REPORT PLANNING, PREPARATION, AND REVIEW GUIDE

U.S. Geological Survey
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REPORT PLANNING, PREPARATION, AND REVIEW GUIDE

By John E. Moore, David A. Aronson, Jack H. Green, and Celso Puente

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U.S. GEOLOGICAL SURVEY

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FOREWORD

This report is intended as a guide to authors of reports prepared by the Water Resources Division of the U.S. Geological Survey. As such, specific direction is provided for many of the steps involved in the planning, preparation, and review of technical reports. Numerous references are made to internal memorandums and other documents that provide guidance or instructions related to specific technical or policy aspects of reports that are unique to the U.S. Geological Survey.

Because of the widespread interest in U.S. Geological Survey guidebooks on the planning, preparation, and review of reports expressed by educational institutions, domestic governmental agencies at all levels, and foreign governments, this report is being made available to the public.

Philip Cohen
Chief Hydrologist
Water Resources Division

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ABSTRACT

The guide describes critical steps in the planning, preparation, and review of hydrologic projects and reports. Project and report planning and organization are discussed first. Report writing and guidelines for writing selected parts of the report are covered next. The last topics covered are editorial and technical review. The guide contains examples of good and poor writing, report checklists, and source references to assist authors in the various stages of report preparation.

INTRODUCTION

The final report is the most important aspect of any project, because it generally is the only product of a project that a cooperator, client, or the public ever sees. Many of our reports,however, are poorly written and not completed in a timely manner because of inadequate attention to report planning and management. This guide was prepared to assist authors and reviewers in the planning and review of technical reports, and provides many common-sense tools to help them produce quality reports on time. The guide describes systematic methods to improve the technical quality, organization, and readability of reports and journal articles. The guide is based on lecture notes and handout materials that have been used at report workshops at the U.S. Geological Survey's National Training Center and at District offices.

The material in the guide is organized under three main headings--

Project Planning and Management discusses preparation of project proposals and project work plans.

Report Planning and Preparation discusses the use of report work plans and outlines and the preparation of report components.

Report Review describes procedures to be followed during editorial and technical review of a report.

This guide presents methods of report planning and review that have been used successfully for hundreds of hydrologic reports prepared each year by personnel of the U.S. Geological Survey. The guide contains examples, check lists, and references to guide authors and reviewers.

Ideal Project and Report

An ideal project has specific **objectives, a work schedule** and a **time limit for completion, adequate staffing,** and **adequate funding.** The project is completed on schedule and produces a technically and editorially correct report.

The **objective** of the project is to solve one or more specific problems. If the objectives are clear, an appropriate approach can be devised and each step in the project can be defined. If the objectives are not clear, the project can lack focus and the report will fail to satisfy the needs it was designed to address. Indefinite objectives commonly result in wasted time, collection of irrelevant data, and neglect of critical details.

The **time limit for completion** of a project ideally should be 3 years or less. Projects of any length, however, could result in late reports. Accordingly, project work schedules should be designed so that parts of the projects are devoted solely to report preparation, review, and approval.

The **staffing** must be full time and continuous for efficient project management. The transfer or loss of the project chief before the project is completed will probably delay the project and the report.

Adequate funding is essential for project success. Managers must avoid underestimating costs to make the project more attractive to potential cooperators. Cost cutting can result in substandard reports, overdue reports, and dissatisfied cooperators.

Project progress must be reviewed on a regular schedule. The review should be conducted at least every 3 months, and a written summary of the review should be prepared and copies submitted to key project and supervisory personnel. Elements that comprise the ideal project are:

1. A project proposal that includes (or reflects)
    - Clear objectives
    - Adequate planning
    - Detailed work plan
2. Adequately trained, competent, and continuous staff
3. Adequate budget
4. Frequent project reviews
5. A technically correct and readable report
6. Completion of the report on time and within budget

Project and Report Quality Assurance

An orderly plan or system is needed to direct the project and the preparation of a report from conception through completion. An example of the steps in a quality-assurance system to guide the project and report is shown below. This system, which is used in offices responsible for all aspects of hydrologic reports, has evolved during many years.

STEPS IN PROJECT AND REPORT QUALITY ASSURANCE

PROJECT PLANNING
- LONG-RANGE PLAN
- PROJECT PROPOSAL AND WORK PLAN

↓

PROJECT START
- CREATION OF PROJECT FILE
- TOPICAL AND ANNOTATED OUTLINES
- QUARTERLY REVIEWS
- WRITING OF PARTS OF REPORT

↓

REPORT PREPARATION AND REVIEW
- FIRST DRAFT OF REPORT
- EDITORIAL REVIEW
- TECHNICAL COLLEAGUE REVIEWS
- REPORT REVISION

↓

DIRECTOR'S APPROVAL
- REGIONAL EVALUATION
- HEADQUARTERS EVALUATION

↓

REPORT PUBLICATION AND DISTRIBUTION

PROJECT PLANNING AND MANAGEMENT

Project and report planning are directly related and should begin at the same time. The major elements of project planning are the project proposal, which should include a detailed work plan, and a report outline. Sound planning can provide the project chief with the tools needed to design and complete the project (and report) within the allotted time and budget. A project will be successful only when the project chief thoroughly plans all foreseeable aspects of the project before the project begins. Project objectives must be specific, deadlines must be realistic, and difficulties must be anticipated. If the work plan is not followed, the project likely will not be completed on time and within budget.

Elements of a Project Proposal

A project proposal is a plan to solve a specific problem or problems. This proposal should outline the technical objectives of the project, the period of time needed to achieve those objectives, and adequate personnel and funding necessary to complete the work. A proposal should be clear and concise and should address the what, why, where, when, and how of the project. The proposal should follow a standard format and contain enough information to evaluate the proposal and report plan. An example project proposal and work plan is presented in Exhibit 1. A review sheet for project and report review is given in Exhibit 2.

Title.--Relate the project title to the purpose, scope, location, and, possibly, the time period of the study. Ideally, the title should resemble the title of the proposed principal report resulting from the study. The title should be concise yet informative.

Problem.--Explain why the project deserves the proposed commitment of time and money. The project must produce results worthy of funding. The need for the study must be greater than just the satisfaction of intellectual curiosity.

Objectives.--Relate the proposed technical results to the expressed need for those results. The objectives should be specific. This is one of the most important factors when evaluating the project proposal.

Approach.--Describe how the objectives will be addressed. If standard approaches and methods are used, a brief description will suffice. If the approach is new and untested, a more detailed description will be needed.

Relation to long-range plans.--Tell how problem or need addressed by project relates to established agency objectives.

Relation to Federal, State and local government programs.--Tell how project relates to established Federal, State, and local government objectives.

Benefits.--Show how the results of the project will be of benefit to the U.S. Geological Survey or to the science or both, as well as to the cooperator.

Reports.--Describe the planned report or reports. State the probable title or titles of report(s), outlets, and key milestone dates. Important milestones include the preparation of report outlines, report writing, colleague review, submittal of the report for approval, and anticipated date of Director's approval. Ideally, Director's approval should be received by the end of project funding.

Project work plan.-- Schedule starting and ending dates for each work element. Remember that some elements might be concurrent, whereas others need to be completed in sequence. (See "Work Plan" in Exhibit 1.)

Personnel.--List personnel needs by specialty, grade, and time. Note that all personnel must be available at the time called for in the work schedule. Indicate too, the possible need for outside advisors and consultants.

Project costs.--With adequate reference to plans, schedule, and personnel, itemize costs for each fiscal year. Be certain that the budget is adequate to cover the costs of all planned project activities for the anticipated period of study, including all costs associated with publishing the report(s).

Project-Management System

The major element of project management is a periodic review of progress. Written and oral reports on work progress are needed at least quarterly. Each project should be reviewed individually. Other opportunities for review are possible at staff meetings, technical seminars, and briefings for cooperators.

An essential part of the review is to compare project progress with the work plan. Emphasis should be placed on accomplishments (completion of specific work elements), project findings, report progress, needs for assistance, financial status, and plans for the next quarter. Some of the advantages of project review are listed below:

1. It helps keep the project on time and focused on objectives.

2. It identifies the need for modifying project objectives.

3. It identifies personnel, technical, and financial problems.

4. It provides guidance and assistance for project chief.

5. It provides technical quality control.

6. It improves morale.

7. It educates managers, supervisors, and cooperators.

8. It helps keep the report on schedule.

A project-management file should be established by the project chief early in the project to maintain records and document progress on project activity and planned reports. The file should be kept current. Some items to be included in the file are--

1. Project proposal and description
2. Work plan, including milestone dates
3. Budget
4. Topical and annotated outlines for reports
5. Lists of illustrations and tables
6. List of references for bibliographic citations
7. News release
8. Newspaper articles pertaining to project
9. Quarterly review summaries
10. Report drafts and review comments
11. Summary of meetings with cooperator(s) pertaining to project
12. All correspondence

REPORT PLANNING AND PREPARATION

Report planning must precede report preparation; some suggestions for report planning follow:

- Ideally, a topical outline should be prepared during the first month of the project.

- Ideally, an annotated report outline should be prepared during the first 3 to 4 months of the project (assuming a 3-year project).

- If possible, a data report should be prepared prior to the final report.

- If the topic and scope of the study permit, articles and papers that describe key findings should be prepared for technical journals and symposiums.

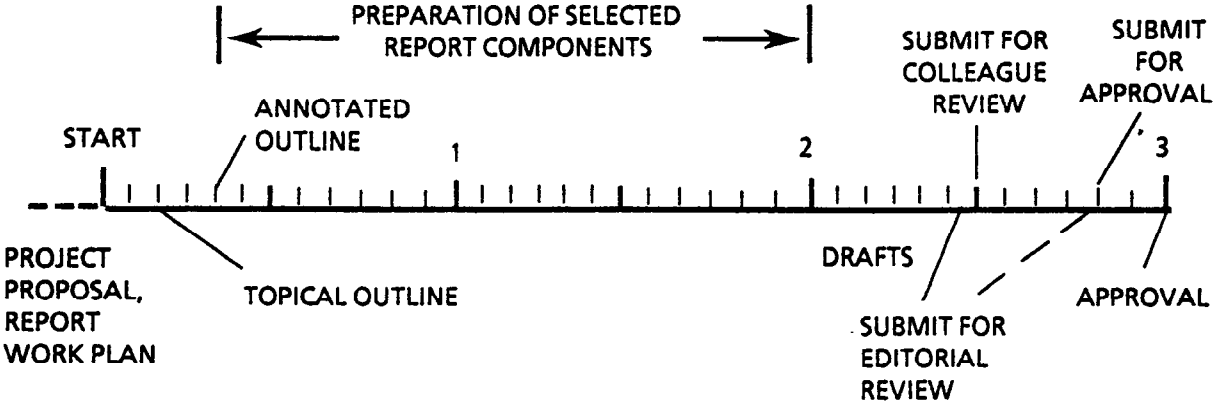
- Consider writing interim reports to decrease the length and complexity of the final report. Alternatively, consider writing several smaller reports about individual project objectives rather than one large report about the entire project. Interim reports can be useful for describing the preliminary results of analyses and preliminary interpretations during the duration of the project.

Report preparation is a continuing effort throughout the duration of the project and should never be treated as a chore to be done at the end of the project. It should start at the beginning of the project. Most components of the Introduction, which includes background, purpose and scope, description of study area, methods of study, and review of previous studies, can be written in the early stages of the project.

Report Work Plan

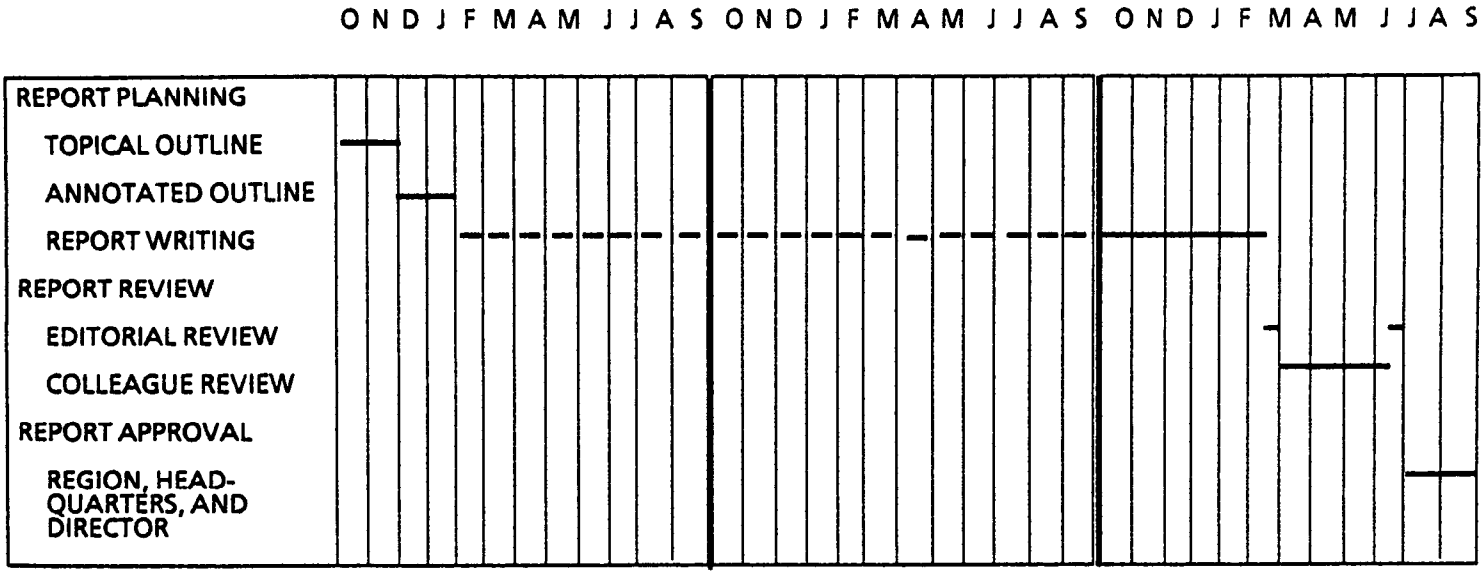
The report work plan should include dates for completion of the outlines, report writing, review, approval, and release. The project chief should submit the first draft of the report for colleague review no later than 6 months before the end of a 3-year project. Project schedules that do not allow adequate time for report revision and review will be behind schedule.

