Report Writing Manual for the Missouri Geological Survey and Water Resources

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Report Writing Manual

for the

Missouri Geological Survey and Water Resources

by

JOHN W. KOENIG

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STATE OF MISSOURI
Department of Business and Administration
Division of
GEOLOGICAL SURVEY AND WATER RESOURCES
THOMAS R. BEVERIDGE, State Geologist
Rolla, Missouri

FOREWORD

An important duty of a Missouri Geological Survey and Water Resources staff geologist is to write reports on Missouri's geology, primarily for those people who are interested in the conservation and development of the state's natural resources, and secondarily for the advancement of basic knowledge in the field of geology. This manual is designed to facilitate the preparation of such reports by standardizing the procedure, format, and principles of Survey report writing.

The development of a report from the time it leaves the author's desk in the form of a loose pile of handwritten or roughly typed stationery to the time it reaches the reader's desk in the form of a printed publication requires careful planning and close attention to detail not only on the part of the author but on the part of the many people through whose hands the report must pass before it reaches the reader. In effect, any Survey report is a reflection of the knowledge, intelligence, and skill of a group effort and is not indicative of just the author's ability. In order that a Survey report be of credit to the people who produce it and to the State organization which it represents, the best cooperative efforts of everyone concerned are not only required but demanded.

In 1952, all the members of the then existing Survey staff, under the editorship of Thomas R. Beveridge, Jack A. James, Garrett A Muilenburg, and Walter V. Searight, contributed to the preparation of a manual to be used as a guide for the writing and editing of Survey reports. This guide made no attempt, and rightly so, to dictate individual expression or style of writing, but it did try to establish, in the form of "suggestions", a

standard format for Survey publications (reports as well as maps). Since then, more experience has been gained through continued publication of Survey reports, and new requirements for economy and efficiency have made obsolete some of the practices which were then adequate. This edition of the manual is an outgrowth of these new requirements.

The manual is devoted specifically to the requirements of preparing a manuscript. This entails on the part of the author composition of the title page, table of contents, list of illustrations, list of tables, abstract, text, and list of bibliographic citations. Suggestions for modes of expression involving numerals, quotations, references, footnotes, and exact words and phrases are given to assist the author in expressing himself clearly. Construction elements for leaderwork (unboxed tabulations) and tables are discussed so that they may be efficiently designed and executed. A plan for the orderly processing of the manuscript is proposed so that waste of time, material, and labor is reduced to a minimum. Typists' instructions, and suggestions for preparation of illustrations are given to facilitate the physical development of the manuscript.

The manual is intented primarily for authors, but typists, draftsmen, reviewers, and editors will find much of the information useful for their respective duties.

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ABSTRACT

A Survey report should be restrictive in format but flexible in expression for the purpose of clearly presenting geologic information. The style and sequence of its physical elements (the title page, contents, list of illustrations, text, tables, and illustrations) have been established through practice. Conformity to the directives concerning their organization is expected. Forms of expression for such items as numerals, quotations, references, and phraseology have developed through custom and usage and are to be adopted to maintain for it an acceptable standard of uniformity. Economy requires that its producers (authors, typists, draftsmen, reviewers, and editors) follow the regulations of standard authoritative references and cooperate in an efficient manner for its production.

MANUSCRIPT PREPARATION

Years of editing experience by Survey staff members have indicated that adherence of authors to a uniform style of report writing is desirable. However, it is realized that the style should not be of such rigidity that it restricts an author's freedom of expression and hinders the clarity of his

report. A Survey author should be familiar with the requirements as set forth in this manual and should prepare his manuscript accordingly.

An author should first determine in what form his report will be published and what type of format would be most suitable. He should then organize his material and prepare an outline. This should then be submitted to the State Geologist for approval if the article is to be published by the Survey. Outlines of reports to be published outside the Survey need not be submitted for approval, but the completed article must be cleared by the State Geologist before publication.

Because a graduate thesis is prepared for the school in which the student is enrolled, it is not required that an outline of the thesis written under the sponsorship of the Survey be submitted to the State Geologist for approval. However, if the student so elects, he may present an outline for review and comment, and all students preparing theses under Survey sponsorship are encouraged to follow the suggestions of this manual insofar as the thesis requirements of their schools will allow.

Of the several types of reports that the Survey publishes, the following three are most common: 1) geologic studies of given geographic areas, 2) stratigraphic studies of given rock units, and 3) economic studies of one or more natural resources. The first of these types has become stereotyped through practice and has the most rigid framework of the three. Because of this, it will be discussed in detail below. The second type is less rigid in outline but generally follows the plan of the first. The third type has no formal outline because the nature of the subject necessitates individual treatment. In the latter case, an author should consult previous Survey publications on economic geology for ideas as to how he may arrange his material.

Reports are published by the Survey in one of three forms: 1) Volume, 2) Report of Investigations, or 3) Information Circular. These report forms have seven basic elements: 1) title page, 2) list of Survey personnel, 3) table of contents, 4) list of illustrations, 5) abstract, 6) text (usually with illustrations), and 7) index. A Volume contains, in addition to these seven elements, a letter of transmittal. Any of these publication forms may contain a bibliographic citation, a list of tables, tables, and one or more appendices.

Surface and subsurface geologic reports may cover large geographic areas of the state, or they may cover only parts of a $7\frac{1}{2}$-minute quadrangle. Because of the type and quantity of data involved, such reports have usually been published as Volumes or as Reports of Investigations. Volumes have normally been used for geologic reports of large regional areas, counties, and some important quadrangles. Reports of Investigations have been used for reports on significant 15- and $7\frac{1}{2}$-minute quadrangles. The suggested outline for the text material of these reports is the same for both forms of publication. This outline should contain the following items in the sequence given: 1) Introduction, 2) Geography, 3) Physiography, 4) Stratigraphy, 5) Structure, and 6) Economic geology.

Title Page

The elements of a title page are standard for all Survey publications, but the layout for a Volume title page differs slightly from that of a Report of Investigations and Information Circular. A Volume title page contains the following elements in the sequence given, starting at the

top of the page: 1) title, 2) name of author or authors, 3) Volume number and series, 4) State seal, 5) date of publication, and 6) departmental organization. On the title page of a Report of Investigations or an Information Circular, the title is followed by the word "by" and the positions of the publication name and number, and the State seal are inverted.

Title.-- The title should be brief and informative. Insignificant words or phrases and artificial unit modifiers invented as attempts of brevity should be avoided. The first word in a title should be important, and the balance of words should be significant of textual content. A compelling reason for brevity is the limited amount of space available for printing the title on the title page of Survey publications.

Authorship.-- The name of the author should be complete with given name, middle name or initial, and surname. When more than one author is responsible for the work and conclusions represented in a report, the sequence in which the names appear will depend upon the particular circumstances under which such a work is written. The following cases of multiple authorship are cited with suggestions for selection of name precedence:

1) When the major part of the work for a single report is done by one person with substantial assistance of one or more people, the names may be arranged in sequence of decreasing responsibility. If the number of such names exceeds a total of three, the principal author's name may appear on the title page followed by the words "et al." and an appropriate explanation may be given in the Introduction.

2) If a single report by one or more authors contains a subordinate contribution on a related phase of the work, credit may be given by adding

to the title and authorship the words "With a section on (subject) by (author)".

