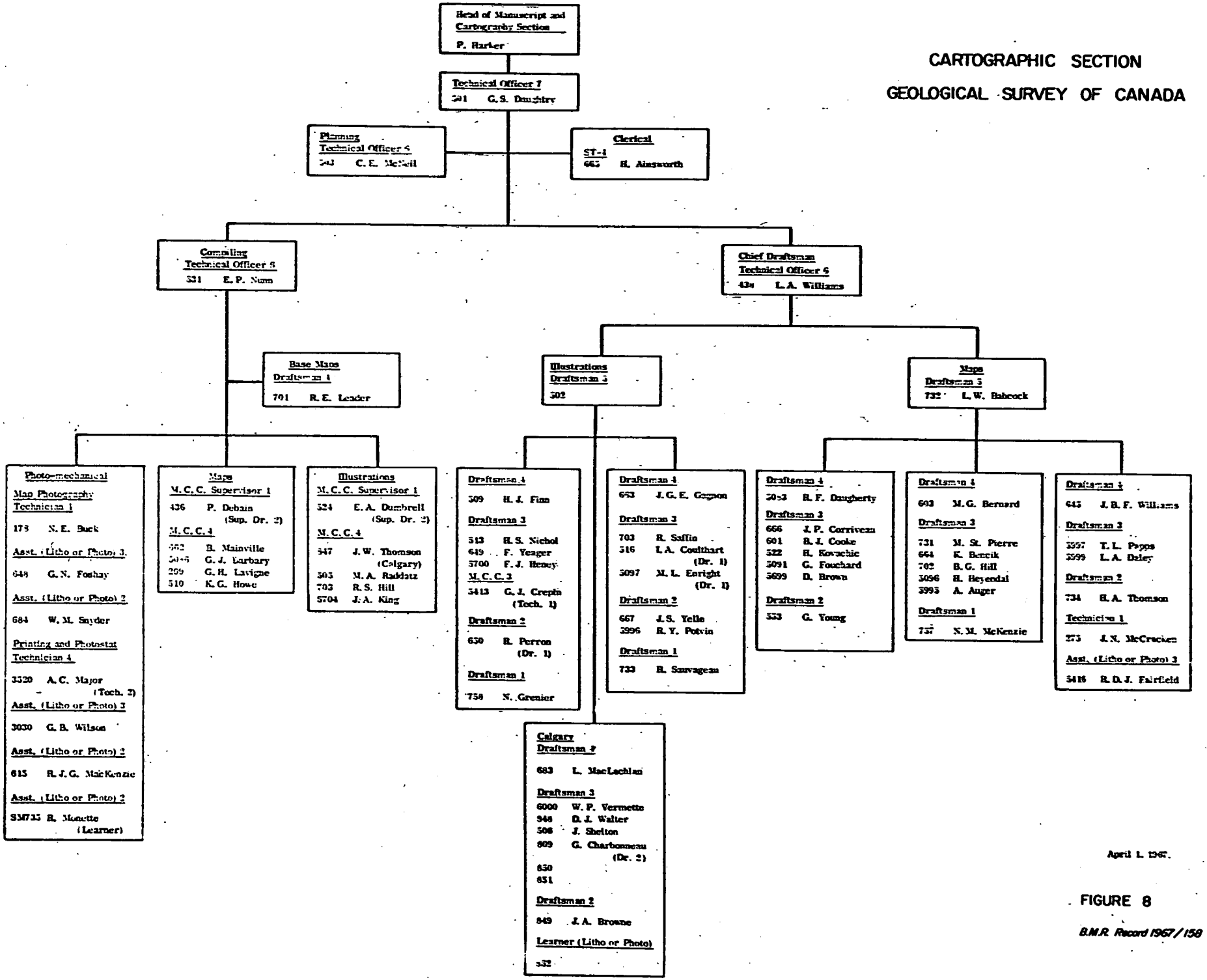

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FIGURE 8