Idealized report work plan for 3-year project

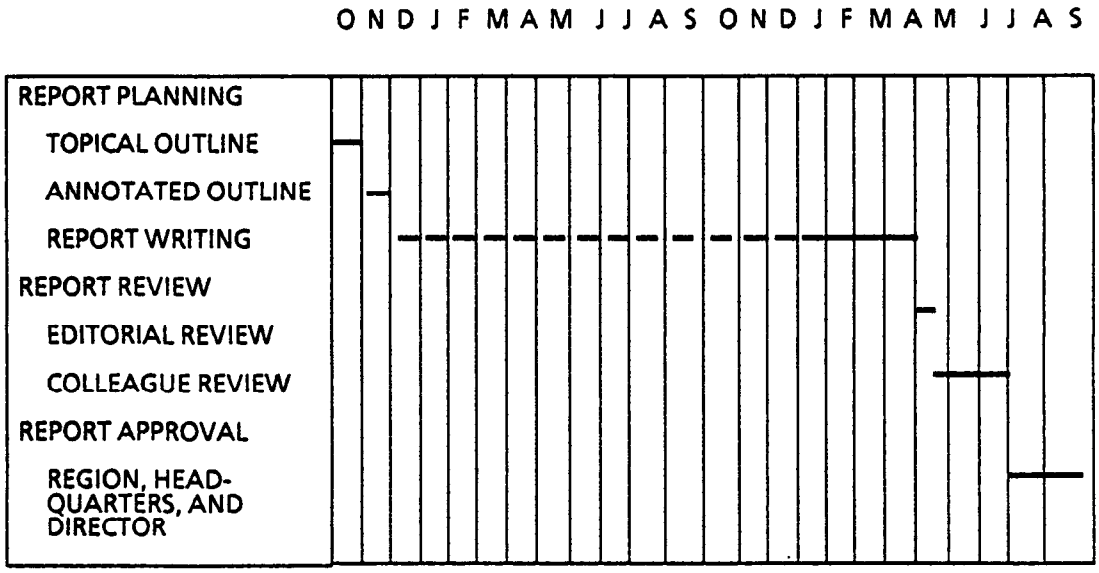


In the above report work plan, and those that immediately follow, one-third of the duration of the project is devoted to report writing, review, and approval, because experience has shown that this is what is required for most reports. Unless adequate time is built into a project for report activities, the report likely will not be approved until after the project officially ends. Authors of hydrologic reports need to make every effort to ensure that their reports receive Director's approval by the end of the project. This plan is being used successfully by numerous offices preparing hydrologic reports. Exhibit 1 also shows a report work plan as part of an overall project work plan. The following report work plans are for projects having 3-year, 2-year, and 1-year schedules.

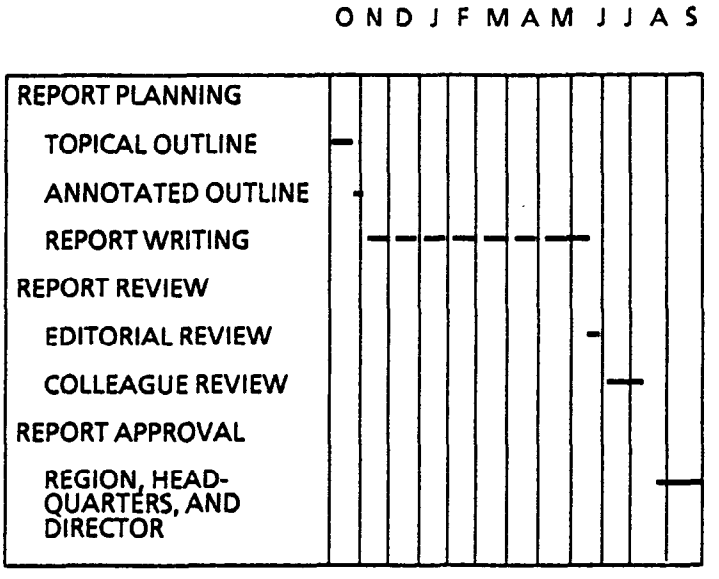
Report work plan for a 3-year project



Report work plan for a 2-year project



Report work plan for a 1-year project



Report Organization and Outlines

The organization of a report requires the author to make decisions on the content and order of presentation. Each report presents a different problem in organization, and no cookbook method of report organization can be given. The information contained in the title, contents, purpose and scope, and summary and (or) conclusions should be integrated and consistent. An example of this is shown in Exhibit 3.

The first step in report writing is the preparation of an outline. An outline helps authors organize their thoughts early in the project and to focus project activities throughout the duration of the project.

After selection of the title (see following section), authors should prepare a topical outline that contains major and minor headings that reflect the title and organization of the report. After the topical outline is prepared, it needs to be reviewed by the author's supervisor, a discipline specialist (as applicable), and a reports specialist (as applicable). It is far easier to reorganize an outline than a completed report. Two sample topical outlines are given in Exhibit 4.

The next step is to prepare an annotated outline. The annotated outline is an expanded version of the topical outline. A sentence or paragraph is prepared for each heading in the topical outline. After the annotated outline is prepared, it needs to receive the same review as the topical outline. If applicable, the annotated outline should be sent to the cooperator(s) for review. This review helps ensure that the final report will meet the needs of the cooperator, insofar as general content is concerned. Two sample annotated outlines are given in Exhibit 4.

Preparation of Selected Report Components

Title

Ideally, the title of the report should be brief but informative. Although this statement might sound contradictory, a brief but informative report title should be the goal for all authors. In essence, the title is a concise description of the subject of the report and, as such, has to convey to the reader the content of the report. The title of the report will be read by thousands of readers, whereas the report itself might be read by fewer than 100 readers. One of the best methods to ensure that the report will reach the intended audience is through a complete title that can be properly indexed for bibliographic files. Ideally, the title should be as short as possible and contain the following:

- Subject(s) of report
- Location of study area (if appropriate)
- Time or period of study (if appropriate)

For example, the report title "Potentiometric surface of the Floridan aquifer in southwestern Florida, October 1988," includes the above elements. Some non-Survey publishers specify a character or word limit for the report title. For these publishers, authors need to attempt to include as much of the information--subject, location (if appropriate), and time (if appropriate)--in the report title as possible within the specified limit.

The title **should not** contain abbreviations, brand names, or jargon. Acronyms are permitted only if the source words are spelled out in the title and the acronym is needed to describe the subject of the report. Word names for computer programs also are permitted if the title clearly defines their meaning.

Examples of weak titles (a.) and revisions (b.) are--

a. "Testing Framemaker[1] and Ventura desktop publishers software"
b. "Comparison of desktop, report-processing software for production of technical reports"

[1]The use of brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

a. "HYDRAUX: a one-dimensional, unsteady, open-channel flow model"
b. "The computer program HYDRAUX, a model for simulating one-dimensional, unsteady, open-channel flow"

a. "SUTRA: a finite-element model"
b. "Documentation of a computer program for the Saturated-Unsaturated TRAnsport (SUTRA) finite-element model"

a. "ANNIE--a computer program for interactive hydrologic analyses and data management"
b. "Users manual for ANNIE, a computer program for interactive surface-water hydrologic analyses and data management"

a. "Integration of Computer Associates Tellagraf and Text Editors"
b. "Integration of computer graphics and text-editing software for production of reports"

a. "Industrial areas and ground disposal of industrial waste in Connecticut--includes favorable aquifers and generalized geologic map"
b. "Location of industrial waste areas in Connecticut"

a. "Colorado radium"
b. "A history of the development of uranium in Colorado"

a. "The distribution of uranium and radium in a stream reservoir"
b. "The distribution of uranium and radium in selected reservoirs in Colorado"

a. "Estimating higher permeability zones in the Madison Limestone Formation from log analysis"
b. "Use of geophysical logs to identify permeable zones in the Madison Limestone in Wyoming"

a. "Headquarters reports-tracking-system documentation--District users group"
b. "Documentation of the computerized Reports Tracking System of the U.S. Geological Survey, Water Resources Division."

a. "Ground-water restoration at McClellan AFB"
b. "Evaluation of ground-water restoration programs at McClellan Air Force Base, California"

a. "Hydrology of bottomland forests of the Mississippi embayment"
b. "Hydrology of bottomland forest areas in the Mississippi embayment, Mississippi"

a. "Distribution and concentrations of selected constituents in the Delaware River estuary bottom sediments"
b. "Distribution and concentrations of selected constituents in bottom sediments of the Delaware River estuary, Pennsylvania"

a. "Ground water in the vicinity of Raton, New Mexico as a supplementary water supply"
b. "Hydrogeology of the eastern part of Grant County, New Mexico"

a. "Predicted effects of mine flooding at Tract C-5 in Piceance basin, northwestern Colorado"
b. "Simulated hydrologic effects of pumping to dewater an underground mine and recovery of water table after cessation of pumping at tract C-5, northwestern Colorado"

Abstract

A well-prepared abstract tells the reader the basic content of the report. There are two types of abstracts--indicative and informative. Indicative abstracts are used for data reports that contain no results or conclusions and tell the reader about the general content of the report. Statements that include passive verbs, such as "are discussed," "are described," "are compared," "are given," and "were investigated" generally are regarded as being indicative in nature. Informative abstracts are used for interpretive reports and contain the significant findings and conclusions discussed in the report. No abstract is required for map reports published by the U.S. Geological Survey.

The abstract is a condensed summary of the report and, thus, should contain the following information:

- An opening statement that includes the reason for the study, its scope, and a statement of cooperation, if any.

  For example:

  This report/paper describes/discusses/presents the results of a study by the U.S. Geological Survey, done in cooperation with _____, to evaluate/describe/predict _____.

- Type of study if not evident from report title--for example, water-quality study, case history, hydrologic reconnaissance, progress report, original research, areal investigation, and so forth.

- Results of study, in order of decreasing importance. (Order of presentation of the results, therefore, can differ from the emphasis embodied in the report organization.)

- Conclusions, if any.

The abstract is prepared after the paper is written and can not contain information that is not included in the report. Although there is no word limit for abstracts in U.S. Geological Survey reports, there is a 250-word limit for Water Resources Scientific Information Center (WRSIC) abstracts. Some non-Survey publishers specify a word limit.

The inclusion of reference citations, abbreviations, and acronyms in abstracts should be avoided. If, however, references are included in the abstract, the complete reference must be cited. Abbreviations and acronyms can be used in abstracts to save space if they are used in more than one place in the abstract and if they are defined in parentheses where first introduced. Note that some journals do not require that abbreviations be spelled out where first used. Authors should be aware of publishers' guidelines when preparing abstracts for publication in technical journals and the proceedings of technical meetings.

The following are examples of weak abstracts or part of abstract (a.) and revisions (b.):

a. This report describes a computer-model program that simulates conditions in the water-table aquifer of the Pine Barrens in southern New Jersey. The model simulates seepage from the aquifer to streams and swamps. Ground-water flow is approximated in two dimensions. Theoretical development of equations is presented as well as documentation of input data and instructions for use of the model.

b. A preliminary, two-dimensional, steady-state model of the water-table aquifer underlying the Mullica River basin, New Jersey Pine Barrens, was constructed as an initial step in developing a predictive model. The purpose of the model is to evaluate simplifying concepts of the flow system and data required to simulate it. The computer model is based on the finite-difference method for solving stream-seepage equations coupled to the ground-water-flow equation. Model-simulated water levels and streamflow compare closely with measured values. Initial estimates of streambed hydraulic conductance and aquifer hydraulic conductivity were adjusted to those used in the model. Simulated water levels were within 5 feet of measured water levels at 41 of 42 wells. Simulated streamflow was within 20 percent of measured streamflow at 12 of 15 sites.

a. This report contains information about the occurrence, quality, quantity, and direction of movement of ground water in Hampton County.

b. During an investigation of ground-water hydrology in Hampton County, water levels were measured in 196 wells and water samples for chemical analysis were collected from 188 wells and springs, mainly during September 16-27, 1974. Fifteen wells and 3 springs were re-sampled in March and May 1975.

a. In an investigation of thermal springs in the Boise River basin, 28 thermal springs and 5 nonthermal springs were located and studied to define areal distribution and to evaluate chemical and isotopic water composition. Chemical analysis for common ions, for silica, and for the minor elements arsenic, boron, lithium, and mercury were made.

b. In the Boise River basin, water from thermal springs ranges in temperature from 33 o to 87 °C, (degrees Celsius), is a sodium carbonate type, and is slightly alkaline. Dissolved-solids concentrations are less than 280 milligrams per liter. Estimated reservoir temperatures, as determined by the silica and the sodium-potassium geothermometers, range from 50 °C to 98 °C.

a. Ground-water-quality analyses representing 99 wells and 19 springs were evaluated in the San Luis Valley in Colorado and New Mexico. The San Luis Valley has been studied extensively but few studies have been done in the Conejos River subbasin, at the Colorado-New Mexico border. Therefore, the Conejos River subbasin is emphasized in this report. Only 10 of 12 sites in the New Mexico part of the San Luis Valley had sufficient data for hydrologic analysis; consequently, interpretation of data from that part of the San Luis Valley is limited.

b. Chemical analyses of water from 99 wells and 19 springs in the San Luis Valley of Colorado and New Mexico were evaluated to determine selected water-quality characteristics as an aid in understanding the flow of ground water in the valley. The evaluation indicated that the areal distribution of chemical water types in the valley is consistent with chemical changes expected along flow paths in rocks typical of those in the valley. The San Luis Valley is underlain by a surficial, unconfined aquifer and, in turn, by a confining unit and a deeper confined aquifer. Previous studies indicated that the ground-water system is recharged around the edges of the valley and that ground water then moves toward discharge areas in the topographically closed part of the valley and along principal streams. Results of this ground-water-quality evaluation support the previously developed concepts of flow through the aquifer system in the San Luis Valley.

