FORM AND CONTENT OF THE REPORT

PAGE

Besides the report title itself, the title page of a Survey book report carries the name(s) of author or authors, series and number, volume title if applicable, a statement of cooperation if applicable, and a brief descriptive statement characterizing the report. The title and authorship also appear on the first page of text above the abstract, about 2 inches from the top of the manuscript page to allow space for directions to the printer and for volume title if needed. Check several recently published papers for examples of format.

Use great care in choosing an informative title. It may be the only reference a reader will have to the report. Most literature and subject searches start there, and nothing will better catch the reader's eye. The title should be as brief and clear as possible; it should give the reader a clear idea of your paper's content, but it should not serve as a summary of the report. Long titles do not necessarily indicate scholarship, and they are seldom quoted in their entirety anyway, but do not attempt to shorten the title through the use of multiple compound modifiers, or through a pyramid of prefixes.

Avoid beginning the title with insignificant words or needless words such as "The," "A," "Notes on," "Report on," and "On." These words can be effective in text headings, but in a book title a more meaningful word is better. The first word should be an important one.

For some Survey reports there are no guidelines, and the author must devise an informative title, but many Survey reports have fairly standardized titles:

Mineral Resources of the North Absaroka Wilderness Study Area, Park and Sweet Grass Counties, Montana

Environmental Geology of the Front Range Urban Corridor and Vicinity, Colorado

Stratigraphy and Structure of the Western Kentucky Fluorspar District

Geologic Map of Dinosaur National Monument and Vicinity, Utah and Colorado

Geologic Map of the Ripley Quadrangle, Jackson County, West Virginia

Ground Water in North Monterey County, California

Titles of standard quadrangle reports customarily include the county name or names involved; county names may be appropriate for other reports also.

AUTHORSHIP

Authorship is an extension of the responsibility of seeing a research project through to completion. When more than one investigator has participated, the project chief or supervisor ordinarily decides how authorship is to be divided, after having evaluated the relative contributions of the collaborators and their abilities to deliver segments of the joint manuscript. For any research project that involves more than one scientist, all workers should clearly understand at the outset what parts of the research are their responsibility, what parts of the final report they are to prepare, and where their names will fall, if at all, in the order of authorship. The person in charge of the investigation, or the one who prepares the report or map, will naturally be author or coauthor. Other coauthorship is restricted normally to participants who contribute substantially to the results of the investigation. Administrators and supervisors are not normally included, nor are individuals who contribute only routine technical assistance.

Seniority, grade, and like distinctions are not criteria for deciding authorship or coauthorship, nor should such distinctions influence the choice of names on the title page, in the section on acknowledgments, or in a table of laboratory results. Credit should be based on responsibility for the finished product and for the work and thought that went into it. Laboratory assistants and other support personnel are more commonly credited in text or tables, but a participant who has shared greatly in the outcome of a research investigation might be listed as coauthor or, more rarely, as senior author.

Survey reports seldom warrant more than four principal authors. The form "*by* A.B. Brown, C.D. Smith, E.F. Jones, and others" is sometimes used, but if so, contributors not named as authors should be given due credit in the text or in a preface. A sup-

plemental contribution on a related phase may be credited by adding, to the main title and authorship, the words "*With a section on* (subject), *by* (author)."

The author of each separately titled report will be named regardless of whether the report is published as an individually numbered publication or as a separate chapter under a more inclusive general title.

Multiple authorship of a single report can cause problems for supervisors, editors, librarians, bibliographers, and even promotion boards, as well as the authors themselves. In today's times of increased specialization and multidisciplinary research, many reports are prepared jointly by several persons whose shared responsibility should be credited; acknowledgment in the text will generally suffice. A listing of more than four authors for a short article or a journal abstract suggests a lapse of judgment on the part of the principal investigator.

The general title page of a collection of several chapters by named authors omits any authorship if the chapters have only a general topical or geographic relationship. Such chapters are commonly issued separately, but if the chapters are closely related, authorship is shown on the general title page in accordance with currently existing policies. For example:

Data of Geochemistry
Sixth Edition

Michael Fleischer, *Technical Editor*

Chapter T. Nondetrital Siliceous Sediments
By Earle R. Cressman

Affiliations

Authors of Survey reports are assumed to be Survey employees, and no affiliation is shown unless some coauthors are not. In that event, affiliations of all authors are shown on the title page or on the first page of text. For most Survey reports, the senior author must be a Survey employee. For reports prepared in the Survey for outside publication, affiliations are shown for all authors, and if the Survey is to pay page charges, the senior author must be a Survey employee.