3) If responsibility for individual sections of a single project is borne by each of several authors, the section for which each is responsible should have his name accompany the section's title. If one person in the group has been responsible for the overall project either as a director or editor, his name may appear on the title page preceded by the words "Supervised by" or "Edited by". If no single author of the group has had more responsibility than another for the development of the project, the order of sequence of the several authors may be agreed upon by the authors and approved by the State Geologist. The number of names to be placed on the title page in such a case should not exceed a total of three. If the number of names is in excess of three, the State Geologist's name may be used on the title page preceded by the terms "Prepared under the direction of", and the names of the authors can be listed in the approved order on the first page of the text beneath the title.

Publication and number.-- For a Volume, the term "volume" should be abbreviated (Vol.), and its number in the series should be in Roman numerals. The terms "Second Series" should follow. For a Report of Investigations and an Information Circular, the terms are not abbreviated but the term "number" (No.) is, and it is followed by Arabic numerals.

State seal.-- A reproduction of the "Great Seal of the State of Missouri" appears on the title pages of all Survey publications. The author may mark its approximate position on the title page of his manuscript by a short dashed line or with the terms "State seal" within parentheses.

Date.-- Manuscripts may be dated at the time they are completed by the author, but the date will have to be changed by the editor to that of the month and year in which the report will be published. For example, if a report is completed near the end of one year but is not to be delivered by the printer for distribution until the following year, the latter date is used rather than the date of the month and year in which the report was completed. The month and year in which the publication is distributed to the public is regarded as the official date of publication.

Departmental organization.-- The format for the departmental organization is inflexible and standard for all Survey publications. It should be arranged and written as follows:

STATE OF MISSOURI
Department of Business and Administration
Division of
GEOLOGICAL SURVEY AND WATER RESOURCES
JOHN R. DOE, State Geologist
Rolla, Missouri

List of Survey Personnel

All reports published by the Survey as Volumes, Reports of Investigations, and Information Circulars must contain on the reverse side of the title page a list of names of the Survey's permanent technical and clerical staff which is employed at the time of a report's publication. Although the preparation of this list is an editorial duty, the author may make provision for its later inclusion by inserting a blank sheet in the proper position in the manuscript.

Table of Contents

The table of contents, which should be designated by the heading "CONTENTS", is a concise list of the headings which appear in the body of the text. These headings should be arranged so that their relative rank in degree of importance is indicated by the amount of their indentation from the left-hand margin of the page. Major headings of coordinate material are set at the extreme left-hand margin. Successively less important subheadings are indented to the right. Each heading in the list is followed by dot leaders (a row of dots). In manuscript form, the page numbers of the various headings should not be filled in by the author. They are supplied by the printer as one of the last steps in the preparation of page proofs.

For any Survey report, it is undesirable to provide headings of more than five ranks for two reasons: 1) excessive refinement in text subdivision confuses the reader, and 2) there are limitations in the selection of type styles and sizes for proper distinction of the headings within the body of the text. When there are as many as five ranks of headings in the body of the text, it is undesirable to list the last rank in the table of contents because it unnecessarily lengthens the list, and the amount of indentation required makes the layout of the printed matter unsightly.

In listing the headings in the table of contents, only the first word and proper nouns should be capitalized.

Headings.-- Headings are titles subordinate in rank to the title of the report. They should be constructed with as much care as the main title and should succinctly indicate the things discussed or described in the text.

Headings should be written and arranged as follows: Primary headings are written with capital letters and centered on the line above the text to which they refer. Secondary headings are written with capitals and lower case letters and are either indented from the left-hand margin of the page and placed at the beginning of the paragraphs to which they refer or are centered on the line above. In the first instance, no headings of lesser degree may appear in the body of the text because the marginal position is reserved for headings of lowest degree. In the second instance, headings of lesser degree may or may not follow. If a heading of tertiary degree follows and is not succeeded by headings of lesser degree, it is written in caps and lower case and placed in the marginal position. All marginal headings of this type must be followed by a period and a dash (2 hyphens of a typewriter).

Three ranks of headings are the maximum that can be handled within the type style and size limits of a standard typewriter--CAPS (centered), Caps and lower case (centered), Caps and lower case (marginal). A quaternary subheading may be designated by underscoring it, but this is not advisable because the printer will set any underscored word in italics, and italicized headings do not conform with the Survey's printing standards. Therefore, if an author uses as many as five headings, he may designate those lower in rank than secondary be centering the tertiary and quaternary headings and penciling beneath each a dashed and an undulatory line, respectively. The remaining heading will then be marginal as already described.

When a principal heading in the body of the text is followed by a brief general statement that precedes detailed explanations for which

suitable headings are provided, it is unnecessary to insert a perfunctory heading such as "Introduction" or "General statement" for this material.

List of Illustrations

The list of illustrations, designated by the heading "ILLUSTRATIONS", is a tabulation of abbreviated plate titles and figure captions which accompany the illustrations in and with the printed report. Because of space limitations of the page on which the list is printed, it is undesirable to write out the complete titles and captions. They should be reduced in length to the least number of words consistent with intelligibility and written in a telegraphic style. As in the table of contents, the cryptic descriptive phrase is followed by dot leaders, and the author should not fill in the page numbers. The first word and proper nouns are the only words in the phrase to be capitalized.

Plates vs. figures.-- Aside from the factor of size, there are no real differences between plates and figures. Before the development of modern printing facilities, method of reproduction had also been a distinguishing factor. Illustrations which required special reproduction methods by lithography, photogravure, or photogelatin processes had to be separately prepared from the text and printed as plates on specially coated paper. They were then hand inserted into the report prior to binding. Today, any type of illustration which does not exceed the page size of the printed report is considered to be a figure. The only exception to this rule is when several figures are grouped together on one page as for paleontological illustrations. Such illustrations retain a

plate designation to facilitate reference to the contained figures, it being less confusing to the reader for the author to refer to Fig. 3, Pl. 6, than for him to refer to Fig. 3, Fig. 6; or Fig. 3-6. All illustrations which are larger than page size are regarded as plates.

Figure captions.-- In preparing his manuscript, an author should designate all of his illustrations (with the exception of a page of grouped figures) as figures unless they are of such size that even with considerable photographic reduction they cannot be printed with the text. Thus, all exceptionally large maps and charts which cannot be conveniently printed with the text should be designated as plates.

If it is possible, an author should avoid placing titles and captions directly on the face of his illustrations to be printed as part of the illustrations except in the case of maps and charts which will be printed as plates. Instead, he should append with rubber cement or an adhesive tape to the back of each illustration a slip of paper containing the illustration's figure number, title, and caption. These captions will be typeset by the printer and inserted beneath the illustration in the body of the printed text. The author should also include a separate list of these figure captions with his manuscript to facilitate composition of the captions by the printer.

List of Tables

If there are one or more tables included in the body of the text, a list of their titles, with the heading "TABLES", must follow the list of illustrations. As in the list of illustrations, lengthy titles should

be reduced to a minimum number of words. The requirements for capitalization, for leaders, and for the absence of page numbers are the same as for the list of illustrations.

Letter of Transmittal

A letter of transmittal to the Governor of the State is customarily written by the State Geologist for inclusion in published Volumes. The letter is not a necessary part of the manuscript being prepared by the author, but he may make provision for its later inclusion by inserting a blank sheet in the proper position for it in the manuscript.

Abstract

An abstract is a digest of the report and should not be written until after the manuscript is complete. A good abstract requires careful thought and preparation because it must convey a maximum of information with a minimum number of words. It should be suitable for publication in an abstract journal and should contain key items for bibliographic indexing. It should stress major contributions related to the main topic of the report, clearly orient the report in place and function, and systematically group the facts and data presented.

Extraneous items to be avoided are: 1) summation of the previous work of others; 2) citations or references to tables, illustrations, or other material in the body of the report; 3) useless verbiage such as "examples are given", "this is discussed", "it is shown that"; and

4) outlines, tabulations, and raw data.