Introduction

The introduction begins with a brief discussion of the need for the study--that is: Why was the study done? The introduction also includes mention of the study area and a statement of cooperation, if applicable. This material is followed by a statement of the purpose and scope of the report. The purpose of the report defines the subject of the report and the scope describes the depth of discussion to follow in developing the subject of the report.

The purpose and scope of a report might or might not be identical to the purpose and scope of the study that resulted in the report, and they need to be differentiated if they differ. In either instance, the purpose and scope of a report needs to be related to that of the study. For example, the purpose (objective) of a report might be to describe long-term trends in concentration of chloride within a study area, whereas the purpose of the study might be to describe the overall hydrogeology of the study area. The scope of a report might include, for example, the time period analyzed, the number of samples collected and analyzed, the data base used, and the analytical techniques. The report needs to be developed around its purpose and scope. The objectives of the report as stated in the purpose need to be fulfilled and reflected in the summary and or conclusions or both.

Background.--Includes the problem addressed by the study or the need for the study, the objectives of the study, and the statement of cooperation, if applicable. This subheading can be deleted if the Introduction contains at least two other subheadings.

Purpose and scope.--Follows the "background." This section describes the purpose and scope of the report, which may differ from that of the overall study. (See the example purpose and scope in exhibit 3.)

Description of study area.--This information can include brief discussion of the location and size of the study area; its climate; physiographic, geologic, hydrologic (or hydrogeologic) setting. Other descriptive information on the study area can be given only if it is pertinent to the objective(s) of the report.

Methods of study.--Material under this heading pertains only to methods. No data, such as basin drainage areas or water-quality data, are to be included. Remember, the heading "methods of study" (or any other heading) absolutely limits the content of the material that follows.

Approach.--Optional, but desirable in some complex, multidisciplinary, or model report. The approach differs from the "methods of study" by presenting the rationale behind the study and the manner in which the study was performed. For example, a statement of an approach might be:

"The study involved three phases of activity: (1) Organizing and evaluating the geohydrologic data in order to develop a conceptual model of the ground-water basin of the San Bernardino Valley; (2) developing a steady-state and transient-state digital-computer model of the basin; and (3) using the computer model to predict ground-water levels under selected pumping alternatives, primarily in the artesian areas of the basin."

Previous studies.--This material acknowledges past work encountered as part of the project literature review. Be sure that this information is accurate and as complete as possible. Be sure to compile all bibliographic information for all citations (here and in the rest of the report) at the time the source publication is examined to avoid time-consuming bibliographic searches after the report is written.

Acknowledgments.--In most reports, only the assistance of non-Survey personnel should be acknowledged. Help from Survey employees that was given as part of their normal responsibilities is not acknowledged. However, Survey employees who provided help of an extraordinary nature outside their normal responsibilities can be acknowledged. An outstanding colleague review by a Survey employee can be acknowledged if the review made a major contribution to the successful completion of the report. Statements that "the work was done under the guidance and supervision of the District Chief," for example, are not appropriate, nor are acknowledgments of agency cooperation or funding. (Statements of agency cooperation belong in the "Background" section of the introduction.)

Body of Report

The body of the report contains the data and interpretations that answer the problems stated in the introduction. The body of the report presents information in the form of text, illustrations, and tables. The author needs to develop all discussions along the main theme of the report as noted in the title, contents, introduction, and purpose and scope.

Summary or Conclusions or Both

This section of the report always provides an answer to the problem(s) stated in the introduction and focuses on the significant findings. This section provides the major source of information in the abstract. After completion of a manuscript, many authors inquire about how to determine whether a concluding section is needed at all, the relation of the abstract to the summary or conclusions, and how summary or conclusions differ from one another

A concluding section is required for most reports published by the U.S. Geological Survey. Exceptions are: (1) Data reports published in a book format where the inclusion of a concluding section is the option of the author; and (2) data or interpretive reports published in a map format where the inclusion of a concluding section also is the option of the author. For reports that are not to be published by the U.S. Geological Survey, the guidelines of the non-Survey publisher are to be followed.

When a concluding section is to be included in a report, the section can be titled "Summary" or "Conclusions" or "Summary and Conclusions." Generally, either a "Summary" section or a "Conclusions" section is sufficient, but for some reports, a "Summary and Conclusions" section might be appropriate. How the concluding section relates to the abstract of the report, and the differences between a "Summary" section and a "Conclusions" section are described below.

The two most widely read parts of a report are the abstract and the summary or conclusions, because these sections state the most important ideas and facts, and their significance. The abstract and concluding material are to be in complete agreement, and present the essential information in the report. They should not be mere repetitions of one another, although the same statements and data can be included in both. The main difference between the abstract and the summary or conclusions is that the abstract is generally restricted in length and concentrates on the principal results, whereas the summary or conclusions can include greater detail and also can elaborate on the significance and potential applications of the results. Guidelines to follow when writing the abstract are given in the preceding section "Abstracts." Guidelines for preparing the summary or conclusions are given below.

A summary is a restatement of all the main ideas presented in the report beginning with the introduction. The summary differs from the abstract in that it includes greater detail and has a broader scope than does the abstract. For example, the summary might describe the manner by which interpretations were derived as well as potential applications of the results. The purpose of a summary is to recapitulate the most important facts so that the reader can correctly recall the results and their significance. The summary should describe or list these items in the order in which they are presented in the text; to do this, the author needs to review the table of contents and the main discussions when writing the summary.

The conclusions section states the final results and interpretations of a study. All conclusions must be either stated in the report or be easily derivable from the material presented therein. In preparing the conclusions, the author should refer to the "Purpose and Scope" section to verify that the two sections support each other--that is, the stated purpose of the study has been fulfilled, the scope adhered to, and the purpose and scope are reflected in the body of the report and in the conclusions. In general, the conclusions are listed in the same order as the corresponding objectives in the "Purpose and Scope" section, and the main conclusions should be incorporated in the abstract.

Guidelines for Report Writing

The writing of a report, like the building of a house, most likely will be successful if the effort is preceded by careful planning. The following steps are critical to the timely completion of a well-written, technically correct, on-time report.

1. Define the audience of the report.
2. Find published reports that could serve as models.
3. Prepare a topical outline and have it reviewed.
4. Prepare an annotated outline and have it reviewed. Also send a copy to the cooperator(s) for review, if appropriate.
5. Begin writing parts of the introduction of the report during early stages of the project.

6. Write the first draft, putting each paragraph on a separate page.
7. Revise the first draft. It usually takes more than one draft to write a report.
8. Have the report edited before technical colleague review.
9. Have the report reviewed concurrently by within-office and out-of-office colleague reviewers.
10. Respond, in writing and in an appropriate manner, to colleague-review comments.
11. Have the report edited again, depending on the extent of revisions after colleague review.
12. Submit the report for Director's approval through the Regional Hydrologist.
13. Publish the report as quickly as possible.

REPORT REVIEW

Competent and thorough editorial and technical review is the most certain way to improve and assure the high quality of the final report. The major objectives of report review are to:

1. Ensure that the report achieves the goals stated in the project description.

2. Ensure the readability of the report.

3. Ensure the technical quality of the report.

4. Evaluate suitability of the proposed publication media.

5. Evaluate the effectiveness of the presentation.

6. Correct errors and other deficiencies that could embarrass the author and the agency.

Principles of Colleague Review

The quality of U.S. Geological Survey reports is the result of a team effort. The technical colleague reviewer is, next to the author, the most important member of this team. The ability to do a good technical review is learned by practice.

Before a report is sent to a colleague reviewer, the report should be edited to ensure readability and correctness of grammar and syntax. A poorly edited report distracts the colleague reviewer from the technical evaluation. Although the technical evaluation is the principal goal of colleague review, the colleague reviewer still needs to evaluate the editorial quality--specifically, whether the writing is clear and unambiguous. The colleague reviewer also needs to evaluate the logic of the organization of the report--that is, are the major headings in the table of contents reflected in the title and purpose and scope, and does the summary or conclusions address the objectives stated in the purpose and scope? The colleague reviewer also needs to determine: (1) Whether the report is free of technical errors and conforms to agency policy (see section 1 of the WRD Publications Guide, 1986 ed.) and (2) whether the tables and illustrations are clear, necessary, and meet publication standards.

The colleague reviewer should be objective, direct, careful, reasonable, and considerate. The following guidelines (Henry Barksdale, U.S. Geological Survey, written commun.,1960) are provided to reviewers to improve the quality of their review:

1. BE OBJECTIVE--Examine your attitude carefully before you begin a review, and examine your attitude at frequent intervals during the review. Are you sincerely trying to improve the report as a part of the report team or are you trying to show how smart your are? There is no place for sarcasm in the review comments.

2. BE DIRECT--Avoid vagueness and ask definitive and clearly stated questions. If space on the page is insufficient to make intelligent questions or comments, use a separate sheet of paper. Isolated question marks are not acceptable forms of inquiry.

3. BE CAREFUL--The author and supervisor have a responsibility to ensure that the report is as free from errors as they can possibly make it. Ideally, most editorial and technical errors should have been eliminated before the report is submitted for technical review. Little time should be spent by the reviewer in editing.

4. BE REASONABLE--Constructive suggestions are appreciated. Remember, however, that when the report is sent for colleague review, most of the allotted time and money have already been spent.

5. BE CONSIDERATE--Place yourself in the shoes of the author. Refrain from the use of humor, witticism, and sarcasm in your comments. No matter how funny it seems to you at the moment, you can be sure the author will misunderstand and be resentful of even the most well-meaning barbs. Be brief and courteous in your remarks. Remember that your report will be reviewed, and you should treat your colleague's report as you would like yours treated

Types of Review

There are four basic types of review: concurrent, consecutive, group, and storyboard. The type most commonly used is concurrent review because it takes the shortest time. Group and storyboard reviews are useful in situations where the author needs special assistance.

Concurrent review--Copies of the report are sent to each reviewer simultaneously and all comments are incorporated at one time. If reviewers disagree on a particular point, the author should send each a set of the other's review comments, ask them to resolve the conflict, and notify the author of the resolution. If the conflicts are minor, they might be resolved by a telephone conference call. In any instance, authors are required to document all correspondence, whether written or oral. Concurrent review is the type favored in the U.S. Geological Survey.

Consecutive review--Copies of the report are sent to a reviewer and, after his/her comments and corrections have been made, the report is subsequently sent to a second reviewer. An advantage of this type of review is that the report, in theory, is improved after each review, assuming that the second reviewer will correct errors missed by the first reviewer. Some disadvantages are that the total review time is longer than that required by a concurrent review, and that the second reviewer might contradict comments made by the first reviewer. If this should occur, the author needs to follow the steps outlined for resolving conflicting review comments as described under concurrent review above.

Group review--Two or more colleague reviewers are sent copies of the manuscript. After they have completed their review, the reviewers and the author meet to discuss and revise the report. Commonly, these meetings result in group interaction and discussion that results in a greatly improved report. A disadvantage of the group review is that it can require a great deal of time to accomplish because of the need to discuss each point raised. A facilitator or chairperson might be needed to control the pace of the meeting and to mediate any conflicts that result.

Storyboard review--Mockups of the text and illustrations are displayed in sequence on a table or wall in a room. A blank sheet of paper can be attached to the mockups for reviewers' comments. After the review, the author compiles the comments and discusses them with the reviewers. This type of review is especially well suited for reports to be published in map and Sequential Thematic Organization of Publications (STOP) formats.

Each reviewer develops their own method of reviewing a manuscript. One method that has been used with some success is as follows:

1. Read the transmittal memorandum from the originating office to become acquainted with background information about the report.

2. Read the entire report carefully and, preferably, in one or two sessions to enhance comprehension.

3. Review all illustrations and tables.

4. If the report has obvious deficiencies, such as technical errors, unsupported conclusions, unreadable illustrations and tables, faulty organization, or faulty computations, the report should be returned to the author for additional work prior to completing the review.

5. Compare the title, table of contents, purpose and scope, and summary or conclusions for consistency.

6. Study the methods and body of the report for technical correctness.

7. Re-evaluate the introduction, the summary or conclusions, and the organization.

8. Evaluate the abstract.

9. Put the report aside for several days.

10. Re-read the entire report and re-write review notes.

11. Make sure that the review is complete and that you have documented all your comments in your review notes to the author.

12. Write a summary of the review in a memorandum to the author. Also send courtesy copy of the review memorandum to the author's Office Chief.

Editorial and Technical Review

Editorial Review

The editorial review of text, illustrations, and tables, needs to include examination of the logic of the report organization, consistency in the use of terminology, clarity of expression, proper grammar, agreement of content with headings and figure/table titles, adherence to publisher's style and format, consistent use of topic sentences for paragraphs, suitability of illustrations and tables, readability by the intended audience, and completeness of all components and supporting documents. (When papers and abstracts proposed for publication outside of the U.S. Geological Survey are submitted for Director's approval, the manuscript package should include the editorial guidelines of the publisher to justify deviations from Survey editorial standards.) A description of key steps in the editorial review of the text, illustrations, and tables, is given below in the form of questions a reviewer (or author) needs to ask themselves. An editorial review needs to be done before technical review, and if substantial revisions are made, again after technical review.