Statement of Cooperation

Some Survey products are sponsored jointly with cooperating Federal, State, or other governmental agencies. If so, statements of cooperation must appear on the title pages and covers of book reports and on the margins of separately published maps. You as author are responsible for ascertaining the exact title of the cooperating agency for such statements. Some examples:

> Report prepared jointly by the U.S. Geological Survey and the National Oceanic and Atmospheric Administration
> Cooperating organization: Colorado Geological Survey

> Prepared in cooperation with the U.S. Army Corps of Engineers, Mobile District

> Jointly supported by the U.S. Geological Survey and the Department of Housing and Urban Development, Office of Policy Development and Research

> Prepared in cooperation with the States of Illinois, Indiana, Kentucky, and Tennessee, and with other agencies

> The work on which this report is based was performed in accordance with a cooperative agreement between the U.S. Geological Survey and the Ministry of Petroleum and Mineral Resources, Kingdom of Saudi Arabia

You as author should follow the wishes of a sponsor or cooperator who desires a particular form of acknowledgment.

Descriptive Statement

A brief statement characterizing the report should appear on the title page of the manuscript. The editor will know if it should be italicized. Examples from recent Survey reports:

> The Figuera Lava and the overlying Fajardo Formation are redescribed and assigned to the Lower Cretaceous Series

> A stratigraphic-paleontologic study of rugose corals as aids in age determination of Great Basin Devonian rocks

> A descriptive summary of geologic conditions in a region of varied physiography and rapid urbanization

> A study of the problems associated with fission-track dating of glass

> Modal and chemical data on plutonic rocks of the Mariposa quadrangle

Front Matter

Foreword and Preface

A foreword is written and signed by, or carries the name of, someone other than the author; a preface is by the author. Both precede the table of contents—the preface after the foreword if a report has both—but most Survey publications have little need for either. Carefully prepared introductory material generally eliminates the need for a preface, and few

reports need any comment other than the author's text. Prefatory statements may be appropriate, however, if (1) publication is unusually important, (2) a report has an overall title but consists of a collection of related papers, each having its own author and title, or (3) a report is a result of a cooperative investigation with another governmental agency. Such publications may benefit by a foreword that is written and signed by an appropriate official who cites the importance and circumstances of the investigation.

A preface can be a prominent place for bibliographic information, such as the relationship of a report to earlier editions or to other reports on the same subject, or for certain credits and acknowledgments not included on the title page. In reports authored by an organization, such as those on surface-water supplies of the United States, the preface can credit suppliers of data who would be recognized as authors in other types of reports. A preface may be unsigned or it may carry the name or initials of the author.

Contents, Illustrations, and Tables

The manuscript should include lists of "Contents," "Illustrations," and "Tables." Suggestions for formatting are given in the section on "Formatting Survey Manuscripts for Review and Editing," page 250. To get an impression as to how your headings should be organized, scan recently published examples of similar reports. The "Contents" consists of the headings in the manuscript, except that repeated minor headings are omitted. The rank of headings is indicated by appropriate indention, and few manuscripts require more than three or four; excessive ranking confuses the reader. The "Page" column shows final manuscript page numbers. Illustrations should be listed as figures in the manuscript; they will eventually be separated into plates and figures, if necessary, by the illustrators and editors, who will then make the needed changes in the manuscript. An exception is the paleontologist's preparation of plates on which groups of figures show photographs or drawings of individual fossils. "Contents" is a de facto outline of the report.

Abstract for the Written Report

An abstract for a written report may differ significantly in purpose and content from one for an oral presentation, so the two are discussed separately here. Except for certain statistical reports, such as streamflow records, and composite group efforts that may be unsuitable for abstracting, any but the briefest scientific paper is preceded by an informative abstract. A proposal to present a paper orally must have one also.