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CANADA

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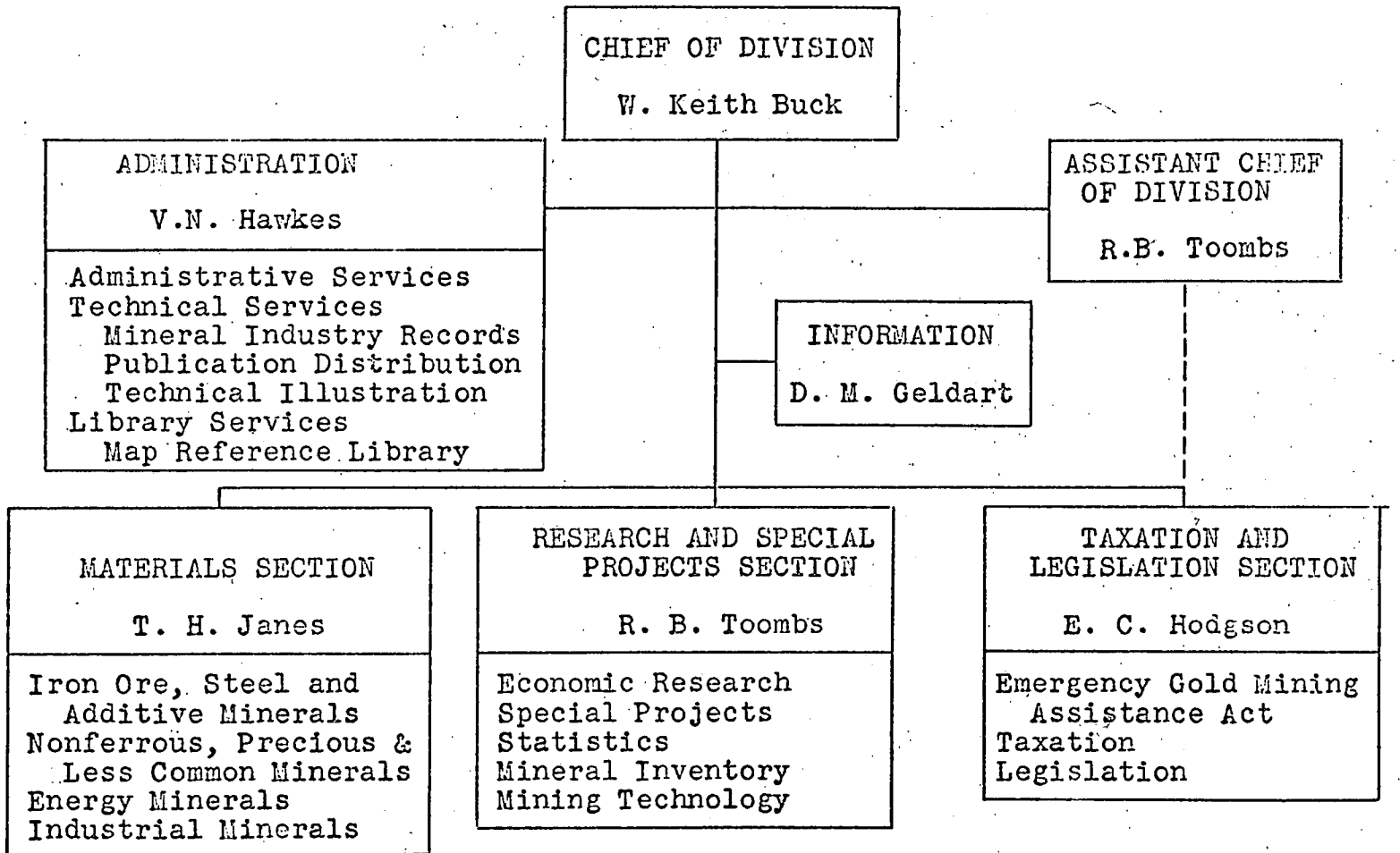