Text

- Is the format of the report appropriate for the intended publication medium?
- Is the title of the report concise and accurate, and does it reflect Survey policy?
- Are the title and authorship the same on the cover page, title page (if applicable), abstract page (if applicable), manuscript routing sheet, all appropriate supporting documents, and transmittal memorandum?
- Are (if applicable) the cooperators' names capitalized on the cover and title page? Has assistance given by cooperators been acknowledged?
- Is the organization of the report, as indicated by the section headings logical and appropriate for the proposed publication medium?

- List of illustrations (if applicable)--Is the type of illustration indicated? Is the title for each illustration correctly presented? Are any abbreviations and acronyms correctly presented?

- List of tables (if applicable)--Does the title of each table match the table title or a correctly abridged version thereof? Are any abbreviations and acronyms correctly presented? Are headnotes and footnotes used correctly?

- List of conversion factors and abbreviations--Does it include all units of measure in the text, illustrations, and tables, and no others? Is the format correct? Is the information presented correct?

- Sea level note--Does its use follow guidelines in Water Resources Division Memorandum No. 87.21? If "sea level" is used in the report, the following paragraph should be placed at the bottom of the table of conversion factors and abbreviations: Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea level datum of 1929.

- Is the abstract of an interpretive report informative rather than indicative? Does it reflect the summary or conclusions and stress the most important results?

- Has the entire report been read for grammatical and spelling accuracy, and for internal consistency, preferably before colleague review and again before submission to Region?

- Is the wording clear and unambiguous? Is it free of jargon?

- Do text headings agree with the table of contents in wording, rank, and page number? Do discussions under a heading pertain to the heading?

- Does the report follow guidelines in Water Resources Division Memorandum No. 86.73 regarding use of trade, industry, firm, and product names? Can statements be re-worded so as to eliminate the need to mention such names?

- Units of measure--Are International System (metric) or inch-pound units used consistently? (Note that it is acceptable to mix inch-pound units with metric units of chemical concentration and specific conductance, among others.)

- Do numbers and descriptive material in the text agree with the data in tables and with information shown in illustrations?

- Are all bibliographic citations in the text, tables, and illustrations in the list of references? Are they in the correct format, and do authorship and year of publication agree with information in the list of references?

- Are notations indicating the first principal reference to tables and illustrations shown in the margin of the text?

- Is, as applicable for the proposed publication medium, a page containing only the illustration number and title placed immediately following the page containing the first principal reference to the illustration?

- Does the summary or conclusions contain only information given in the report, and does it answer the purpose(s) of the report?

Illustrations

- Is the format of the illustration correct?

  -- Does the format meet the standards of publisher?
  -- Is the format of similar illustrations the same?
  -- Is the explanation, if needed, complete and in the proper format?

- Is the illustration title correct?

  -- Does the title reflect the content of the illustration?
  -- Is the source of the illustration either given in a data-credit note or cited at the end of the title, and is the number of the illustration in the cited source included in the citation?
  -- If geographic names are given in the illustration title, are they appropriate and correct?.

- If the illustration is a graph--
  - -- Are axis labels, grid, scale, and units of measurement appropriate?
  - -- Are the axes properly labeled?
  - -- Is there agreement between the title of the graph and information depicted by the graph?
- If the illustration is a map--
  - -- Does the map, if it is the only map in the report, contain all geographic names and the location of data-collection sites in the study area that are mentioned in the report? (Such features can be shown on other maps in the report.)
  - -- Are the scales properly presented? (For U.S. Geological Survey reports, use a dual-unit scale with the units used in the report; for non-Survey reports, follow the guidelines of the publisher. If topographic contours are shown on the map, make sure the appropriate contour-interval and datum notes are shown below the scales.
  - -- Are the coordinate systems properly presented and labeled?
  - -- Is the explanation correct? Are all data--colors, patterns, contours or lines of equal value, and symbols (other than base) either included and explained in the explanation or labeled directly on the map?
  - -- If the map is a plate, is the plate title complete, including the type of illustration and complete geographic location?
  - -- Is a base-credit or a data-credit note or both needed?
  - -- Is information shown on the map in agreement with statements made in the text, and data mentioned in the text, presented in a table, or shown in another illustration?
- If the illustration is a section constructed to scale--
  - -- Are the same vertical and horizontal scales used and, if not, is the magnitude of vertical exaggeration stated?
  - -- Is the view from the east or south?
  - -- Are the end points labeled and do they correspond to those shown on the map trace?
  - -- Do all features and linear distances agree with those shown on the map trace?
  - -- Are the maps that show the section traces referred to?
  - -- Is it possible to use the same horizontal scale as that on the map showing the section traces?
  - -- Are the intersections with other sections identified?
  - -- Are all data shown explained?

Tables

- Is the table complete?

- Are the data in the table presented logically?

- Were the data in the table checked against the data mentioned in the text, presented in an illustration, or presented in another table?

- Is the position of the table in the report appropriate?

  -- Does the table follow the first principal reference to the table?
  -- If a table is long, should it be moved to the back of the report, perhaps as an appendix?

- Is the format of the table correct?

  -- Does the format meet the standards of the publisher?
  -- Is the format of similar tables the same?
  -- Are headnotes and footnotes used properly?
  -- Does the presentation of data in the table parallel the table title and the discussion of the table in the text?
  -- Are the location of the data and period of record needed in the table title to understand the table?
  -- Is the source of the table or data cited (in a headnote)?
  -- Is the number of significant figures presented correctly and in a consistent manner?

- Is an unnumbered table properly introduced?

- Are all geographic names and sites in a table located on a map?

Manuscript Package

The following components of the manuscript package need to be examined for correctness and completeness during editorial review. Detailed guidelines for preparing these and other report components are given in the WRD Publications Guide, Volume 1, 1986 ed., p. 130-133.

- Memorandum from the District or Branch Chief to the Region (which authors may be asked to prepare)--Do the report title, authorship, project number, and publication outlet agree with all other documents? Are the grammar and spelling correct? Is the memorandum free of typographical errors?

- Manuscript routing sheet--Do the title; authorship; project number; number of pages, tables, and illustrations; and type of report agree with the manuscript and with other documents? Is it completely filled out? Are names printed or typed, is the time spent filled in, and are the appropriate columns checked? (See Exhibit 5.)

- WRSIC abstract--Does it agree with information in the manuscript? Is the abstract no longer than 250 words? Do the number of references, tables, and illustrations agree with items in the manuscript? Are the grammar and spelling correct?

- News release--Is all the information accurate, such as the telephone number of the contact person in the originating office, and the title, authorship, and availability of the report? Can it be written in a more interesting way? Is the information presented in order of decreasing importance?

- Colleague-review copies--Have at least two colleague reviews been done, one of which must be an out-of-office review (for interpretive reports)? Has the author responded to reviewers' comments, and are colleague-review copies and author's responses included in the report package?

- Are two complete copies of the report included for Region/Headquarters evaluation and approval (except for Open-File data reports, which require only one copy).

Technical Review

The importance of technical (colleague) review in the preparation of quality reports cannot be overemphasized. At least two colleague reviews are required for all reports. The reviewers should be selected on the basis of special knowledge or interest in the subject material in the report. For interpretive reports, at least one technical reviewer should be selected from outside of the originating office

A technical reviewer should concentrate on the technical adequacy of the report, but any major editorial errors, particularly in organization, should be pointed out. Reviewers should summarize their comments and make recommendations for improvement of the report in a memorandum to the author: Brief, clear, and legible review comments should be entered directly on the manuscript. Reviewers should maintain objectivity and refrain from using humor, witticism, or sarcasm in their comments. The author should evaluate all review comments objectively and make changes as appropriate.

Reviewers should adopt a systematic approach when evaluating reports. The 14-step method given in the section "REVIEW STEPS" provides a system for performing technical reviews. Key instructions for technical reviewers that appear on the back of Water Resources Division manuscript-routing sheets are shown in Exhibit 6.

Report Policy, Ethics, and Good Practice

The act of Congress (Organic Act) that created the U.S. Geological Survey in 1879 established the Survey's obligation to make public the results of its investigations and research. The Organic Act also stated that the Director and members of the U.S. Geological Survey shall execute no surveys or examinations for private parties.

The widespread respect for U.S. Geological Survey reports results in part from the adherence of authors to the policy requirements established by the Survey. Authors are obligated to make sure that their reports show no bias toward any special interest group or individuals. Reports should: (1) be free of recommendations or suggestions; (2) not be critical of work by others; (3) not tell

readers what they must or should do; (4) be free of statements that place the Survey in competition with the private sector; and (5) be released to everyone at the same time. (See p. 3-38 of the WRD Publications Guide, Volume 1, 1986 ed.)

Authors should adhere to the following guidelines when they prepare their reports:

- Do not make recommendations or suggestions.
- Do not be critical of the work of others.
- Do not tell readers what they must or should do.
- Avoid statements that place the Survey in competition with the private sector. (Site-specific projects should be avoided.) (See Water Resources Division Memorandum No. 85.59.)
- Maintain a high standard of excellence.
- Complete the report and see that it is approved by the Director before the end of the project.
- Exercise extreme care when writing statements or preparing reports that bear directly on legal matters.
- Obtain written permission to use copyrighted material.
- Credit and acknowledge all sources of information and the role of significant contributors.
- Make sure that all references are documented.
- Maintain impartiality, objectivity, and integrity.
- Avoid the use of trade names, but, if their use is necessary, add a suitable disclaimer statement. (See Water Resources Division Memorandum No. 86.73.)

- Make sure the report is appropriate (format, writing style, and absence of jargon) for the intended audience.

- Avoid use of industry or firm names in connection with statements about the sources of contaminants or factors that cause changes in natural or constructed systems.

- Make sure conclusions are logical, unbiased, and technically sound.

- Use standard references--the latest editions of Suggestions to Authors and WRD Publications Guide.

- Ensure reports are reviewed by technically qualified personnel.

- Respond to all colleague review comments by making changes in the report where appropriate. All review comments should be answered and initialed by the author. A response of "no" or "author's preference" is not acceptable. A check mark can be used to indicate acceptance of a comment. If comments are rejected, provide written justification for rejecting review comments. Authors should resolve and document differences of opinion with and among reviewers.

Responsibilities of Authors

The successful completion of the technical report is due, in large part, to the diligence of the author. Some major responsibilities of the author are provided below. Authors should--

- Prepare topical and annotated report outlines early in the project, and have the outlines reviewed. Provide the cooperator(s) with a reviewed copy of the outline.

- Revise and update outlines as the scope and direction of the project change. If the outline changes substantially, it may need to be reviewed again. Send a copy of the revised outline to the cooperator(s).

- Ensure that the report is the best product the originating office can produce before submitting it for technical review and, especially, for approval.

- Ensure that the report is of a high technical quality and that it is readable and timely.

- Ensure that all illustrations and tables necessary to the report are neat, legible, and complete.

- Use a manuscript check list.

- Help select at least two colleague reviewers. Make sure that the selected reviewers can perform a competent technical review of the report in a timely manner. If the report is multidisciplinary, the author should make sure that the reviewers can review the entire report. Otherwise, additional reviewers might need to be selected.

- Keep track of the time spent by colleague reviewers.

- Fill out the manuscript routing sheet with all requested information.

- Obtain an editorial review. The editorial review should be done before colleague review, and again if substantial revisions were made after colleague review.

- Evaluate objectively and acknowledge all technical review comments and incorporate them if accepted, or give written reasons if any are not accepted. Document resolution of disputes with and among colleague reviewers.

- Make sure the manuscript package is complete before submitting it for approval.

Responsibilities of Reviewers

The objective of the technical (colleague) review of the report is to ensure its technical soundness and to help the author improve the report. The following is a list of responsibilities of reviewers. Reviewers should:

- Have appropriate training, expertise, and interest in the report subject. It is incumbent on the reviewer to identify technical areas of a report for which he/she does not have the necessary expertise and convey this information to the author so that additional reviewers can be selected.

- Be willing to review the report in a timely manner.

- Ensure technical soundness and clarity and suggest other methods of analysis or interpretation, if appropriate.

- Devote adequate time and effort to check the mathematics, approach, organization, editing, adequacy of data used to support conclusions, applicability and soundness of illustrations and tables, and readability.

- Clearly indicate problems in the report and prepare a summary of the review.

- Avoid derogatory or humorous comments and make constructive suggestions for improvements. Reviewers should point out both positive and negative aspects of the report.

- Communicate with the author during the review process. Many comments and recommendations may be unnecessary if reviewers discuss the report with the author during the review.

Report-Review System for Districts

The reports-processing system used by the Mid-Atlantic District and an accompanying memorandum that emphasizes the importance of the system are shown in Exhibit 7. Other Districts might use a similar system. In the sample reports-processing shown, the Section Chief has a critical role in the technical and editorial quality of the report. Indeed, many reports are returned by a Region or Headquarters because of inadequate participation of the Section Chief in the report-preparation and review process. Implementation of a report-review system in every District is strongly encouraged.

Review Steps

The following 14 steps, if followed, can greatly improve the quality of colleague review. Although not included in the steps, colleague reviewers should attempt, as part of their review, to evaluate the editorial quality of text, tables, and illustrations, as described in the section "Editorial Review".

Step 1--Transmittal Memorandum

Carefully read the transmittal memorandum from the originating office and other background information on the project that generated the report. Such information can be extremely helpful to the reviewer by indicating the emphasis needed to be placed on various parts of the report or can explain deviations from Survey style required by the publisher.