The abstract should have the centered heading "ABSTRACT" and should appear on the first page of the body of the text immediately beneath the name of the author (or authors) which is centered below the title of the report. If the preliminary draft of the manuscript is being typed by the author, he should single space the typed lines of his abstract and indent both margins five spaces from the outer margins of the text. If the manuscript is handwritten, the author should indent the margins and instruct the typist to single space the material.

Text

The text constitutes the body of the report. It contains the observations made during the author's investigations together with his descriptions, interpretations, and conclusions concerning them. The arrangement and treatment of this material can be and is in most instances an individualistic effort on the part of the author, but there are a few cases in which the style of the report has been stereotyped through practice. One such case is the geologic report on a given geographic area. Because of this, the format of this type of report will be described in detail and in so doing a few subsidiary items pertinent to the writing of all reports can be discussed.

The text material for an areal geologic report is customarily subdivided into six major units which are arranged as follows: 1) Introduction, 2) Geography, 3) Physiography, 4) Stratigraphy, 5) Structure, and 6) Economic geology.

Introduction.-- The treatment of introductory material can be as individualistic as the author who writes it, but to properly accomplish his purpose the author should keep in mind a few basic requirements of a good introduction. Such an introduction should contain at least the following elements: 1) a statement of the purpose of the investigation; 2) a résumé of the conditions under which the work was done; 3) a plan of treatment of the subject matter of the report; 4) a summary of previous work in the field; 5) a discussion of the conclusions drawn by the author in relation to other work if any done on or in the same area of study; and 6) an acknowledgment of cooperation and favors.

If the introduction is lengthy, the above mentioned items may be treated under separate subheadings instead of in paragraphs under a single heading. In many Survey publications, the last item has been treated as a separate unit under the heading of "Acknowledgments", but this is not a necessary requirement and should be left to the discretion of the author.

In regard to acknowledgments, an author should acknowledge the assistance rendered by persons not connected with the Survey. Specific contributions of noteworthy character by Survey staff members must be credited to the persons that made them. Such contributions may be in the form of fossil or mineral identifications, analyses, computations, and field assistance on specific problems. It is unnecessary to mention assistance rendered by other Survey staff members unless such assistance has been of more than routine nature.

Geography.-- The length and amount of information contained in this part of a report is dependent upon and proportional to the purpose of the investigation and size of the area investigated. Of the five principal

topics which may be discussed, only two are necessary to the development of the report. They are: 1) a description of the location and extent of the area in relation to geographic coordinates and political boundaries, and 2) a discussion of the cultural features of the area, such as towns, populations, transportation facilities, and economic resources. The other topics are: 1) climate, 2) scenic attractions, and 3) economic and cultural history.

Physiography.-- The essential points for discussion in this part of a report are topography and drainage; their description, character, and stage of development. In addition to these major topics, a description of the area's location within the regional physiographic province may be given, and specific features of geologic interest such as caves, sinks, springs, and natural bridges may be discussed.

Stratigraphy.-- In most surface geologic reports, the stratigraphy of an area is generally discussed chronologically with the oldest rocks being first and the youngest last. However, this treatment may be reversed for some subsurface geologic reports where it is advantageous for the author to describe the rock formations in the order in which they are penetrated by the drill.

The order of arrangement of the rock units in either case should be consistent with standard classificatory treatment in that within the author's framework the principal time-stratigraphic and rock-stratigraphic units are followed by successively less important units, proceeding from System to member.

Because the formation is the fundamental rock-stratigraphic unit in the classification of rocks, it receives a more detailed description than

any of the other units which may be treated in a manner similar to that described below. Refinement of the descriptive method has developed over the years, and the following pattern of treatment has become standard for most Survey areal geologic and stratigraphic reports.

(1) Formation name. Discussion of the formation name includes a definition of the formation, a history of the name's usage and development, the location, and if necessary, a description of the formation's type section, and other data which may be pertinent.

(2) Distribution and thickness. A description of the areal surface and subsurface extent of the formation within the area of investigation should be given along with information pertaining to the formation's variations of thickness. Here, as well as in the following section on lithology, it is customary to cite specific locations of exemplary outcrops and drill holes by the system of fractional section, township, and range.

(3) Lithology. The elements of the lithic character of the formation should be arranged insofar as possible in the following sequence: a) predominant and subordinate lithologies; b) color of fresh and weathered surfaces; c) texture based on megascopic and (or) microscopic observation; d) primary structure, principally type of bedding; e) secondary sedimentary structures within the formation; and f) contained organic structures and their mode of preservation. If the number or length of the illustrative stratigraphic sections containing the particular formation under discussion is not excessive, they may be included in this part of the text. However, if the number exceeds a total of three or four, or if the sections are exceptionally long, they may be presented in an

appendix to the report.

(4) Stratigraphic relations. The relationships of the formation to overlying and underlying beds within the area of study as well as the character of their boundaries should be described in detail.

(5) Topographic expression. Many formations affect the topography of the area in which they are located. If the effect is pronounced, a careful description by the author may be of singular importance for recognition or mapping purposes. Occasionally, a formation will exercise control on local drainage or on the distribution of certain types of vegetation. Any observations of this type should be treated under this heading.

(6) Paleontology. Because of the character of an areal geologic report, it is not required to give more than a brief summary of the paleontological evidence present within a formation. However, an author wishing to discuss in some detail a fossil or faunal assemblage which may be pertinent to his discussion of the age and correlation of the formation may insert informal descriptions or faunal lists at this point in the report. In his treatment of his paleontological material an author should be cognizant of the following regulations: 1) formal generic names are capitalized, specific names are not, but both names are italicized (underscored) when used either separately or as a species name. Example: Spirifer rockymontanus. 2) Suprageneric and anglicized names are not italicized. Example: "True spirifers comprise the family Spiriferidae". 3) Generic names of a species may be abbreviated to the capitalized initial if in a discussion relating to or concerning a particular genus the name has been previously given in full and there is

no danger of confusion with another generic name containing the same initial letter. Example: "Spirifer arkansanus and S. lateralis are present in the Upper Mississippian".

(7) Age and correlation. Here, the author may present his conclusions concerning the age and correlation of the formation. His interpretations as well as those of others should be fully discussed.

Structure.-- The structure within the area of investigation and its relation to regional structure should be described here. The author may find it convenient to arrange his material under the specific headings of folds, faults, and joints.

Economic geology.-- This section should contain a detailed description and discussion of the mineral resources of the investigated area so that interested persons may have some idea of its economic exploitation potential. Wherever applicable, chemical analyses and (or) physical properties of these resources should be given. Available production records of mines, quarries, and oil and gas fields should also be included along with reserve estimates. Because of the importance of ground water to the agricultural and industrial development of the state, a statement or section pertaining to it should be appended in this part of the report. Selected well logs, casing records, and results of completion tests should be included whenever practicable.

Appendix.-- The appendix is the place where the author may tabulate data which cannot be conveniently fitted into the body of the text or which are more suitably consolidated for the reader's comprehension of comparative material than if the data were scattered through the text. Such material may be of any type dependent upon the subject of the report,

but the following is common to Survey reports: 1) descriptions of outcrop sections; 2) descriptions of drill-hole samples (well logs); 3) chemical analyses; 4) petrographic analyses; and 5) mineral and fuel analyses and (or) production.