FIGURE 9

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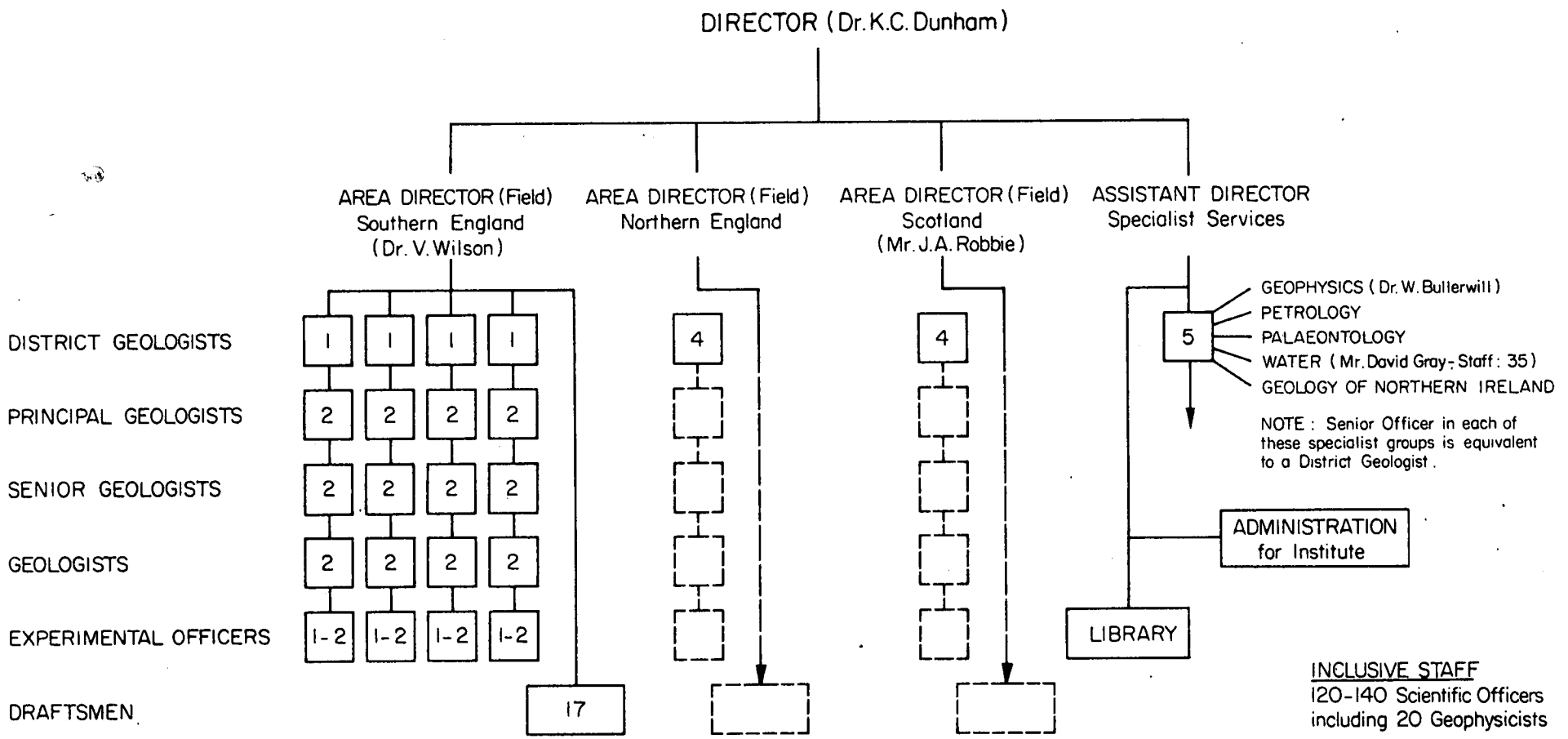

Fig. 10 Partial Organization of the Institute of Geological Sciences - Britain

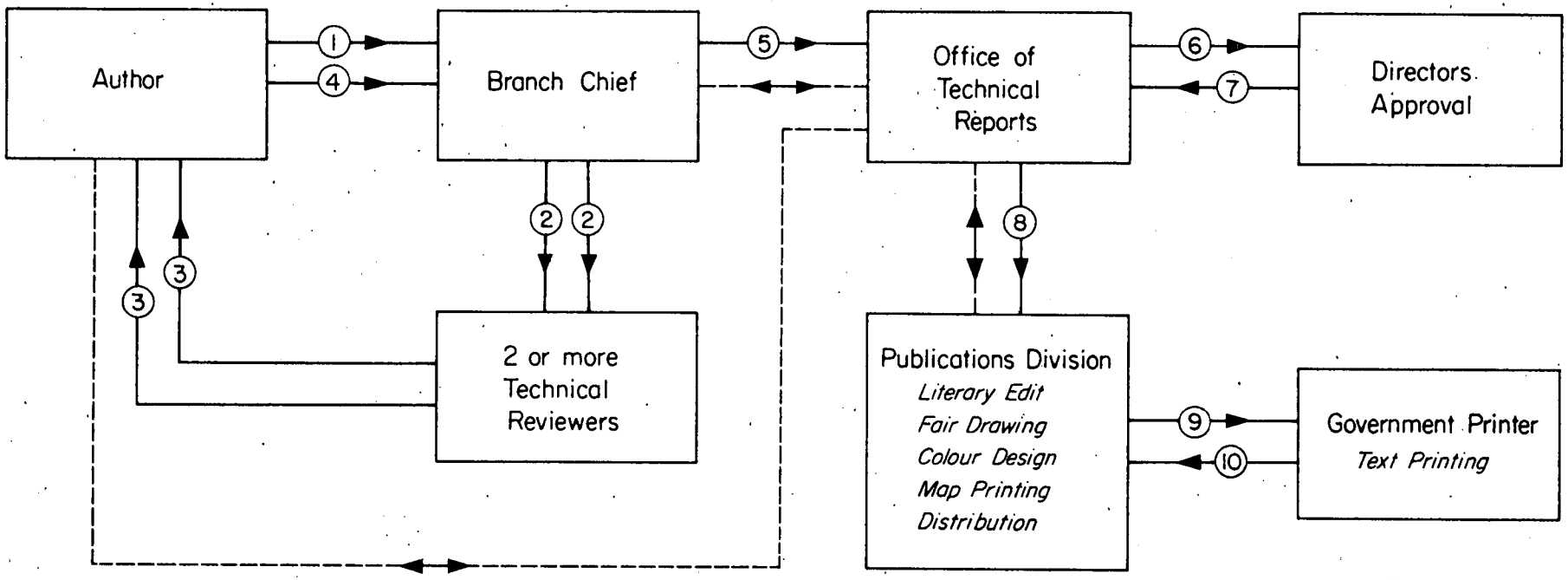

Fig. 11 Flow Diagram for Publications of Geologic Division, USGS.