Step 2--Title

Carefully read and study the report title. The title should convey the subject(s)of the report, yet be as short as possible. More than 15 words might be too many.

- Does the title accurately reflect the main theme of the report and first-order headings in the contents?
- Is the location of the study area included?
- Is it necessary to include the time period of the study or of the data set?
- Does the title avoid abbreviations, acronyms, brand names, and extraneous words?

Step 3--Contents

Carefully examine the contents. The contents tells the reader the order in which the topics are discussed and indicates the relative importance of these topics. A well- organized table of contents shows that the author has written a report with a logical and orderly presentation of information.

- Do the first-order headings in the main body of the report accurately relate to the key words in the report title, both in wording and in order of presentation?
- Are the contents logically organized in a manner that contributes to continuity of thought?
- Are all headings appropriately subdivided so that the subheadings further develop the subject of the heading?
- If subheadings are listed under a heading, are at least two subheadings used?

Step 4--Conversion Table

If the report contains a unit-of-measurement conversion table, compare it with units of measurement in the text, illustrations, and tables of the report.

- Does the table include all units of measurement used in the text, illustrations, and tables, and no others?

- Are the units of measurement worded correctly, and are the abbreviations in the form required by the publisher?

- Does the table include a definition of "Sea Level" if used in the report?

Step 5--Abstract

Read the abstract several times. The abstract is a digest of the information in the report. It can be written only after completion of the entire report.

- Is the abstract of an interpretive report informative rather than indicative? Does it reflect the summary or conclusions and stress the most important results in order of decreasing importance?

- Does it contain information that the reader can readily find in the body of the report?

- Does it address the purpose of the report and include the most salient findings of the report in decreasing order of importance?

Step 6--Introduction

The introduction sets the theme of the report and establishes the logic of the presentation that follows. It also is a place for miscellaneous information that does not belong in the body of the report.

- Does the Introduction clearly define the need for and the purpose of the investigation--that is, the what, why, where, and when of the investigation? Does it relate to the main theme of the report as indicated in the title and table of contents?

- Does the *purpose and scope of the report* define the objectives of the report and reflect the title and table of contents? Does it pertain only to the report (not to the project itself)? Does the scope of the report describe the depth of discussion in developing the subject of the report? The section "Report Organization and Outlines" contains an example statement of purpose and scope.

- Are the methods or approach or both stated briefly and are they appropriate to the problem and purpose of study? Does the methods section pertain only to methods? Remember that new methods and approaches will need more detailed explanations than will standard methods and approaches.

- Does the introduction describe the physical setting of the project area, giving only that information necessary to understand the data and interpretations?

- Is previous work in the subject area discussed and properly referenced?

- Are information obtained from outside sources and assistance from non-Survey persons or cooperating agencies acknowledged?

Step 7--Body of Report

Read the entire body of the report, keeping in mind the following questions:

- Does it present information to address the purpose of the report and does it stay within the intended technical and geographical scope?

- Are all data as accurate, complete, uniform, and appropriate as possible? Are comparisons based on data for the same or similar time periods? Are the data adequate to support all methods of interpretation and conclusions that may be reached? Are all data properly qualified and referenced? Do reports that include computer models meet the special requirements for modeling reports? (See Ground Water Branch Technical Memorandum 75.11.)

- Are mathematical and chemical equations and formulas accurate, clear, numbered, referenced, and appropriate to the problem and methods used?

- Does the text discuss the significance of the data in tables and illustrations and not just repeat the data?

- Has written permission to use copyrighted material in the report been secured from the copyright holder?

- Are the data shown in text, tables, and illustrations in agreement?

- Has the discussion been developed along the main theme of the report as indicated in the title, table of contents, and purpose and scope?

- Are all methods discussed relevant to the theme of the report? Do discussions answer the purpose of the report?

- Is the report free of agency policy violations?

Step 8--Summary or Conclusions

The summary, conclusions, or summary and conclusions section is the terminal section of the report. A summary is a brief re-accounting of the informative parts of the report. The conclusions are answers to questions addressed by the purpose(s) of the report. The summary and conclusions are second in importance to the abstract and usually serve as the principal source of information for the abstract.

- Is the summary or conclusions a logical outgrowth of information developed in the report?
- Does it contain or is it based only on information that is in the body of the report?
- Does it reiterate the theme expressed in the title and purpose and scope?
- Does it draw together and briefly reiterate the principal findings of the investigation?
- Does it provide solutions or answers to problems addressed in the Introduction?
- Is it as quantitative as possible and does it include numerical findings presented in body of the report?

Step 9--References

The list of references gives credit to the sources of all publications cited in the report.

- What is the title of the list of references? If the list only contains references that are cited in the report, the list is called "References" or "References Cited." If the list is more extensive and contains references not cited in the report, the list is called "Selected References." If the list is an extensive or exhaustive compilation of pertinent references, it is called a "Bibliography."

- Are all literature citations in the text, tables, and illustrations listed? Has the author included the page, figure, or table number of the source material in the citation?

- Are the references listed in the proper style and format for the intended publication?

Step 10--Tables

Tables should be self explanatory, and in a format appropriate to the publication outlet. See the section titled "Editorial Review" for additional guidelines in reviewing tables.

- Is the table needed? If so--

  -- Are the data presented in a table repeated unnecessarily in the text?
  -- Are all data presented in the table needed?
  -- Are the data presented in a table repeated in an illustration that is easier to understand than is the table?
  -- Could the data in a table be better presented in the text or in an illustration?

- Are the data in the table correct? Were they cross-checked against data mentioned in the text, shown in an illustration, or given in another table?

- Would additional tables improve clarity? Is the table difficult to understand because it contains too much data?

Step 11--Illustrations

Maps, hydrologic and geologic sections, graphs, diagrams, line drawings, and photographs should be self-explanatory. They should complement and support the text. They must be technically correct. Most problems with illustrations can be identified during a thorough editorial review. See the section titled "Editorial Review" for additional guidelines in reviewing illustrations.

- Is the illustration needed?
- Are the data better presented in a table?
- Can the illustration be combined with another illustration?
- Is the illustration legible and complete, and does it reflect the cartographic standards of the publisher?
- Are the data shown in the illustration portrayed correctly and accurately?
- Do the data shown in the illustration agree with the statements and data mentioned in the text, listed in a table, or shown in another illustration?
- Is there agreement between the title of the illustration and the data shown in the illustration?
- Does the illustration contain enough information so that it can "stand alone."

Step 12--Verification

Verification is the process that is intended to make the report internally consistent. Internal consistency can be improved by use of the following check list:

- Is the report title the same wherever it appears--on the cover, title page, abstract page, routing sheet, WRSIC abstract, and transmittal memorandum?

- Are the wording and rank of headings in the table of contents the same as those in the body of the report?

- Do table and illustration titles agree with the lists following the table of contents?

- Is the pagination correct?

- Do values in the text, tables, and illustrations agree with one other?

- Is the arithmetic correct?

- Are units of measurements in a consistent form, and, as applicable, are all included in the conversion table? Is the definition or lack thereof of unit abbreviations consistent with the standards of the publisher?

- Are geologic, hydrologic, chemical, and other symbols in a standard format and are they consistent throughout the report?

- Are all geographic names in the text, tables, and illustrations shown on a map, or noted as being outside of map boundaries?

- Are contours shown on maps supported by values placed at data-control points on a review copy?

- Have changes made to the body of the report during review been incorporated in the abstract and summary or conclusions?

Step 13--Re-examination

At this point, all parts of the report have been reviewed. Now go back and check it all over again. The reviewer has a good idea what the author has attempted to say, what the author really has said, and how the author has said it. A re-examination with all this in mind might disclose parts of the report where additional improvement is needed.

Step 14--Review Memorandum

After the review has been completed, the reviewer should prepare a memorandum that summarizes the results of the review. Major problems should be described. Comments written in the manuscript need not be reiterated in the memorandum unless they have special significance. Comments of a complimentary nature also should be included in the memorandum.

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EXHIBIT 1

EXAMPLE PROJECT PROPOSAL AND WORK PLAN

Development Alternatives in the Usquepaug-Queen Ground-Water Reservoir, Rhode Island

PROBLEM: The RIWRB (Rhode Island Water Resources Board), which is responsible for implementing development of the State's major water resources, is identifying sites in the Pawcatuck River basin where high-yield wells can be constructed. This is being done through an extensive program of test drilling and aquifer testing in major ground-water reservoirs in five subbasins (Chipuxet, Usquepaug-Queen, Beaver-Pasquiset, lower Wood, and upper Wood). Sites most favorable for water-supply development are being purchased by the State and retained for future use.

Cooperative studies between the U.S. Geological Survey and the RIWRB to analyze and interpret lithologic data and aquifer-test data and to assess ground-water-development alternative through model analysis have been completed for the Chipuxet subbasin (Johnston and Dickerman, 1985) and the Beaver-Pasquiset subbasin (Dickerman and Ozbilgin, 1985). Field work for the lower Wood subbasin is complete and the report is ready for colleague review. Work in the upper Wood subbasin is scheduled for completion in FY 88. The Usquepaug-Queen subbasin (fig. 1) is the last unstudied subbasin of the Pawcatuck River basin. This proposal addresses the need for determination of ground-water development alternative and chemical quality of ground water in the subbasin.

A moderate amount of test drilling and aquifer testing has been done in the Usquepaug-Queen subbasin, but completion of the testing program by the RIWRB has been stalled for several year because access to land that overlies a large part of the ground-water reservoir area has been denied by property owners. Rather than litigate to obtain land access rights, the RIWRB intends to use estimates of yield obtained from a number of apparently favorable sites in this largely untested area. The estimates will be based upon interpolation and extrapolation of data from available lithlogic logs and pumping tests.

A highly permeable sand and gravel aquifer occupies the preglacial bedrock valley of the Usquepaug-Queen River. the thickest and most transmissive part of the aquifer forms a ground-water reservoir estimated by Allen and others (1966) to be capable of sustaining a perennial yield of 17 Mgal/d (million gallons per day). However, their study concludes that withdrawal at the rate of 17 Mgal/d would probable cause wetlands and streams over the reservoir to be a dry for long periods of time.

Assessment is needed of the ambient quality of ground water and surface water in the subbasin. Evaluation of surface-water quality is necessary because much of the water pumped from wells would be infiltrated from streams. A substantial part of the reservoir area is overlain by commercially cultivated land to which large quantities of nitrogen fertilizers, pesticides, and herbicides have been applied. Because concentrations of nitrate that approach or exceed the mandatory drinking water standard of 10 milligrams per liter, and aldicarb, a highly toxic pesticide, have been found in ground water near several commercially cultivated fields elsewhere in the Pawcatuck River basin, there is concern about the impacts of land use on the quality of ground water and surface water. Although few instances of ground-

water contamination by volatile organic chemicals have been reported in the Pawcatuck River basin, it is desirable to demonstrate that significant concentrations of these chemicals are not present in the study area.

A digital simulation model of the stream-aquifer system is needed to evaluate the impact of alternative pumping plans on ground-water levels and streamflow. Much of the data needed to construct and calibrate such a model are available from reports by Allen and others (1963, 1966). Results of a determination of the ambient quality of ground water and surface water and predications of the ground-water flow model will aid the RIWRB in making decisions about site acquisition in, and development of, the ground-water reservoir in the Usquepaug-Queen subbasin.

OBJECTIVES: The objectives of the study are:

1. To assess the impacts of alternative pumping schemes on ground-water levels and streamflow.

4. Determine the ambient quality of surface water and ground water in the subbasin.

APPROACH: The investigation will include the following elements:

1. An inventory will be made of geohydrologic information (lithologic logs, well construction and pumping test data, water-quality date, etc.) that have become available in the study area since studies were completed by Allen and other (1963, 1966).

2. Estimates of hydraulic conductivity and saturated thickness of the sand and gravel aquifer will be made from well logs and pumping tests and will be used to update maps of the saturated thickness and hydraulic conductivity prepared by Allen and others (1966).

3. A network of 30 to 50 observation wells will be established in which to measure water levels monthly for at least 12 consecutive months. Most of the wells will be previously inventoried dug wells that are still accessible. Approximately 25 Observation wells will be drilled with the Survey's drill rig to obtain water-level data in key areas. Continuous water-level recorders will be installed on up to four wells. Altitudes of the measuring points on observation wells will be determined by leveling or surveying altimeters.

4. Partial-record streamflow sites will be established at four or five sites on streams that flow over the ground-water reservoir from areas of till-covered bedrock. Measurements will be made monthly at these sites for at least 1 year. Estimates of average monthly discharge at these sites will be made monthly at these sites for at least 1 year. Estimates of average monthly discharge at these sites will be made using a method described by Riggs (1969). Monthly measurements of discharge also will be made monthly at selected sites on the main stem of the Usquepaug-Queen River. Discharge measurements at partial-record sites also will be correlated with discharge at a continuous recording downstream gage to estimate average monthly discharge at partial-record sites for 1959. These estimates of average monthly discharge at partial-record sites for 1959 are needed for streamflow input to aid in calibrating the ground-water-flow model. The altitudes of the reference points used to measure stream stage will be determined by leveling. Continuous records of streamflow

will be obtained at the downstream end of the ground-water reservoir from an existing U.S. Geological Survey stream gage.

5. Estimates of average annual and average monthly recharge to the Usquepaug-Queen ground-water reservoir will be based on water-budget computations developed from this study and from similar computations made for the study area by Allen and others (1966). Precipitation data will be available from a National Weather Service station located 3 miles east of the study area.

6. Approximately 15 to 20 sites will be identified where yields of 1 Mgal/d, which are adequate for municipal-supply use, might be obtained from large-diameter wells. Identification of potential well sites will be based largely on analysis of available lithologic logs and pumping test data. Several potential well sites will be identified in untested areas by interpolation and extrapolation of data. More sites will be identified than are likely to be needed, in the event actual yields obtainable at some sites are less than predicted.