Bibliographic citations.-- There are three types of bibliographic lists which may be used depending upon the author's intentions. 1) References, References cited, or Literature cited. This type of heading indicates a listing of only those references that are specifically cited by the author. 2) Selected references or Selected bibliography. This type of heading indicates that the list contains additional references to those specifically cited. Such additions are intended as literature leads for interested readers. 3) Bibliography. This heading indicates that the author has included all papers known to him that cover the main and peripheral elements of the topic or area investigated, including those cited in the report. Such a list is intended primarily for the benefit of specialists in the field of study covered by the report.

Reference citations in any type of bibliographic listing should be arranged as follows:

(1) Author(s). The surname of the author(s) must precede the given name and the initial of the middle name. When more than one author is cited the conjunction "and" is preceded by a comma.

(2) Date. The year of publication is cited. If an article has been orally presented prior to publication, the place and date of presentation should be set at the end of the citation. If the imprint date of the publication differs from the date of publication (the date of

release by the publisher or distributor, the imprint date is placed after the author's name, and the date of release is placed in brackets at the end of the citation.

(3) Title. Only the first word and proper nouns of all titles are capitalized. No abbreviations are used, and the complete title is cited. Only obvious typographical errors are changed.

(4) Source. The name of the publication is cited. If the publication is a book, the place of publication and publisher's name are given. Names of serial publications usually are abbreviated, and such abbreviations should be understandable to the reader. A list of titles of representative serial publications and their abbreviated forms are given on pages 114 to 119 of the U. S. Geological Survey "Suggestions to Authors", fifth edition, 1958.

(5) Volume and Number. The numbers of volumes and of serial publications are cited only in Arabic numerals. If originally given in Roman, they must be transposed to Arabic. The terms "volume" and "number" are abbreviated with the first letters in lower case (vol., no.).

(6) Page reference. All the numbered pages of a publication are cited. If the cited material is a part of a serial publication, the number of both the first and last pages of the article is given. If the publication is a book or a self-contained unit, the total number of pages is given. The term "page" is abbreviated and the letter is in lower case (p.); plural (pp.).

(7) Plate and text-figure references. All plate and figure references of a publication are cited in the same manner as pages. The term "plate" is abbreviated with the first letter in lower case (pl.); plural

(pls.). Roman numeral plate numbers are transposed to Arabic. The terms "figure" and "text-figure" are abbreviated with the first letters in lower case (fig., text-fig.).

Examples of cited publications are given on pages 119 to 122 of the U. S. Geological Survey "Suggestions to Authors", fifth edition, 1958. These suggestions reflect the editorial policy of the U. S. Geological Survey, and the citation forms therefore differ slightly (specifically in the abbreviation of terms "volume" and "page") from those of the Missouri Survey. This indicates that an author should familiarize himself with the editorial styles of whatever organization he intends to have publish his material.

In citing references of foreign publications, an author must not omit any diacritical marks, and he must check carefully the spelling of all words. A translation of a title in a foreign language may be placed in brackets after the title.

Names of many foreign authors are commonly preceded by a prefix which makes it difficult to place properly the citation in the bibliographic listing. If there is a prefix that is a definite article (La, Le, L') or a preposition (D'), or a preposition and an article forming one word (Dall', Du, Della, Lo), the prefix is considered to be part of the surname. If the prefix is a preposition standing alone (de, van, da), it is not considered as part of the surname.

Index.-- A well prepared index is a valuable asset to any type of lengthy report. In Survey publications, its use is customarily restricted to Volumes, but it may be employed in any of the other report forms. Although preparation of the index is an editorial duty performed at the

page-proof stage of processing, an author may be asked to assist the editor. The author can do this either by submitting a preliminary index with his manuscript, or by underlining, in galley or page proofs, words which he thinks should be indexed.

Modes of Expression

Numerals.-- Much of an author's uncertainty concerning the proper mode of numerical expression stems from the fact that there are two styles of formal writing, each of which has its own general rules for the writing of numbers. These are the literary style which is normally qualitative in content and the scientific style which is predominantly quantitative. Early training in composition and grammar stresses adherence to the rules of the literary style, and this tends to confuse an author who is preparing a scientific report unless he keeps his purpose clearly in mind.

In the literary style most numbers are written out, but in the scientific style figures are used in most instances and written numerical expressions are held to a minimum. The few rules governing the use of written numbers in the scientific style are as follows: 1) Except when a single number less than 10 is used for a serial number or page reference or as a unit of measurement, time, or quantity, it should be spelled out within a sentence. 2) Numerals at the beginning of a sentence are spelled out. However, sentences beginning with numerals usually can be rephrased. 3) Isolated round numbers (approximately a hundred miles) and large numbers (10 million, 3 billion) are spelled out. 4) Numbers of less than 100 preceding a unit modifier containing a figure are spelled out (three

6-inch beds of limestone). 5) Fractions that stand alone are spelled out, but where the fraction is joined to a whole number figures are used (three-fourths; $1\frac{1}{2}$). When a fraction is written in words, the numerator and the denominator may be joined by a hyphen if neither part itself contains a hyphen. The hyphen is not used when the numerator has the value of an adjective, as in: "He sold one half and kept the other".

Quotations.-- Professional ethics dictate honesty in indirect quotations and accuracy in direct quotations, and place responsibility directly upon the author. Quotations should not have to be checked or verified by the reviewers or editors. It is not necessary for an author to reproduce obvious typographical errors or details of printer's style except when he wishes to preserve such features.

When a direct quotation is less than three typewritten lines in length, it should be incorporated in the body of the associated text and set off by quotation marks. If it is longer than three lines, it should be set apart from the accompanying text by indenting the material five spaces from the left-hand margin and by single spacing the lines; quotation marks are then unnecessary.

Omissions in quoted matter should be indicated by a short leader (a row of three dots). Some editorial policies recommend three asterisks for this purpose, but the relatively large size and ornamental character of the asterisk tend to obstruct reading flow.

The titles of books, articles, or reports that are quoted should be enclosed in quotation marks, and the first word and all important words capitalized. Titles of serial publications are not enclosed in quotation marks, nor are they italicized (underscored) unless it is especially

requested by the author.

The question of how to punctuate direct and indirect quotations often arises, and although the problem is strictly one of typographic style and thereby an editorial responsibility, it is discussed here for the benefit of all concerned.

Most American publishers put commas and periods inside closing quotation marks whether they belong to the quotation or not. Admittedly, there is no logic to this practice, but printers feel that the terminal quotes are needed to help fill the small spot of white that would be left if the comma or period came outside. Because this necessity does not exist with other punctuation marks, they are treated in a logical manner. Until recently, this situation was not accorded recognition by the editorial staff of G. & C. Merriam Company, publishers of the Merriam-Webster series of dictionaries, because they gave the printer's style ruling status. However, in the sixth edition of "Webster's New Collegiate Dictionary", 1953, they appended the following note to the rules for quotation marks with other punctuation marks:

> NOTE. A logical distinction is often applied in printing U. S. Congressional matter and in the British and Canadian style of punctuation, and advocated by some American writers, whereby a period or comma is placed outside the quotation marks when it belongs not to the quotation but to the whole sentence or the clause containing the quotation (Webster's New Collegiate Dictionary, 1953, pp. 1151-52).

Scientific reports often abound in quoted material, and because of this a logical style of punctuation should be adhered to for the sake of clarity of statement. This style of punctuation is to be recommended for all Survey Reports.

References.-- Formerly, cited references in Missouri Survey publications were treated as footnotes--a practice still allowed in the literary style of writing--but the method is cumbersome in manuscript form and expensive in printed form. It is now replaced in formal scientific writing by the contrivance of referring the reader directly to an appended bibliographic list by giving only the author, date, and page of the reference in the text.