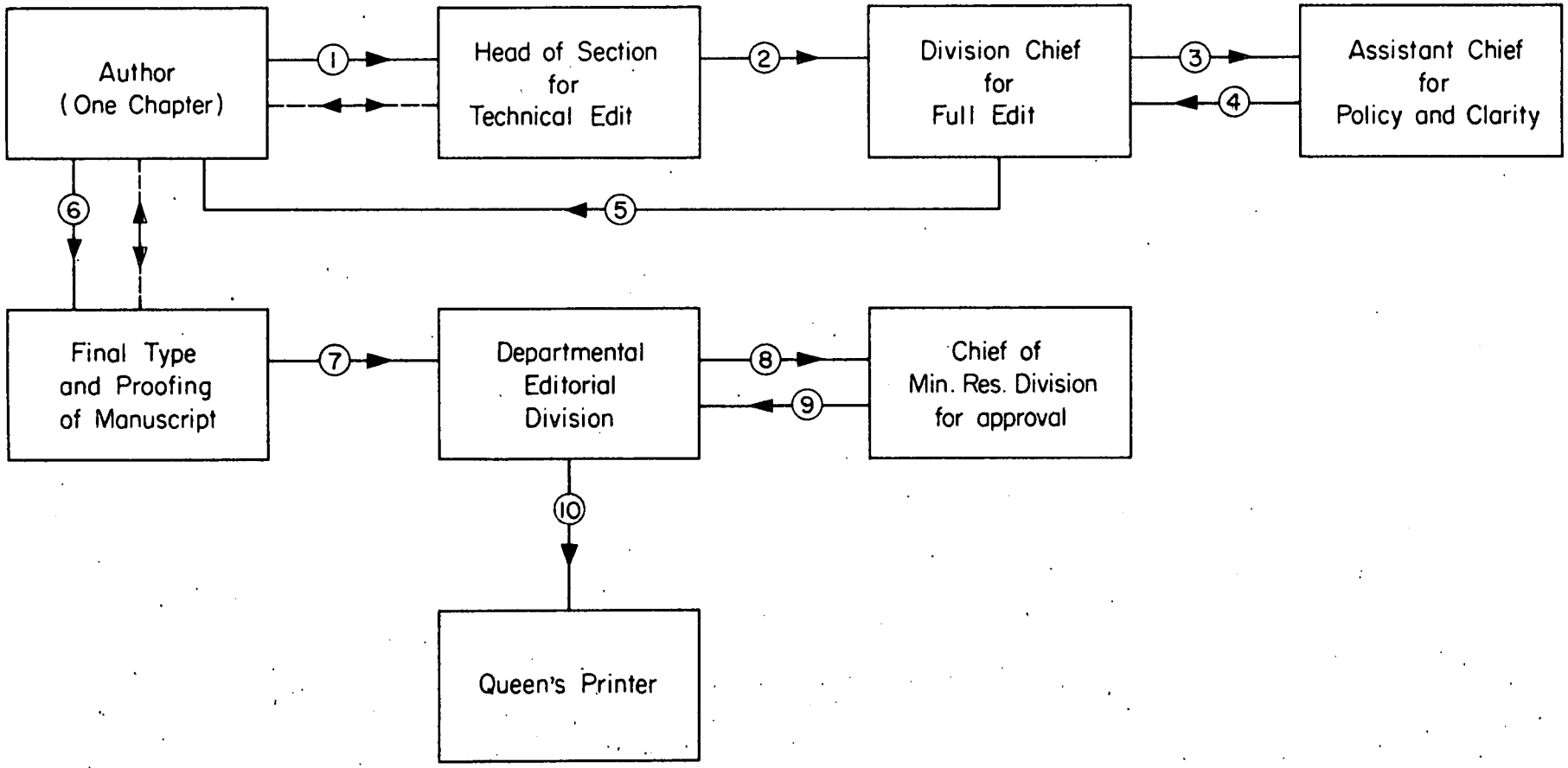

Fig. 12 Flow Diagram for Canadian Minerals Year Book

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FIGURE 14

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FIGURE 15

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