7. A two-dimensional model of the stream-aquifer system will be developed using the U.S. Geological Survey's three-dimensional modular finite-difference model (McDonald and Harbaugh, 1984). the model will be calibrated first under steady-state conditions using estimates of long-term average annual recharge and water-level and streamflow data collected by Allen and other (1966) in 1959, a year when conditions were close to long-term average. The model then will be calibrated under transient conditions using average monthly recharge, water-level, and streamflow data for 1959. Verification of the transient model will be done be attempting to simulate water-level and streamflow data collected during this study.

8. The transient model will be used to simulate withdrawals from various combinations of hypothetical pumping wells, at various combinations of rates, to determine the potential impacts on streamflow and ground-water levels. Withdrawals will be simulated for conditions approximating long-term average annual recharge and for periods of below-normal recharge during droughts. The principal goal of the model simulations will be to determine the maximum withdrawal rates that can be made from selected combinations of wells, particularly during months when streamflow is normally low, without causing streams to go dry or causing excessive lowering of water levels in wetlands.

9. Water samples will be collected from the same 15 wells that were sampled between 1955 and 1960 by Allen and others (1963, table 11), if accessible, and from a few additional wells. Samples will be collected in the spring and fall. they will be analyzed for the inorganic constituents shown in table 1, which includes all constituents for which analyses were made in the earlier study. These wells also will be samples once for volatile organic chemicals listed in table 2. Field determinations will be made on all samples for pH, specific conductance, dissolved oxygen, alkalinity, and temperature.

10. Clusters of three wells screened at different depths will be installed at four sites downgradient from commercially cultivated fields to which aldicarb has been applied. These wells will be sampled once in the spring and fall. The samples will be analyzed for the pesticides listed in table 3, for inorganic chemicals listed in table 1, and for field constituents listed above in item 9.

11. Water samples will be collected from streams during periods of base flow in spring and fall at the same sites sampled in 1958 and 1959 by Allen and others (1963, table 10). They will be analyzed for inorganic constituents shown in table 1, which includes all of the constituents for which analyses were made in 1958 and 1959. Field analyses listed in item 9 also will be determined for all samples.

Table 2.-*Summary of proposed water-quality analyses for organic volatile constituents*

Lab code	WATSTORE code	Constituent
1338	00000C	ALDICARB
1343	00000C	ALDICARB, SULFOXIDE
1344	00000C	ALDICARB, SULFONE
1345	00000C	CARBOFURAN

BENEFITS: The Usquepaug-Queen simulation model will allow rapid assessment of ground-water withdrawals on the stream-aquifer system. this information will complete the study of all five subbasins in the Pawcatuck River basin and will aid planners in deciding how best to protect, develop, and manage ground-water resources. The study supports the State's responsibilities for developing ground-water resources, and the Survey's goal of increasing knowledge of the distribution and quality of the Nation's ground-water and surface-water resources.

REPORT PLANS: Two reports are planned. A geohydrologic data report will be published in a State series by the Rhode Island Water Resources Board. An interpretive report will be published in the Water-Resources Investigations Report series: (1) First draft, December 1989; (2) colleague review, March 1990; and (3) final approval, September 1990.

PERSONNEL REQUIREMENTS: The following lists the number of work days required for the project:

	FY 88	FY 89	FY 90
Hydrologist GS 12		168	168
Hydrologic technician GS 8	20	138	138
Hydrologic technician GG 7	137		
College work study student	24	75	75

A college work study student will have to be hired. A hydrologist (GS 12), hydrologic technician (GS 8), and hydrologic technician (GS 7) are available.

PROJECT COSTS: The projected cost for each fiscal year of this project is as follows:

	FY 88	FY 89	FY 90
Salaries and benefits	$ 13,790	$ 46,040	$48,470
Travel and per diem	1,500	2,000	
Vehicles	1,500	2,000	3,000
Printing and reproduction			4,000
Publication			4,000
Supplies and materials	3,000	3,000	2,395
Drilling (Survey drill rig)	7,000	8,000	
Laboratory		3,600	6,000
Common services	24,510	59,140	62,095
Technical service charge	5,700	13,750	14,440
TOTAL	$ 57,000	$137,530	$144,400

SOURCE OF FUNDS: Cooperative project with the Rhode Island Water Resources Board.

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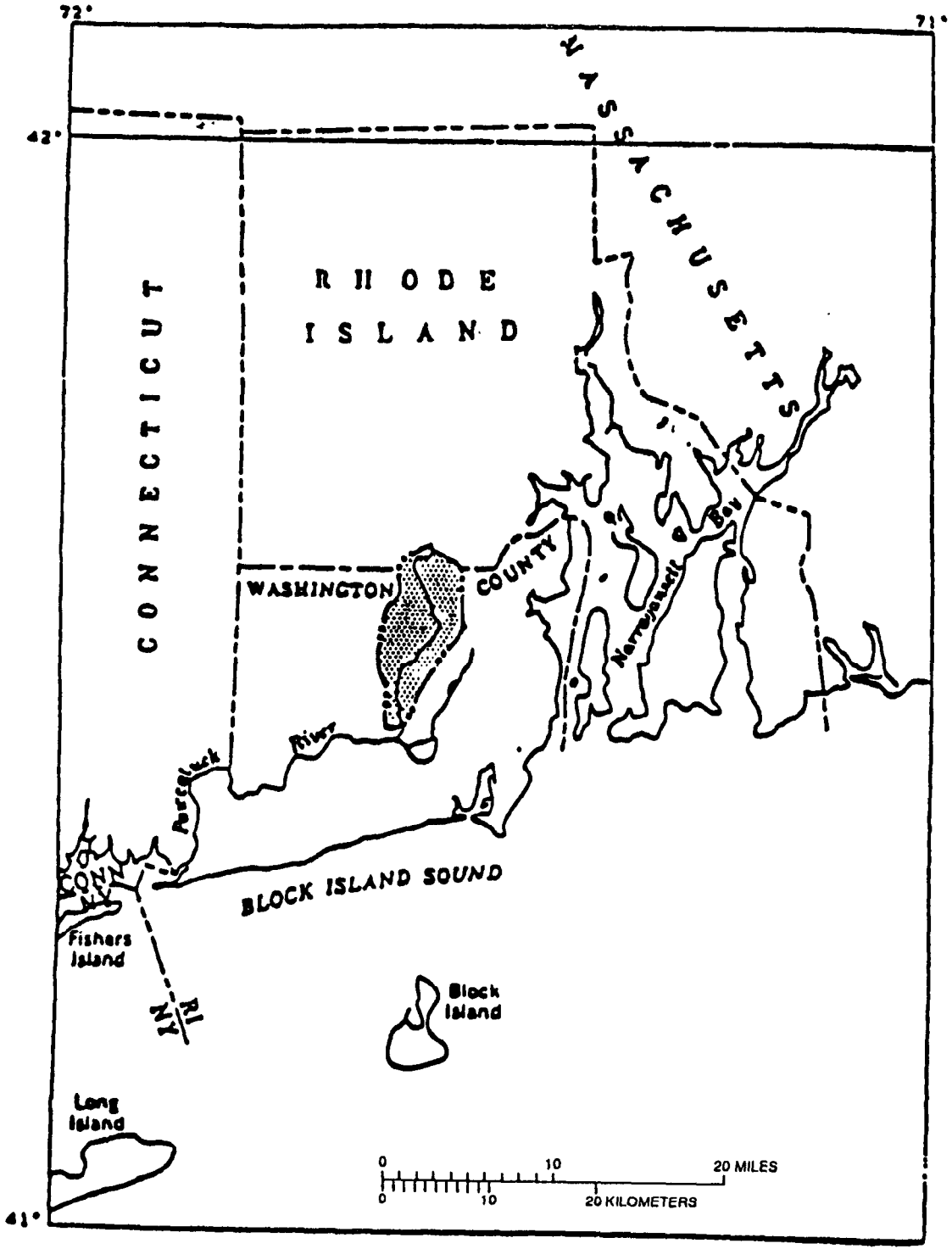

Figure 1.--Proposed Usquepaug-Queen study area.

EXHIBIT 1

USQUEPAUG-QUEEN WORK PLAN

Work Unit	1ST YEAR	2ND YEAR	3RD YEAR
	ONDJFMAMJJAS	ONDJFMAMJJAS	ONDJFMAMJJAS
Data inventory	X X		
Order base maps	X		
Test drilling			
Water-level network	X		
Pesticide network		X	
Aquifer-test analysis	X		
Partial-record streamflow	XXXXXXXXXXXX	XXXXXX	
Water-level data	XXXXXXXXXXXX	XXXXXX	
Water budget	X		
Update map of:			
Bedrock	X		
Water table	X		
Saturated thickness	X		
Hydraulic conductivity	X		
Prepare transmissivity map	X X		
Water-quality sampling			
Ground water	X	X	
Surface water	X	X	
Digital model			
Design		XX	
Developed & input values		XXX	
Calibration		XX	
Verification		XX	
Model runs/analysis		XXX	
Report Generation			
Report outlines	XXXXX		
Geohydrologic data report		XXXXX	XXXXX
Interpretive report			XXXXXXXXXXXX

EXHIBIT 2

PROJECT AND REPORT REVIEW SHEET

PROJECT NUMBER: _____ DATE: _____

PROJECT TITLE: _____

PROJECT CHIEF: _____

WORK ITEMS	DEADLINE	COMPLETE	INITIALS
1. Proposal			
2. Work plan			
3. Report outline			
Topical			
Annotated			
4. Equipment and instruments			
5. Construction			
6. Base map			
7. Annotated outline review			
8. Data collection			
9. Data analysis			
10. Report first draft			
11. Report final draft			
12. Section chief review			
13. Editorial review			
14. Report specialist review			
15. Cooperator review			
16. Colleague reviews			
17. District chief review			
In-house			
Out of office			
18. District transmittal			

Comments: _____

_____

New Project Review Date: _____

EXHIBIT 3

EXAMPLE TITLE, CONTENTS, PURPOSE AND SCOPE, AND SUMMARY AND CONCLUSIONS

Title

Time of travel, water quality, and bed-material quality in the Cuyahoga River within the Cuyahoga Valley National Recreation area, Ohio, 1981-83

Contents

Purpose and Scope

This report presents the results of a study of the Cuyahoga River within the Cuyahoga Valley Natural Recreation Area (CVNRA) , Ohio from 1981 through 1983. The study provides an overview of water quality and identifies areas that are of concern to the National Park Service when they evaluate land-use priorities in the basin as they relate to water quality. The objective of the first phase of the study was to establish the relation between discharge of the Cuyahoga River and time of travel through the park reach so that the passage of any water-soluble contaminant discharged upstream from the park can be predicted. The objective of the second phase of the study was to assess the effect of 13 tributaries within the park on dissolved-oxygen depletion and on contamination from microorganisms on the main stem during a low-flow period. Tributaries that need to be studied in additional detail in terms of their effect on the park's water quality are identified. The objective of the third phase of the study was to identify tributaries that are receiving trace-metal contamination by examining metals sorbed to bed material at 18 locations.

Summary and Conclusions

A study was conducted in the Cuyahoga River basin within the Cuyahoga Valley Natural Recreation Area. The study entailed (1) measurement of time of travel, (2) a 24-hour water-quality survey, and (3) a survey of concentrations of metals in bed materials.

Time of travel was measured on the main stem (with discharge at the Independence gaging station used as an index) from the upstream to the downstream terminus of the CVRNA at 222 and 720 ft^3/s in 1983 and from the upstream end of the CVNRA to Peninsula at 376 ft^3/s in 1981. Time of travel is described by the following equations:

$$T = -0.038Q + 46.9 \quad \text{(between Botzum and Independence),} \qquad (1)$$

$$T = -0.009Q + 13.0 \quad \text{(between Botzum and Peninsula).} \qquad (2)$$

These equations are valid only for discharges (measured at the Independence gaging station) ranging from 222 to 720 ft^3/s. At a flow of 222 ft^3/s, some pooling effect occurred behind the diversion dam at Brecksville. The pooling effect would be even greater at lower flows and would significantly lengthen the time of travel.

A water-quality survey was conducted over a 12-hour low-flow period on September 14, and water quality was measured at high flow on September 15, 1982. The following constituents were measured: Water temperature, specific conductance, pH, and concentrations of dissolved oxygen, biochemical oxygen demand, and fecal bacteria. In addition, discharge was measured at each site.

Highest arsenic concentrations in bed material (about 5 µg/g) were found at Langes, Dickerson, and Salt Runs, all of which drain an area that is used largely for agriculture. Certain herbicides and insecticides contain arsenic. Arsenic is persistent in soils and can accumulate with repeated applications of such compounds.

Differences between the concentrations of constituents in bed material sampled at the main-stem sites were not significant; thus, none of the tributaries could be singled out as a potential source of toxic material. However, concentrations of manganese, lead, nickel, and zinc were higher on the main stem than at most of the tributary sites.

Although several of the tributaries (such as Langes, Robinson, and Haskell Runs and the unnamed tributary at Independence) were found to contribute significantly greater BOD loads or bacterial contamination than did the other tributaries, their contribution is small relative to that already present in the main stem from upstream sources. Two of the larger tributaries, Tinkers Creek and Brandywine Creek, contribute a relatively larger share of the BOD load and bacterial contamination, but these contributions are still small when compared to those of the main stem.