Early rough-draft summaries should not be made over into abstracts; they might be helpful in planning a report, but the final abstract should be a concise summary of the completed manuscript. Preparation of a good abstract—one that summarizes the important content of the report and nothing more—deserves as much thought, rewriting, and polishing as any other part of the report. Your abstract is a digest of your report, and its adequacy determines much of the report's impact and usefulness. Used by abstract journals and indexing services, moreover, an informative abstract will increase potential readership and the reference value of the report in the literature. Busy readers may even ignore the report unless the abstract provokes their interest. For an oral presentation, the adequacy of the written abstract probably will determine whether a paper is accepted or rejected and, if accepted, whether it will draw an audience. To assist reader comprehension, avoid abbreviations and acronyms.

The abstract should be informative rather than descriptive. Some water-resources reports, by their nature, require a descriptive abstract, but abstracts for most Survey reports should spell out the results of the research and state briefly the conclusions. Inappropriate phrases, commonly in the passive voice, include "are discussed," "is described," "were investigated," or "conclusions are given." The abstract should relate what the report tells, not what the report is about. For example:

Write "A gravity high of 25 milligals suggests that * * *," not "The gravity anomalies in the area are discussed."

Write "The Cretaceous rocks yield 50–150 gallons per minute of moderately mineralized water to wells 800–1,200 feet deep," not "Ground water in the Cretaceous rocks is described and its depth is given."

An author's conclusions are the most valuable part of a report or abstract, but within space limitations the abstract should also indicate the method of attack and the type of data used and should clearly orient the paper in place and function. It should supplement the title, not duplicate it, and it should not be a mere expansion of the table of contents. It should contain no information that is not discussed in the report. The

abstract should stand by itself, independent of the text; references to text tables and illustrations should be avoided. Reference to a published work is rarely needed and should also be avoided.

The Survey sets no specific limits on lengths of abstracts in its publications, but short abstracts are more likely to be read than long ones and are more apt to be included in their entirety in abstract journals.

Few abstracts are long enough or complex enough to need center headings, except for monographic treatises, and few need to be amplified by examples. Abstracts offered to scientific meetings generally must meet rigid limits on words or space; exceeding those limits risks rejection of the proffered paper. For still-timely advice on abstract preparation, the classic counsel of Landes (1966) is reprinted in full as follows:

A SCRUTINY OF THE ABSTRACT, II

KENNETH K. LANDES
Ann Arbor, Michigan

ABSTRACT

A partial biography of the writer is given. The inadequate abstract is discussed. What should be covered by an abstract is considered. The importance of the abstract is described. Dictionary definitions of "abstract" are quoted. At the conclusion a revised abstract is presented.

For many years I have been annoyed by the inadequate abstract. This became acute while I was serving a term as editor of the *Bulletin* of The American Association of Petroleum Geologists. In addition to returning manuscripts to authors for rewriting of abstracts, I also took 30 minutes in which to lower my ire by writing, "A Scrutiny of the Abstract."[1] This little squib has had a fantastic distribution. If only one of my scientific outpourings would do as well! Now the editorial board of the Association has requested a revision. This is it.

The inadequate abstract is illustrated at the top of the page. The passive voice is positively screaming at the reader! It is an outline, with each item in the outline expanded into a sentence. The reader is told what the paper is about, but not what it contributes. Such abstracts are merely overgrown titles. They are produced by writers who are either (1) beginners, (2) lazy, or (3) have not written the paper yet.

To many writers the preparation of an abstract is an unwanted chore required at the last minute by an editor or insisted upon even before the paper has been written by a deadline-bedeviled program chairman. However, in terms of market reached, the abstract is *the most important part of the paper*. For every individual who reads or listens to your entire paper, from 10 to 500 will read the abstract.

If you are presenting a paper before a learned society, the abstract alone may appear in a preconvention issue of the society journal as well as in the convention program; it may also be run by trade journals. The abstract which accompanies a published paper will most certainly reappear in abstract journals in various languages, and perhaps in company internal circulars as well. It is much better to please than to antagonize this great audience. Papers written for oral presentation should be *completed prior to the deadline for the abstract*, so that the abstract can be prepared from the written paper and not from raw ideas gestating in the writer's mind.