Reference citations of indirect or direct quotations should be placed within parentheses after the quotation and should consist of the author's surname (and initials in cases of name duplication), the date of publication, and the specific page and (or) illustration reference. If the author's surname is used in the sentence containing or paraphrasing the quotation, then only the date and page reference need be enclosed in parentheses after his name. If both the author's surname and date of publication are integral parts of the sentence, then only the page reference is enclosed in parentheses and placed after the date. If the quotation is taken from an article which has two authors, both surnames must be given; if three or more, only the surname of the principal author is given accompanied by the terms "and others". If reference is made to one of two or more articles published in the same year by the same author, each reference is indicated by having a successive lower case letter of the alphabet follow the date, as "1960a, 1960b".

Footnotes.-- In modern scientific writing (not in literary writing), footnotes are considered to be antiquated and obsolete forms of reference which are not used except in rare cases of necessity. The current views of many scientific editors on the subject have been pithily expressed as

follows by Stumm and Kesling (1957, p. 1022): "Most footnotes are uncalled for. They should never be used for references. Parenthetical remarks can almost always be phrased to fit into the text."

If the use of a footnote is unavoidable, it should be typed or written immediately after the line in which the reference mark occurs and be separated from the body of the text by having lines placed above and below it. An author may provide space for a reference mark by placing a "shelf" (___/) at the desired position in the text, but he should not number the footnotes no indicated; the numbering will be done by the editor after all eliminations and additions have been made before the manuscript goes to the printer.

Exact words and phrases.-- Suggestions for proper methods of expression are about as numerous as the improper methods which most writers use. The number of books containing these suggestions are therefore numerous as well as available. A few of them are listed in the Bibliography, and Survey authors are advised to consult them with the same frequency that they should consult a dictionary.

Editorial experience has indicated that the following words and phrases cause most Survey authors some degree of trouble:

And/or, and (or). The expression "and/or" is primarily used in business or legal writing. However, it is useful when three choices exist and is so employed in Survey reports, but the recommended form for such use is to place "or" in parentheses rather than to separate it from "and" by a virgule: "and (or)".

Combination color terms. Combinations of color terms are not hyphened unless they are used as unit modifiers.

Compass direction. Terms of compass direction such as "west" and "western" are both adjectives, either of which may be used, but each should be used consistently in a particular sense throughout a report. Indefinite or general terms of broad application may end in "ern", as "in western Missouri", but terms of definite designation need not have this ending, as "the west end of the outcrop".

Due to. This phrase often causes more trouble than it is worth, and it should be avoided if possible. If a Survey author has to use the phrase, he must use it formally as an adjective and not informally as a compound preposition. The word "due" is an adjective which means "owed or owing" as a debt or as a natural or moral right, as "to give due consideration". It also means "owing or attributable to something", as "his death was due to pneumonia". In this phrase "due" is a predicate adjective modifying "death" and "to" is the preposition of "pneumonia". There is nothing wrong in using "due to" as a compound preposition, but it should not be used as such in formal scientific writing.

Endings "ic" and "ical". Both the endings "ic" and "ical" for geologic terms are often used indiscriminately by the same author in a single report. The only objection to this habit is that it is inconsistent. An author should select one or the other and retain it throughout his report. Whichever form is selected, the author is cautioned to write correctly the name of organizations or publications in which one or the other form is used, such as the established name of the "Missouri Geological Survey and Water Resources".

Occur. Some geologists are violently opposed to what they consider

to be the incorrect use of this word, but their complaints are gradually being covered over by a preponderance of this so-called misuse. This misusage is gradually adding another meaning or connotation to the word, and this is acceptable is a growing, changing language. The principal but now obsolete meaning of the word is "to hasten to a meeting; to meet or clash; to meet in opposition (to); to oppose". A part of the secondary meaning, the one acceptable to the classicists, is "to befall in due course, to happen". This carries a meaning of happening in the realm of time and not of place (the meaning which is now being added to the word).

Formalists would accept this sentence: "The explosion occurred in the afternoon." But they would reject this sentence: "The oolitic limestone occurs throughout the area." If an author is prone to use the term "occur" in a sense of "being present" he may do so, but he is advised to replace it frequently with a more appropriate word or phrase to avoid monotony of expression.

Outcrop, crop out. The word "outcrop" can be used either as a noun or as an intransitive verb, but use of it in both forms in the same report is obviously inadvisable. The verb "crop" used with the adverb "out" is preferable to the verb "outcrop".

Part and portion. The word "part" is one of the fractions into which anything is divided; a constituent of a whole. "Portion" is a share or a division in a distribution. Therefore, the word "part" is preferred unless the author intends to stress the idea of sharing or apportioning.

Range. This term is used properly in the sense of something changing or differing within limits. It is most commonly employed for thickness

variations of stratigraphic units, as "the bed ranges in thickness from 40 to 50 feet". The only objection to this is that the word is often monotonously overworked and many times misused. It is advisable to change the word by rephrasing wherever possible, and authors should use it only when both limits of the range are given. It is not correct to write, "the beds range up to 3 feet in thickness".

The terms "featheredge" and "knife edge" may be applied to the edge of a rock unit which thins to extinction, but many editors now accept "zero" as a substitute for these terms and consider it acceptable to say that "the unit ranges in thickness from 0 to 13 feet".

For additional information on the proper use of words and phrases, the reader is referred to the section "Suggestions as to Expression" in the U. S. Geological Survey "Suggestions to Authors", fifth edition, 1958.

Leaderwork and Tables

The purpose of tabulation is to present in a concise and orderly manner information which cannot be given so clearly in any other way. Leaderwork is a simple form of table having from two to four columns but no boxhead (space for subheadings) or rules (horizontal and vertical lines). Geologic sections, well or drill-hole records, faunal lists, and lists of production statistics are forms of leaderwork.

Any unit of tabulation should be restricted to one subject or should contain related subjects for comparison. An introduction to the tabulation should be made in the text, but it should not duplicate matter in the

leaderwork or table heading. The heading should concisely indicate the principal items of information included. Short tabulations do not need a heading if they are introduced in the text with some such statement as, "The following table shows ..."

Leaderwork and tables are normally placed in the body of the text in juxtaposition to their reference, but if several or lengthy tabulations are to be included, it may be advisable to place them in an appendix.

Except for short tabulations, some of which may require only a few lines on a page, each listing should be restricted if possible to a single page. If several pages are needed, suitable center and sideheads are required for continuity.

It is undesirable to break a table so that parts of it are on different pages. An author should make every effort to design his tables so that each can be retained as a unit on a single page. There are a few devices used by the printer to assist in placing a table on a page or, if necessary, on facing pages. These will not be of any help, however, unless the table is constructed to fit the size limits of the intended publication. The size of the type can be reduced to minimum legibility (6-point), or the table can be set long way on the page, or it may be set on facing pages. If a tabulation is too lage to fit with the body of the text, it should be drawn up by a draftsman for offset reproduction and printed on a separate sheet to be put in a pocket. Large tabulations may be type set but at excessive cost.

Leaderwork and tables may be numbered for ease of reference, but it is not necessary to do so if only a few are used in a report. Tables and leaderwork may also be numbered separately if they pertain to different subjects. All title numbers should be in Arabic numerals, and the word

"number" or its abbreviation is omitted, as: "Table 1".