EXHIBIT 4

EXAMPLES OF TOPICAL AND ANNOTATED REPORT OUTLINES

Topical Outline

"Current and Proposed Ground-Water-Level Data Program in _____"

I. Introduction

A. Problem
B. Purpose and scope
C. Acknowledgments

II. Geohydrology

A. Bedrock geohydrologic units
C. Surficial geohydrologic units

III. Network review

IV. Current network

V. Proposed ground-water-level data program

A. Natural-stress observation wells
(a) Climatic-effects network
(b) Terrane-effects network

B. Manmade-stress observation wells
(a) Surficial geohydrologic units
(b) Bedrock geohydrologic units

VI. Summary

VII. References

EXHIBIT 4

Annotated Outline

"Current and Proposed Ground-Water-Level Data Program in _____"

I. Introduction

A. Problem - Present the history of the water-level data program from its inception in 1939 to the present. This will also include a discussion of the local well- numbering system. The growth of the network was not based on any specific network design criteria. This has led to inadequate statewide coverage. The State has analyzed Maine's ground-water management and recommends significant changes and upgrading. One of their recommendations is to perform a detailed evaluation of the observation-well program and formulate a plan to improve it.

B. Purpose and scope - The purpose of this report is to evaluate the current network and present a plan to improve it. The study will cover the needs for the statewide network. It will address the needs for the program to observe both natural and manmade stresses on ground -water resources in different geologic and topographic environments. The procedures used to evaluate the program will be: selecting hydrogeologic units, compiling well records, evaluating the wells based on network criteria (Heath, 1976) and proposing a plan to improve the network.

C. Acknowledgments -Cooperators and assistance acquired through the project.

II. Geohydrology

A. Bedrock geohydrologic units - The bedrock units will be based on four major lithologic subdivisions (Denny, 1982). They are a generalized lithologic comparison of the many bedrock units.

B. Surficial Geohydrologic Units - These units form the veneer on bedrock ranging from a trace to hundreds of feet thick. They are composed of materials from glacial and nonglacial origin. The emphasis will primarily be on permeable deposits of sand, gravel, and till.

III. Network review - Present ground-water level network concepts developed by Heath.

IV. Current network - Describe the network. Present site descriptions and well classification according to network concepts. Illustrate criteria used to determine unreliable and duplicated well records..

V. Proposed ground-water-level data program

A. Natural-stress observation wells

(a) Climatic-effects network - Present the characteristics of the wells in this network. Propose well locations to fulfill the objectives of this network.

(b) Terrane-effects network -Present the characteristics of the wells in this network. Propose well locations that meet the network criteria.

B. Manmade-stress observation wells

(a) Surficial geohydrologic units - Identify areas of significant ground-water use. Propose well locations for this network.

(b) Bedrock geohydrologic units

VI. Summary - Present the principal results of the investigation. Give answers to the purposes stated at the beginning of the report.

VII. References

Topical Outline

"Guidelines for Using the Steady-State Gas-Tracer Method to Determine Gas-Desorption Coefficients"

Annotated Outline

"Guidelines for Using the Steady-State Gas-Tracer Method to Determine Gas-Desorption Coefficients"

Introduction

A. Purpose and scope -The purpose of the report is to describe guidelines for the application of the steady-state gas-tracer method.

B. Acknowledgments- The authors wish to acknowledge and thank Nabuhiro Yotsukura for his technical assistance and suggestions.

Steady-state gas-tracer method for determining gas-desorption coefficients

A. Theory- There are two techniques for calculating the tracer-gas desorption coefficient for a river reach.

B. Hypothesis- The number of data points affects the accuracy of representing a slug-injected tracer response-curve and the accuracy of gas tracer desorption coefficients calculations.

Guidelines for using the steady-state gas-tracer method

A minimum of 11 data points are necessary to describe a conservative tracer response curve without changing moment values more than 5 percent from the values that would be calculated from a large number of data.

Discussions of guidelines

A. Experience gained for 1983-84 reaeration studies. Questions concerning the effect of data sets with as few as 6 data points and the effect of long duration dye-cloud response curves.

B. Limitations of testing- Sets of response curves of variable duration from four, 1984 tracer studies were used to form new data sets having one-half and one-quarter the number of data points.

Summary and conclusions

A minimum of 11 data points are necessary to describe a conservative tracer response curve without changing moment values more than 5 percent from the values that would be calculated with a large number of data points

References

EXHIBIT 5

MANUSCRIPT ROUTING SHEET

FORM 9-1531 (JULY 1984) — U.S. DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
MANUSCRIPT ROUTING SHEET

WRD NO. (ASSIGNED BY HDQRS.):

AUTHOR(S) (LAST NAME FIRST): Bayer, H.C.; Hamill, J.C.; and Quaker, R.T.

PROJECT NO (Example VA099): IL048

TITLE: Correlations of scanning multichannel microwave observations with snowpack properties of the upper Chicago River basin.

NO. PAGES (INCL. TABLES): 15

NO. ILLUSTRATIONS: 4

(CHECK ONE): [X] INTERPRETIVE REPORT [ ] DATA REPORT [ ] ABSTRACT [ ] OTHER

TABLES NO. 1 NO. PAGES 4

TYPE OF PUBLICATION (WSP, HA, OPEN FILE, JOURNAL, STATE PUBLICATION, ETC.): Symposium Proceedings - 1989 Geoscience and Remote Sensing Symp., Wash., DC, 11/2-3/89

COOPERATING AGENCY: NONE

DOES REPORT CONTAIN GEOLOGIC NAMES? [ ] YES [X] NO

	NAME (Print or type)	DATE IN	DATE OUT	TOPICS REVIEWED	NO. HRS SPENT	CHECK STEP COMPLETED: AUTHOR	EDITORIAL REVIEWER	*TECHNICAL REVIEWER	DIST/PROJ CHIEF	REGIONAL HYDROL	GEOLOGIC NAMES	ADDITIONAL EVALUATION	SCI PUB PROC SPALDM	DIRECTOR	ENTER NEXT ROUTING HERE (Print or type)
1	AUTHOR		1/25 1988												Colleague Review
2	Toler, R.T.	1/26 1988	2/15 1988	ALL	10			X							Colleague Review
3	Jordan, A.F.	2/10 1988	2/21 1988	ALL	6			X							Colleague Review
4	Henry, A.R.	2/25 1988	3/10 1988	Edit. Review	10		X								Author
5	Bayer, H.C.	3/13 1988	5/1 1988	Make Correct	6	X									Colleague Review
6	Ayers, M.E.	5/3 1988	5/15 1988	ALL	2							X			Colleague Review
7	Hayman, E.R.	5/15 1988	5/25 1988	Edit. Review	6		X								District Chief
8	Franklin, E.P.	5/26 1988	5/26 1988	ALL	3				X						Regional Hydrol.
9	Harriman, E.F.	5/28 1988	6/10 1988	ALL	3					X					PMU
10															
11															
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CONTINUE ON ADDITIONAL FORMS, IF NECESSARY

* See instructions for technical reviewers on back of page.

INSTRUCTIONS FOR TECHNICAL REVIEWERS

A thorough and competent review is essential to maintain the technical quality of Water Resources Division reports. The purpose of the review is to give a technical evaluation that will improve the report and eliminate errors that may lead to the embarrassment of the author and the Division. The following guidelines summarize critical policies and procedures in the report-review process.

Number of reviewers – At least two technical reviews are mandatory for all interpretive reports. Whenever possible, the reviewers should be selected on the basis of special knowledge or interest in the subject material of the report. At least one technical reviewer should be outside the District or Research Project office.

Role of reviewers – The role of the technical reviewer is to ensure the technical adequacy of the report. However, significant editorial discrepancies, particularly in organization, should be identified.

Specific items to consider during review –

- *Technical correctness* – Is the report technically valid? Are conclusions properly supported by correctly interpreted data? Are all computations correct? Are assumptions reasonable and clearly stated?

- *Readability* – Is it written for the intended audience, and with correct grammar, syntax, and a minimum of scientific jargon? Are illustrations and tables legible and readily understandable?

- *Title* – Is it explicit and does it reflect the objectives of the report? Generally the title should not exceed 12 words and, if appropriate, should give the project location and study period.

- *Abstract* – Does it state the purpose of the report? Is it informative? Does it describe the study and summarize pertinent results and conclusions? See pages 267–270, WRD Publications Guide (1982), Volume 1.

- *Introduction* – Does it clearly describe the problem(s) addressed by the report, state the objectives and scope of the report, present pertinent background information, and acknowledge significant help? See pages 265–266, WRD Publications Guide (1982), Volume 1.

- *Methods* – Were appropriate techniques used in the study? New methods should be described.

- *Body of manuscript* – Is it organized and presented in a logical sequence that contains the basic information, interpretation of that information, and the results or conclusions of the interpretations?

- *Illustrations and tables* – Are all necessary; do they clearly present basic information and emphasize relationships? Illustrations and tables should be interpreted and referred to in the text, but should be understandable without the text.

- *Conclusions or results* – Do they summarize the principal findings of the study and answer each of the objectives described in the introduction? Are they sound and properly documented? No information should be given that was not discussed in the body of the report. See pages 271–272, WRD Publications Guide (1982), Volume 1.

- *References* – Are all references cited in text included in this section? Are they cited correctly? Were pertinent references omitted in preparing the report?

- *Policy considerations* – See pages 23–24, WRD Publications Guide (1982), Volume 1.

EXAMPLE REPORT PROCESSING-REVIEW SYSTEM

UNITED STATES GOVERNMENT

memorandum

DATE June 13, 1988

REPLY TO ATTN OF Chief, Maryland-DC Office
Towson, Maryland

SUBJECT PUBLICATIONS--Distribution of Maryland-DC Office reports-processing flow charts

TO All authors and supervisors in Towson, Annapolis, Dover, and MGS offices

Attached for your information and reference are five flow charts that describe the reports-processing protocol in the Maryland-DC Office. The charts cover more than 50 sequential steps in the life of a WRD report, ranging from preparation of a report-planning package to final report publication. Included is a brief description of each step as well as desired timeframes and turnaround times for each step. The protocol was adapted from standard WRD guidelines and does not represent any major changes from current Maryland-DC practice. Papers, journal articles, and cooperator reports are subject to the same protocol as WRD reports.

The protocol calls for a report-planning package for every report within 6 months of the beginning of a project. The first draft of the final report for a project is to be started on a fulltime basis 15 months before the end of the project and is to be completed 9 months before the end of the project. The District review step should be completed 7 months before the end of the project, and the colleague review step should be completed 4 months before the end of the project. The final 4 months are reserved for Regional and Headquarters review steps and Director's approval. The approved report should be sent to the publisher about 4-6 months after approval, depending on the type of report. These general timeframes are representative of typical reports under certain circumstances, some of the timeframes may not be applicable. The indicated timeframes are to be viewed as goals. It is interesting to note that the Reports Specialist is involved in 14 of the steps, the Section Chief in 10, and the author in only 8. Of course, the amount of time spent by each of these three people is inversely proportional to the number of steps in which they are involved.

The purpose of these flow charts is to inform all Towson, Annapolis, Dover, and MGS authors and supervisors of their report responsibilities. Authors and Section Chiefs should refer to the charts when planning projects so that sufficient time is allowed for report activities. As the driving forces in the report-review process, Section Chiefs and the Reports Specialist should use these charts to ensure that all the steps in the protocol take place in the proper sequence and that all turnaround times are met.

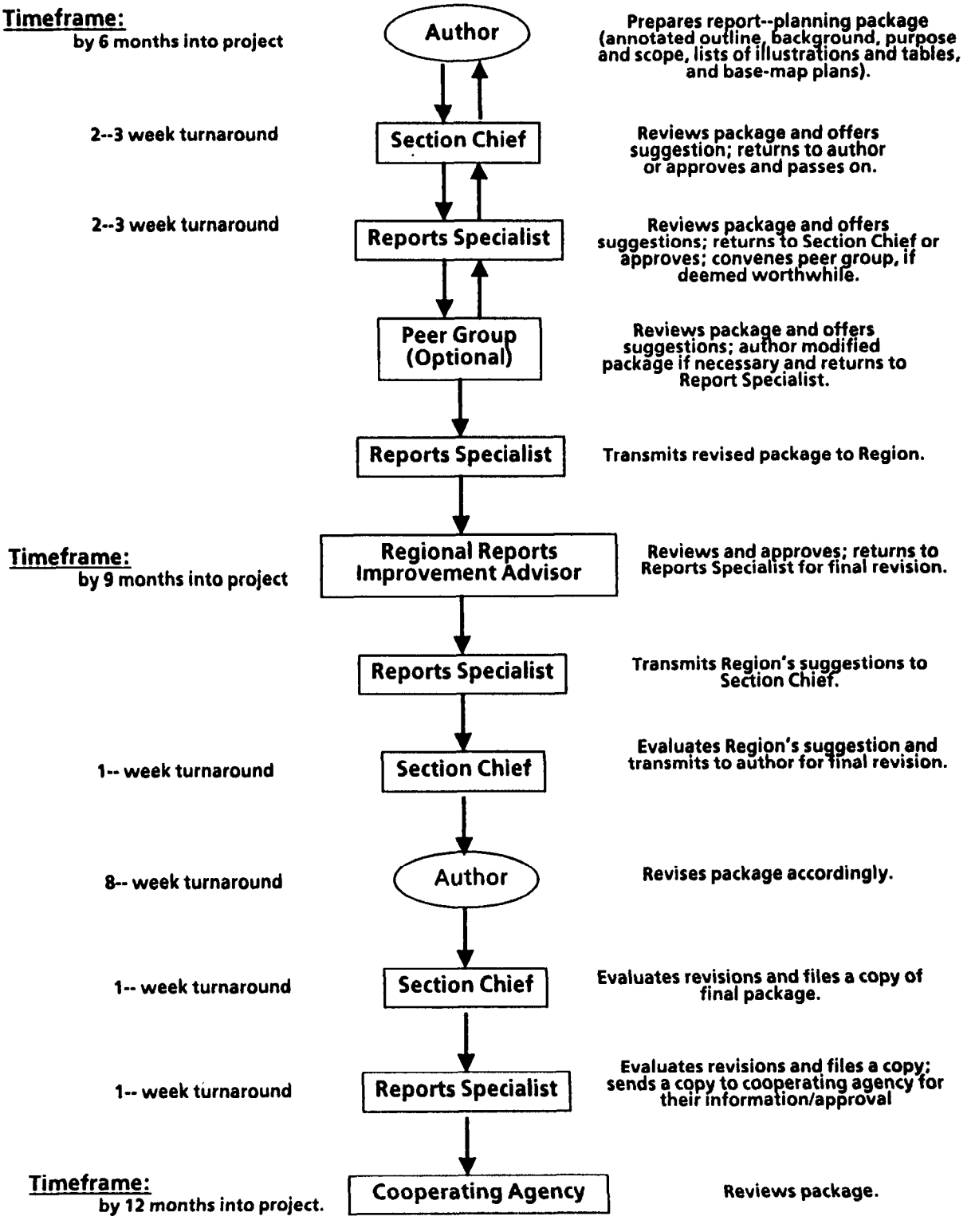
Other than our data bases, reports are the only tangible results of our work. A rigorous reports-processing protocol is one of the main reasons that the WRD enjoys such an excellent reputation of scientific quality. Because of the number of steps involved in the preparation of our reports, it is imperative that all authors and supervisors adhere as closely as possible to the suggested time frames and turnaround time, if we are to maintain our good reputation. I encourage all of you to study these charts, display them or file them for easy access, and refer to them during all report activities.