My dictionary describes an abstract as "a summary of a statement, document, speech, etc. . . ." and that which *concentrates in itself the essential information* of a paper or article. The definition I prefer has been set in italics. May all writers learn the art (it is not easy) of preparing an abstract containing the *essential information* in their compositions. With this goal in mind, I append an abstract that should be an improvement over the one appearing at the beginning of this discussion.

ABSTRACT

The abstract is of utmost importance, for it is read by 10 to 500 times more people than hear or read the entire article. It should not be a mere recital of the subjects covered. Expressions such as "is discussed" and "is described" should *never* be included! The abstract should be a condensation and concentration of the *essential information* in the paper.

Abstracts for Talks at Scientific Meetings

Abstracts for talks at scientific meetings differ from abstracts of written reports because those for talks may be supported by fewer data, are generally more temporal and less archival, and may be based on tentative hypotheses. Such abstracts are useful, however, because they commonly are the first published results of an investigation and, historically, are sometimes the last.

Most abstracts are printed in a prescribed format that allows space for about 250 words. Commonly they are printed as received with little or no further review or editing. The Survey, however, requires technical review, editing, Division approval, and Director's approval.

You might consider this kind of abstract writing as a 250-word contest to win listeners for your talk, professional acclaim, and subsequent endorsement for your project—maybe even funding. With such scientific prizes at stake, such abstracts must be precise, scientifically sound, and skillfully written. The abstract should be informative, even though its results and conclusions may be preliminary when submitted months before the meeting. Abstracting a talk that won't be delivered for several months is a challenge, and you as author must distill a wealth of ideas into one or two exciting concepts, despite incomplete data. Try to write the abstract as if there were no talk, as if the abstract were the only vehicle to convey the findings of your research.

A few guidelines may help you use the available space most effectively:

The title. The title must balance length against content. A short title may be vague and a long one cumbersome. At the very least, it should state the topic and any geologic/geographic fix. Ideally, the title expresses the essence of the talk, and perhaps outlines the talk as well. Such a title calls for strong, precise words (a dictionary and a thesaurus may help); avoid prepositions and strings of unit modifiers. Strong punctuation—such as a dash—can supplant connecting words.

Note the varied titles possible from the following simple abstract, depending on what finding is most significant:

Recent geologic mapping of the Great Silver Gulch Formation in Montana provided evidence that ore deposits in the formation were structurally controlled and that the formation is older than reported previously by Q.R. Smith. The structures are such that new deposits may be found, although exploration will be costly because the geology is complex.

Here are three examples of an informative title:

The Great Silver Gulch Formation, Montana—Evidence indicates Cretaceous age

The Cretaceous Great Silver Gulch Formation, Montana—New ore deposits possible

Structure controls ore deposits—Great Silver Gulch Formation, Montana

By contrast, here is a short, vague title:

The Great Silver Gulch Formation

The beginning. Begin the abstract by putting the "news" up front. In the first sentence or two say what you did, why you did it, and what you learned or expect to conclude. Stress what you did now, rather than what others did earlier, and distinguish your results from your conclusions. Then use the remaining text space to expand on these subjects—perhaps in the same order as they appear in the title.

A conventional scheme is to state the problem, list results, and draw conclusions. Try to adapt this scheme to your material.

Voice. Strive for the active voice. It is stronger and takes fewer words than the passive voice.

Style. Write an informative abstract—one that presents ideas rather than one that merely says what you're going to talk about. The two styles are contrasted in the following examples.

Informative abstract:

Recent geologic mapping in the Great Silver Gulch Formation, Montana, indicates that the ore deposits are structurally controlled.

Uninformative abstract:

The Great Silver Gulch Formation will be discussed and the genesis of the ore deposits will be reported. [Note passive voice.]

References. Avoid citing references (most societies prohibit them). They are generally unnecessary in an abstract, they use up words, and they may frustrate your reader, who won't know what you're referring to if you say, for example, "* * * Cretaceous, an age older than that reported by Smith (1975)." If acknowledgment of previous work is essential, however, choose one of the following models:

1. Incorporate the full name(s) and time(s) into the text.

   * * * Cretaceous, an age older than that reported by Quentin R. Smith and colleagues in 1975.

2. Abbreviate the reference in parentheses without the title.

   * * * reported by Q.R. Smith and others (1975, GSA Bull., v. xx, p. yy–zz).