Geologic sections.-- In constructing a geologic section, the author should place the youngest unit at the top, the oldest at the bottom. The beds are then numbered, beginning with the oldest bed. The classification of each System in the section should be given in the order of succeeding inferior units, and the relative rank of each is indicated by its amount of indentation from the left-hand margin of the page. When the number of ranks is in excess of four, the amount of indentation makes it difficult to type descriptions in the remaining restricted space in the manuscript. In such a case, an author may place all the names of the units flush with the left-hand margin and indent only the descriptions. The editor will then direct the printer to indent the material in the published form. The right-hand side of the page should contain a column for the tabulation of the thickness of each bed in feet and inches (British equivalent).

The descriptive elements for each bed should be given in the following sequence: rock type; color; texture; degree of hardness (optional); bedding features; weathering characteristics; inclusions (organic and (or) inorganic). Hyphens are used between words combined to form unit modifiers that follow the principal term, because the modifiers essentially read back to the noun as though they preceded it. Each descriptive element is separated from the next by a semicolon, because the matter following the punctuation cannot be part of the preceding statement.

In the column for the tabulation of thicknesses, if only feet are given, a zero must be placed in the "inch" column, but if only inches are given, a zero should not be placed in the "feet" column.

An author should number his sections in the order in which they will

appear and be referred to in the text, and he should give each a location title. Such a title must contain the name of an identifying geographic or cultural feature, the fractional section, township, and range in which the section is located, and the name of the county (and state if sections in states outside of Missouri are among those described).

The following section is exemplary of the above requirements:

Section 3

Section at Little Buffalo Creek, SE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 16, T. 53 N., R. 2 W., Pike County, Missouri.

	Thickness Feet	Thickness Inches
Silurian System		
Albion Series		
Edgewood formation		
Bowling Green member		
7. Dolomite, dark yellowish-brown; dense; contains a few brachiopod fragments	2	0
Ordovician System		
Cincinnatian Series		
Maquoketa formation		
6. Shale, medium yellowish-brown; silty; slightly calcareous; finely laminated		3
5. Shale, medium olive-brown; sandy; calcareous layers one-half inch thick alternating with yellowish-brown, sandy limestone layers as much as 1$\frac{1}{2}$ inch thick		10
4. Siltstone, dark brownish-gray; slightly dolomitic; finely laminated; breaks with conchoidal fracture		11
3. Shale, medium gray; sandy; fissile; weathers to dark yellowish-orange		1
2. Shale, light olive-gray; cone-in-cone structure		3
1. Shale, light olive-gray; fissile; calcareous; contains rounded, frosted quartz grains		4

Well and drill-hole records.-- The overall composition for a well or drill-hole record is similar to that of a geologic section. The classificatory and descriptive arrangement is the same, but there are differences in title headings and thickness columns, and the beds in the section are not numbered. The heading for a well or drill-hole record should contain the following: Type of record (sample log or driller's log); name of owner or operator; well or drill-hole number; Missouri Geological Survey file number; location in fractional section, township, range, county, and state; elevation of wellhead; completion date; driller's name and address; and an identification number if the well location is shown on an index map. On the right-hand side of the page, space is reserved for two columns of figures, one column for the thickness in feet of each bed and the other for the depth in feet of the top of the bed from the surface elevation. Values are usually given only in whole feet since most drill-hole records are based on 5-foot intervals, but with cores the measurements are normally given in feet and inches. Casing information is given in a footnote at the end of the tabulation along with other pertinent information. If a well is continued on a succeeding page, the first line on the page must contain the name and number of the well followed by a 2-em dash and the word "Continued". Headings for the thickness and depth columns should be repeated. An example of a typical sample log record is as follows:

Sample log of the City of Senath, Well No. 3. Mo.G.S. 8948. Location: SE¼ SW¼ SE¼ sec. 2, T. 17 N., R. 8 E., Dunklin County, Missouri. Elevation: 259 feet. Completed November 1945 by Weldon Well Company, Cape Girardeau, Missouri. Well No. 8, Pl. 1.

	Thickness Feet	Depth Feet
Quaternary System		
Pleistocene Series		
Recent alluvium		
Silt, brown	15	15
Sand, polished grains, coarse; igneous pebbles	25	40
Clay, brown to buff; lignite; chert	130	170
Sand, polished grains; chert pebbles	25	195
Pebbles, chert and quartz; polished sand grains	15	210
Tertiary System		
Eocene Series		
Wilcox group		
Sand, fine- to medium-grained	40	250
Sand, medium- to coarse-grained, polished	125	375
Paleocene Series		
Midway group		
Porters Creek formation		
Clay, dark gray, micaceous; conchoidal fracture	320	695
Clay, as above; glauconitic	125	820
Clayton formation		
Limestone, white; glauconitic	10	830
Cretaceous System		
Gulf Series		
Owl Creek formation		
Clay, dark gray	20	850
Sand, medium-grained	10	860

Note: The well was cased with 130 feet of 8-inch pipe with a swedge nipple 12 inches long and with 1,511 feet of 6-inch pipe perforated for 50 feet. No screen data is available and yield is unknown. An electric log of the hole was made by the Schlumberger Company.

Faunal lists.-- Faunal lists are necessarily tailored to the needs of individual reports. Accordingly, the genera and species may be arranged in

one of several ways depending upon the completeness of the list, the author's intentions, and the reader's requirements. In a list which is short, of general character, and intended to provide only subordinate information, the taxonomic groups (phyla, genera, and species) may be arranged alphabetically. If the list embraces many phyla, the number of genera and species is large, and the intention is to stress in part the biologic factor, the phyla may be arranged in the order of increasing biologic complexity, and the genera and species alhabetically; in lengthy lists, the alphabetical arrangement facilitates the location of a particular genus or species. In technical reports on systematic paleontology or stratigraphic paleontology, the biologic factor is of primary importance. In the faunal lists of such reports, the phyla may be arranged in the order of increasing biologic complexity, and the genera and species may be grouped by taxa.

If a faunal list contains specimens from several localities, the right-hand side of the page should be used for columns of locality occurrences. If several faunal lists are included, they should be numbered in the order in which they appear in the text, and each list should be headed by a title. The title should contain the name of the formation from which the fauna was taken and the general geographic area where the collection was made.

Faunal lists can be made more useful for specialists or interested readers if the name of the first author or founder of a species is indicated, and the date when the species was first described. The founder's name should follow the systematic name without punctuation and should not be italicized. If a species originally described as belonging to one genus is later transferred to another, the founder's name is enclosed by parentheses.

It is not required that the amender's name be added, but it is most helpful if it is. The founder's name should be followed by a comma and the date of description.

Unless the species in a faunal list have been identified by a specialist, or even if they have been so identified, there are reasons in some cases for expressing degrees of doubt. Degrees of doubt are indicated by question marks, by the Latin abbreviations "cf." (confer) and "aff." (affinis), and by quotation marks.

The position of a question mark indicates particular regions of doubt. If the query follows the generic name, it indicates that the genus is in doubt, but not the species identification. If the query follows the specific name or the founder's name, it means that the species is in doubt, but not the generic identification. If the query precedes the generic name, it implies that the entire identification is doubtful.

The abbreviations "cf." and "aff." connotate degree of similarity and relationship. "Cf." indicates general similarity and the possibility that definite identification could be made if adequate material were available. "Aff." implies close affinity but probable or recognizable differences in detail. The abbreviations should be placed after the name of the genus and should be followed by the initial letter of the generic name, the species name, the founder's name, and date of description. The terms "aff." and "cf." should not be italicized.

Names of very broad or probably erroneous usage should be indicated by quotation marks. This may apply to either the generic name or the specific name, or both.

Tables.-- By definition, tables are boxed (horizontally and vertically

ruled) areas containing tabulated matter of a concise nature. Any type of information which can be converted to or expressed in figures, single words, and (or) symbols may be tabulated. It is desirable to restrict each table to one subject or related subjects which are comparable and to limit its size to the page size of the intended publication. Tables, if not introduced in the text, should be numbered in the order in which they appear and should bear suitably brief titles or headings.

Tables are space savers. If properly designed, they can contain information which would ordinarily take up many pages of text. There are no rules governing the design of tables except those of common sense and clarity. So if an author intends to use tables, he is advised to do so with discretion and with an eye for good design (readability).

Footnotes to tables are independently numbered. Arabic numerals are used unless there are three or less notes, in which case symbols are satisfactory. If it is necessary, to avoid ambiguity, lower case letters of the alphabet may be used. The reference mark should appear immediately after the word or matter to which it relates, but it must immediately precede figures or symbols. A reference mark standing alone in a column should be written between parentheses and centered. Reference marks should appear in numerical, alphabetical, or sequential order, beginning in the heading or title of the table. The footnotes of each table are placed immediately beneath it, not at the bottom of the page on which the table appears.

Manuscript Flow

Preparing and processing a manuscript with the least amount of lost motion requires mental discipline and careful planning on the part of the author. He should organize his thoughts and data systematically and outline his material carefully so that his actual writing time is used effectively. He should endeavor to make his initial draft (longhand or roughly typed) essentially complete in content and make-up so that the number of retyped drafts can be held to a minimum and an orderly processing flow can be maintained. Laxity in this matter is detrimental to the quality of the report and wasteful.

Working methods cannot be dictated, but results of reasonable quality can be expected. How an author prepares his material for presentation in a written report is a matter of individual concern, but the quality of the end product is a matter of immediate concern to many people; typists, draftsmen, reviewers, editors, printers, and readers, essentially in that order. Typists and draftsmen are primarily affected because they are of direct assistance to the author in shaping the completed manuscript. A typist should not have to type and retype the report more than four times before it is sent to the printer, and the draftsman should have to perform the arduous task of designing, laying out, and drawing (or preparing in the case of photographs) the illustrations only once; redrawing or correcting is an extremely wasteful process if the author does not "think through" on his illustrations before they are drawn the first time.

When the first longhand or roughly typed draft is completed, the author should request the typist to copy it with no carbon copies on standard $8\frac{1}{2}$ x 11 stationery and to type it double space on one side of the sheet. The typist should assume the responsibility of watching for and correcting obvious errors such as misspelled words, word omission or duplication, incorrect grammar, and incomplete sentences. Many times a Survey author may overlook the fact that this responsibility on the part of a trained typist is to the author's benefit.

After the single copy of the first typed draft is returned to the author, he should make all his corrections, additions, and deletions. These should be made as legible as possible. Corrections should be in colored pencil and standard proofreaders' marks should be used. Lengthy additions or statements should be spliced into context instead of being put on separate sheets with insertion directions. This expedites retyping. Short insertions and corrections should always be placed above the line to which they are added, never below. Figure and plate references should be inserted, and tables and leaderwork checked and placed in their proper positions in the text. Title page, table of contents, list of illustrations, list of tables, figure captions, abstract, and bibliography must be prepared in a legible manner and appended to the manuscript. Rough drafts or preliminary copies of all illustrations should be ready or near completion at this time. The manuscript is then returned to the typist for retyping with instructions to make enough carbons so that each reviewer may have an individual copy. Three carbons

are sufficient; four clear (legible) carbons are the limit for a single typing. The first impression of the retyped copy is kept by the author for further corrections.

The author must submit copies of his manuscript to each of the following for review: the State Geologist, the Assistant State Geologist, and the Principal Geologist. If the author so elects, he may select other members of the Survey staff to review his report at this time. After the above mentioned staff members have reviewed the manuscript, it may be submitted to persons outside the Survey for review and comment. Such persons may but need not be specialists in the field of study covered by the report, and they should be selected by mutual agreement of the State Geologist and the author.

Comments and suggestions are gathered from the reviewer's corrected copies and transferred to the author's copy. The author then proofs this report thoroughly. He should check the accuracy of his data, his quotations, and cited references. If the report is to be published as a Volume, the author must obtain a letter of transmittal from the State Geologist for inclusion with the manuscript. The manuscript is then retyped with one or two carbon copies and submitted to the editor.

After the manuscript has been edited, the author must review and approve any changes which may have been made to the textual content of the report. When such changes, if any, have been checked and approved, the manuscript is again retyped and two carbons made. At this stage, the entire manuscript is complete and ready for publication. From this

point on, any changes are costly, and unless errors of considerable magnitude are noted, an author should not expect to be able to make them.

An editor's task is twofold. He must prepare the manuscript for the printer as well as for the reader. Preparation for the printer requires a careful examination of the nature and rank of headings, the form of footnotes, the style of citations of publications, accuracy of reference dates to the citations, the forms of tables and geologic sections, and the various features of typographic style (size and style of type, capitalization, punctuation, and spelling). Most of this work is done on the basis of prescribed rules which are taken from authoritative sources such as the "Style Manual" of the Government Printing Office, U. S. Geological Survey "Suggestions to Authors", fifth edition, 1958, and Webster's "International Dictionary", second edition, unabridged.

Preparation for the reader necessitates an attitude of detachment on the part of an editor, who tries to understand the author's statements from the viewpoint of those for whom the report is intended. If an editor finds that the author's ideas are obscurely expressed, it is his responsibility to help the author rephrase the remarks as clearly and concisely as possible. This may necessitate alteration of grammar and of sentence or paragraph arrangement, elimination of repetitious or irrelevant statements, and clarification of obscure passages.

Clarity of expression is a technical art requiring experience and training, and no one person can expect to be entirely proficient in its execution. Therefore, an author should accept an editor's suggestions

and corrections not as derogatory rebuffs of his intelligence and ability, but as aids for the improvement of the report. If an author's intended meaning has inadvertently been altered by an editor's corrections, the author should confer with the editor so that a mutually acceptable revision can be made.

TYPING THE MANUSCRIPT

It is expected that typists who are to prepare typed copies of Survey manuscripts will familiarize themselves with such parts of this manual as are pertinent to their work. They are also advised to use frequently the references cited in this report as well as other publications pertaining to standard rules of grammar, punctuation, and spelling. They should also examine recent Survey publications to note the style of format and make-up of details in the composition of such items as tables, footnotes, leaderwork, figure captions, titles, and headings.

Typographic Style

Insofar as possible, the typographic style of Survey publications should conform to the rules of typography as set forth in the "Style Manual" of the U. S. Government Printing Office, revised edition, 1959; "Suggestions to Authors", U. S. Geological Survey, fifth edition, 1958; and Webster's New International Dictionary, unabridged, second edition, 1949. Because these publications are readily available for reference by

Survey personnel, it is impractical to cite here all of the rules that can be found in them. However, to facilitate their use, an itemized page index is given in the following table:

Typographic Style Index

Abbreviations ----------	SM[1] 149-164	Numerals ----------	SM 165-171
	SA[2] 200-206		SA 194-197
Standard, ----------	SM 155-162		
	WD[3] 2989-3000	Punctuation --------	SM 133-147
Bibliog. citations --	SA 111-119		SA 197-200
Geologic, ----------	SA 89		
		Signs and symbols --	SM 175-178
Capitalization ---------	SM 21-30		SA 227
	SA 191-192		WD 3001-3011
Guide to, ----------	SM 31-56	Geologic, ------	SA 86
		Proofreaders', -	SM 4-5
Compound words ---------	SM 69-76		SA 223
	SA 193-194		WD 3010
Guide to, ----------	SM 77-126		
"Non-," ----------	WD 1660-1662	Spelling ----------	SM 57-68
			SA 192-193
Italic ----------	SM 173-174		WD 1-2968
	SA 194		

1 - SM = "Style Manual", U. S. Government Printing Office, revised edition, 1959.
2 - SA = "Suggestions to Authors", U. S. Geological Survey, fifth edition, 1958.
3 - WD = Webster's New International Dictionary, unabridged, second edition, 1949.