3. Give a conventional reference at the end of the abstract.

   Smith, Q.R., Prinze, Olga, and North, L.M., 1975, Age of the Great Silver Gulch Formation, Montana: Geological Society of America Bulletin, v. xx, p. yy–zz.

The trick is to use the available block of space on the abstract form as effectively as possible.

Abbreviations and Acronyms. Avoid abbreviations and acronyms (p. 104), particularly those contrived to save space. They are unnecessary and just interrupt the reader, who must try to remember what they mean. Some shortcuts are available, however, and formation names are an example. If, for example, you are going to discuss only the Great Silver Gulch Formation in the abstract, write it out in the title and first sentence, then refer to it subsequently as the "Silver Gulch" or "the formation."

If a series of items, such as various rock units in a formation, might be too lengthy to state repeatedly, try numbering each item in the sentence rather than abbreviating each one. This device tells the reader precisely what you are talking about.

> The Great Silver Gulch Formation contains (1) massive biotite and two-mica granite, (2) hornblende-biotite tonalite and biotite granodiorite, (3) the Gold Creek unit (an informal name for the massive, rusty granite), and (4) massive pink granite. The contact between 1 and 2 is obscure.

Figures or Tables. Extraordinarily complex data may require a wordier explanation than space permits. A small sketch or table may be an appropriate substitute if the society allows one in the abstract. Many societies print abstracts from camera-ready copy submitted on their required form, and a sketch or table that fits within the boundaries of the form and that can stand the required reduction to publication size may be an ideal alternative to words.

General Advice. Carefully follow the instructions in the society's announcement of the meeting and call for papers—instructions as to length, format, style, and acceptability of artwork. Start your abstract through Survey processing as early as possible so as to easily meet the deadline and avoid the last-minute crush that usually develops for typists, reviewers, and editors when many authors submit abstracts for the same meeting. Meticulous planning and attention to detail will impress a society's program chairman who despairs of abstracts that are late, carelessly written, or poorly typed on the wrong form (Lucchitta, 1986). Lucchitta further suggests a few simple rules for keeping program committees and abstract coordinators happy and effective, to the benefit of everyone involved:

- Submit abstract on time.
- Submit abstract on correct abstract form.
- Scrupulously follow instructions attached to the form and fill in all blanks.
- Be sure abstract is well written, well typed, and complete.
- Make no revisions and changes after abstract is submitted either before or after the deadline.
- Aim abstract at the proper meeting and at a wide audience.
- Limit contribution to one volunteered abstract unless multiple abstracts are explicitly welcome.
- Do not request confirmations unless you provide stamped, self-addressed return envelopes.
- Check the appropriate publication frequently for information and registration forms for the meeting of interest.
- Do not bother the program chairman for information and forms that are routinely printed in the society's publications.

The Text

The Introduction

Introductions in Survey books and articles vary greatly in size and content, depending mostly on the length and subject matter of the report. In lengthy reports, several subheadings are appropriate; for shorter reports, a single heading may suffice. Like abstracts, introductions are generally best written after the body of the report. Nearly all introductions should mention the purpose of the study and the approach taken. Most should cite acknowledgments of assistance and cooperation. You should consider the advisability of discussing other topics such as location and access, geographic setting, previous work, and your fieldwork. Some of these topics may be unneeded, but some may be important enough to warrant separate headings outside the introduction.

- If an area is well known, you need say little about the location, access, topography, climate, or vegetation, all of which may be relevant only insofar as they bear on geologic or hydrologic problems or on fieldwork. Detailed information on these subjects is rarely necessary.

- The introduction may mention your conclusions on local or regional issues, on further development of current theories, or on differences between your conclusions and those of earlier workers.
- One introduction and one summary generally suffice for a single report, but if a summary of one of the report's subdivisions is desirable, its heading should indicate the subject discussed, such as "Summary of Conditions Affecting Streamflow."

All technical and professional help from non-Survey personnel should be acknowledged, usually in the introduction. General help given by members of the Survey usually need not appear. Further suggestions regarding acknowledgments are on page 12.

Body of the Report

Most reports, in their presentations and discussions, have headings, footnotes, illustrations, tables, geologic and geographic names, significant figures, and so on. All these aspects of the report warrant detailed attention as to style and expression. All are discussed further on the pages that follow and are listed in the index. Beginning writers should take these pages to heart. Experienced writers might profit from occasional reviews.