Typing Instructions

Paper, margins, and spacing.-- Manuscript copy in all but the first rough draft should be typed on one side of standard letter size ($8\frac{1}{2}$ x 11 inches), white stationery (typewriter bond); the first draft may be typed on any suitable letter size stationery. A 1-inch margin must be left on all sides of each page of text except the first page where a 2-inch margin

is left above the title. Text material should be double spaced in all drafts, but the abstract and direct quotations longer than three lines should be single spaced. Both side margins of the abstract must be indented five spaces, but only the left-hand margin of quotations need be indented.

Pagination.-- In all drafts, manuscript pages should be numbered at the bottom, beginning with the title page. Lengthy tables which are typed on separate sheets when inserted in their proper places in the text should be numbered with the corresponding text page number and designated alphabetically--if the table introduction appears on page 10, the table is numbered page 10a.

Titles and headings.-- The title of the report and the author's name must appear on both the title page and the first page of the text. The title must be typed in caps and lower case with the principal words capitalized. The author's name must be typed in caps only. If there is more than one author, the conjunction "and" should be typed in lower case. All principal headings such as "contents, illustrations, tables, letter of transmittal, abstract, and index" have to be typed in caps and centered on the page. If only three ranks of headings are used, the centered secondary headings and side headings must be typed in caps and lower case; five ranks of headings require special penciled notation (see Headings). Titles of tables and figure captions must be typed in caps and lower case.

Miscellaneous.-- For instructions pertaining to capitalization in the table of contents and list of illustrations, for position of footnotes, and for reference marks and footnotes of tables, refer to the specific instructions given in the preceding part of the manual.

The final draft of the manuscript copy should be typed so that no paragraph breaks at the bottom of a page, but this is not a stringent rule to be followed implicitly if it is inconvenient to do so.

Neatness and accuracy are of primary importance for expeditious processing of the manuscript by all concerned. Therefore, erasures, strikeovers, interlined words, splicing and pasting, and crowding of lines can be tolerated only in cases of extreme emergencies.

ILLUSTRATIONS

Illustrations to serve their purpose properly should supplement the text and not be a complete substitute for it. Thus, the number and kinds of illustrations must correspond directly with the subject and purpose of the report. If the report is of a general nature, the illustrations should be simple, inexpensive, and composed with good taste. If the report is of a very technical nature or represents a compendium of knowledge on a particular subject, the illustrations should correspond in detail with the character of the report, and they should be composed with a sense of formal design. Too many illustrations are as detrimental for the effectiveness of a report as too few. The author should use critical judgement in this matter to achieve an effective balance.

Kinds of Illustrations

Illustrations can be classified on the basis of rendering--the method of depicting any type of visual subject matter either manually (a drawing

or map) or mechanically (a photograph). On this basis, illustrations fall into three cateogries: 1) line drawings, 2) full-tone drawings, and 3) photographs. These can then be further subdivided according to subject matter.

Line drawings.-- Line drawing is a printer's trade term for any type of drawing which can be reproduced as black and white copy with no tonal gradation, such as maps, charts, graphs, diagrams, plans, sections, and line sketches. Most line drawings are copied by a process of photoengraving which results in a line etching or line engraving on either a zinc or copper plate. These plates (or cuts) are used only in letter press printing, a method of printing from a raised surface. Line negatives are made for reproduction by photo-offset printing (photo-offset-lithography), a method of printing from a flat surface. Combinations of two or more colors can be reproduced from line engravings either by letter press or by photo-offset, but the colors are printed in blocks of single hues and do not have any gradation of shade or tint. Many multicolored geologic maps are printed in this way. Pattern and tonal gradation effects, however, can be achieved in line engravings by use of a Benday machine or by use of commercially prepared overlay patterns such as Zip-a-tone.

Full-tone drawings and photographs.-- Full-tone drawings result from any type of rendering process which produces a tonal gradation, usually from black to white. Ink-wash, charcoal, and pencil drawings are examples. These as well as photographs are reproduced as halftone engravings or negatives for letter press or offset printing, respectively. A halftone engraving or negative is made by a photomechanical screening

process which breaks up the tones of the original into a pattern of fine dots which correspond in strength to the light and shadow of the copy. Collotype and gravure printing methods, however, can be used for reproduction of full-tone drawings and photographs if reproduction of exceptionally fine detail is required. Both of these methods are highly specialized processes and are correspondingly more expensive. Color work is accomplished by the so-called four-color process in which copy is printed in color from halftones for which color separations have been made. Each halftone plate prints its own color in a composite picture, and four colors are used; yellow, red, blue, and black.

Sizes of Illustrations

Survey publications with the exception of some reprints from other publications are issued in three page sizes: 1) Volume, $6\frac{1}{2}$ x 10 inches; 2) Report of Investigations and Information Circular, 6 x 9 inches; and 3) Guidebook, $8\frac{1}{2}$ x 11 inches. These size limits govern the dimensions, and reduction and enlargement ratios of all illustrations that are intended to be published with text material. If an illustration exceeds these limits or cannot be reduced to fit them, it has to be folded one or more times and placed in a pocket, usually on the inside of the back cover. Tip-ins (folded illustrations inserted between pages of the text) have been used in Survey publications, but they are now avoided because their insertion requires an expensive hand operation on the part of the printer.

The author of a Survey report should keep the publication page size

limitations in mind when preparing his illustrations and should also realize that border, figure caption, and running-head requirements further limit the amount of available space on the page. When these requirements are met, the maximum allowable size for printed illustrations in each of the Survey publications are as follows: 1) Volume, $4\frac{1}{2}$ x 7 inches; 2) Report of Investigations and Information Circular, $4\frac{1}{2}$ x 6-3/4 inches; and 3) Guidebook, 7 x 8-3/4 inches. Exceptional sizes are permissible if informal treatment of illustrations is intended. In such a case, the illustrations can be "bled" off the trim edge of the page or they can be spread across the split between facing pages.

All illustrations should be prepared at a scale not less than one-third larger than publication size. The size of lettering should be such that when reduced to publication scale the smallest letters will not be less than 1/32 inch in height.

Preparation of Author's Copy

All of the author's copy for illustrations should be complete in detail, clean, clear, and accurate so that a draftsman can render it into a finished piece suitable for reproduction with a minimum of questions and corrections. If the illustration is intricate in detail or needs to be published at a scale larger than page size, the author should consult with the chief draftsman and the editor so that he can prepare his copy properly.

Photographs should be printed on 8 x 10 inch semigloss paper and should not be mounted. However, grouped pictures of fossils, rock specimens, and similar material should be mounted, arranged, and numbered as a plate of figures.

Photographs should not be marked in any way. If lines, letters, or other reference marks are required on the surface of the photograph, the author should place them on a transparent overlay and paste it lightly to one edge of the print. Care should be taken in marking the overlay because indentations of the photograph's emulsion surface will show in the published reproduction. Because of this, an author should not write on the back of the photograph with a hard pencil or ballpoint pen. Figure captions and numbers which will accompany the photographs can be typed on onion skin paper and placed on the back of the photograph with an adhesive tape.

An author should be careful to credit, and use only with consent of the owner of the copyright, all copyrighted photographs or other illustrations.

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