Headings

Headings indicate the topics described in the text. They offer cues for the reader's train of thought and convenient landing places for rapid skimming. Long discussions need occasional headings if only as rest-and-recovery places for the reader. They provide starting and stopping places, and they enhance reader comprehension of the text.

The text, however, should be self-contained and independent of the headings. In general, headings should be noun phrases, though short sentences may be effective in nontechnical publications. Phrases such as "Discussion of," "Statement of," and "Table Showing" are superfluous. "General Features" is more appropriate than "General Statement." Avoid inserting a perfunctory secondary heading where a brief general statement precedes a detailed discussion that requires its own heading.

Excessive refinement in subdividing the text confuses the reader; three or four ranks of headings, plus paragraph sideheads where applicable, should suffice. The sidehead has no specific rank; it is a subordinate heading used for terms or phrases that may be repeated under higher ranking headings, as "Age," "Composition," and "Chemical Analysis."

Headings should preferably be typed on separate lines set off from text with space above and below. The rank of headings is indicated by indention in the "Contents." As a further convenience to the editor, you might also indicate the rank of headings by penciling circled numbers in the manuscript. The copy editor may decide that ranks of certain headings should be changed. This decision is better made by the editor than the author.

Footnotes

Footnotes break the reader's train of thought. They are seldom needed in scientific writing except, perhaps, in tables or in short papers that have few references and no bibliographic list. Disclaimers and addresses generally are footnoted. A well-constructed paragraph needs no explanatory footnote, nor should you as author make a footnote of a thought that came late and that should have been woven into the text. A rare footnote may be justified when relevant contradictory or supplementary information becomes available after a manuscript is finished or in proof stage. Otherwise, footnotes are generally more appropriate to literary than to scientific writing. The Survey style of footnoting is given on pages 252 and 255.

Concluding Section

The concluding section should be a concise statement of the main points covered by the report. In a short report the section may need no separate heading; it may be just the last paragraph of the text. In a longer report it may be a "Conclusion(s)," a "Summary," an "Application to Field Problems," a "Need for Further Study," a "Summation of Petroleum Potential," or some other appropriate heading. In some expository reports a concluding section is unneeded, though the reader may feel left in limbo unless some suitable phrasing clearly marks the ending.

Reference List

Nearly all Survey book reports have a list of references or a bibliography that follows the conclusion of the text and precedes the appendix, the list of tables or basic data, if any, and the index. Survey bibliographic style is discussed in the section on preparing references (p. 234).

The Appendix

Few Survey publications need an appendix. If long tables of basic data, analyses, well logs, measured stratigraphic sections, or other such information would interrupt the reader's train of thought by

intruding into the body of the text, these data may instead be placed after the references. If used at all in a Survey report, however, an appendix should be limited to specialized data needed only by a few potential readers. If a report contains more than one appendix, each should be numbered for ease of reference. Nowadays, material that might once have been appended is often placed in open files.

INDEX

Indexing is a technical and tedious editorial function, but no part of a report is more useful than a full, well-prepared index, or is more time saving to a busy reader. The index is not part of the manuscript but is prepared from the page proof. Few authors are trained in index preparation, but the basic principles are easily mastered. Software for indexing, moreover, is available in many computer packages. If an index is planned for your report, adequate time should be budgeted in the printing schedule. While you are still writing, you can compile a list of terms that should not be missed. Consider the feasibility of hiring the services of a professional indexer who is used to working more efficiently and rapidly than you yourself as author-indexer, and under a specific deadline (Mulvany, 1986, p. 66).

Survey indexes are alphabetized word by word, then letter by letter. Thus the order of precedence in Survey indexes is:

East End
East Indies
Eastern time
Easternmost exposures

Authors of papers that are to be listed in a computer data bank may be asked to furnish a list of "descriptors" as selected from the index thesaurus of the agency operating the bank. Most data-bank agencies welcome additional "identifiers" or "key terms" that an author believes are needed for adequate indexing. See, for example, any issue of the semimonthly "Selected Water Resources Abstracts" and the "Water Resources Thesaurus," both published by the USGS.