David Grason
Maryland-DC Office Chief

Attachments

REPORTS PROCESSING IN MARYLAND--DC OFFICE

REPORT--PLANNING STEPS



REPORTS PROCESSING IN MID-ATLANTIC DISTRICT
FIRST--DRAFT AND DISTRICT--REVIEW STEPS

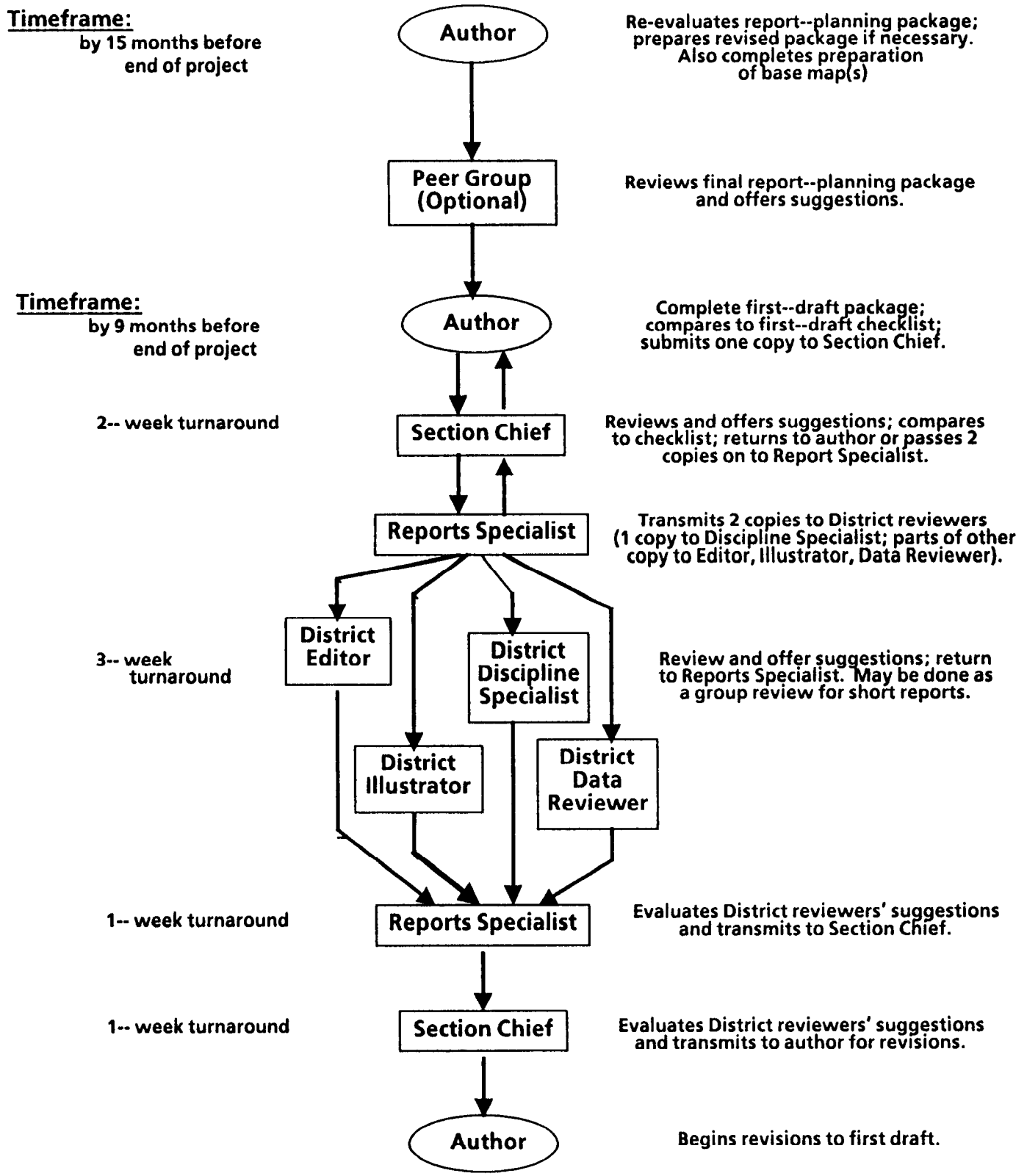


EXHIBIT 7

REPORTS PROCESSING IN MID-ATLANTIC DISTRICT
COLLEAGUE--REVIEW STEPS

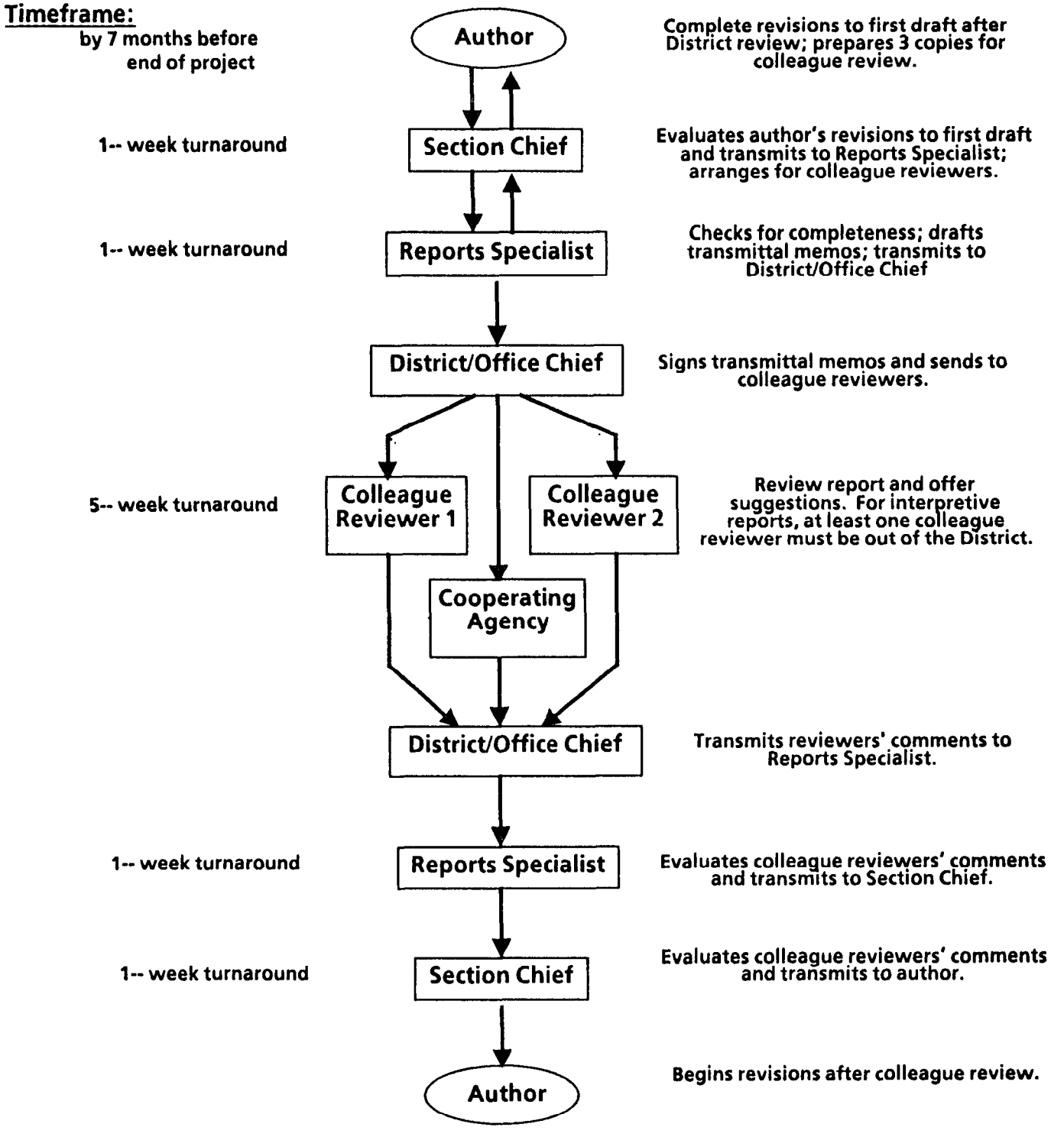


EXHIBIT 7

REPORTS PROCESSING IN MID-ATLANTIC DISTRICT
REGIONAL AND HEADQUARTERS REVIEW STEPS

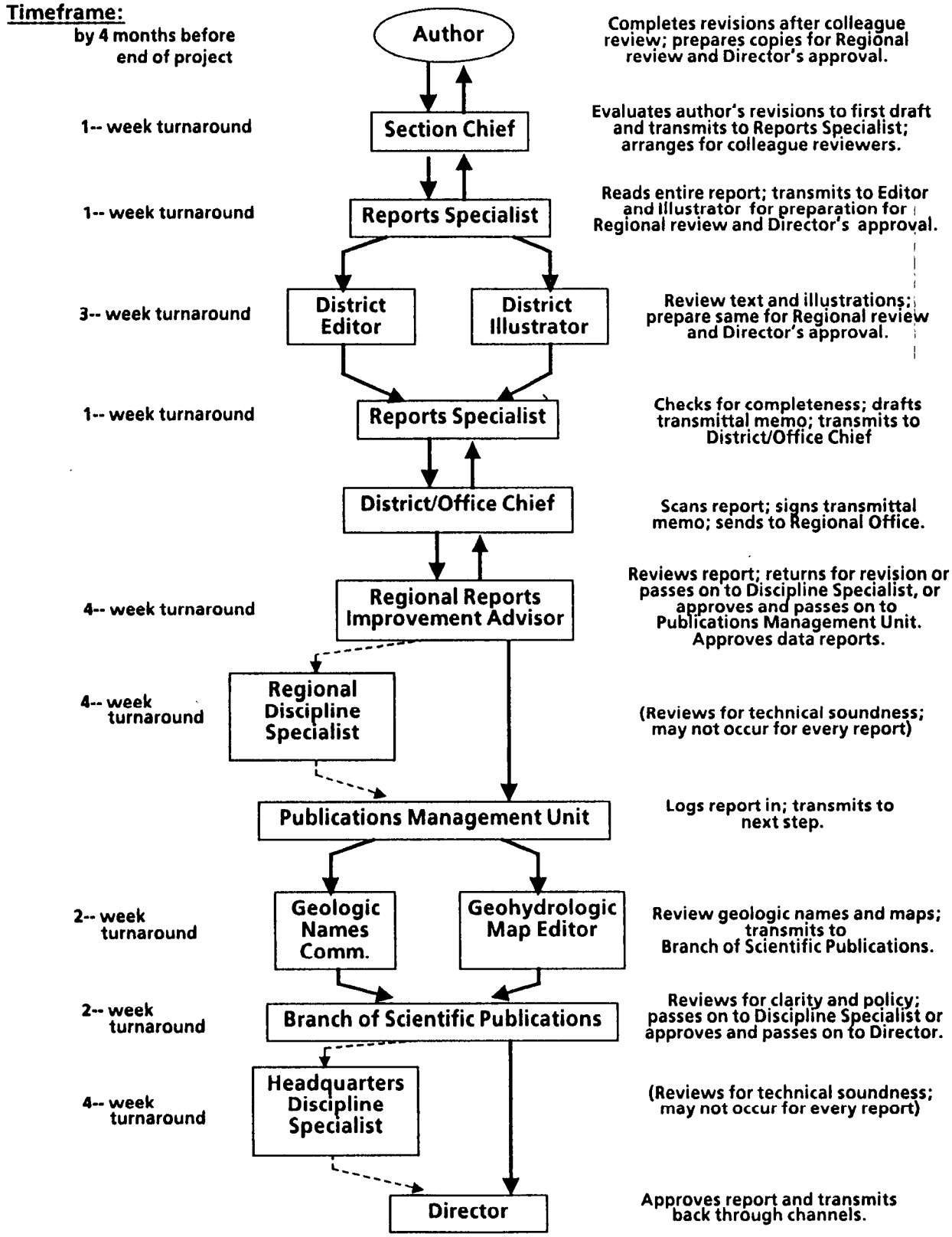
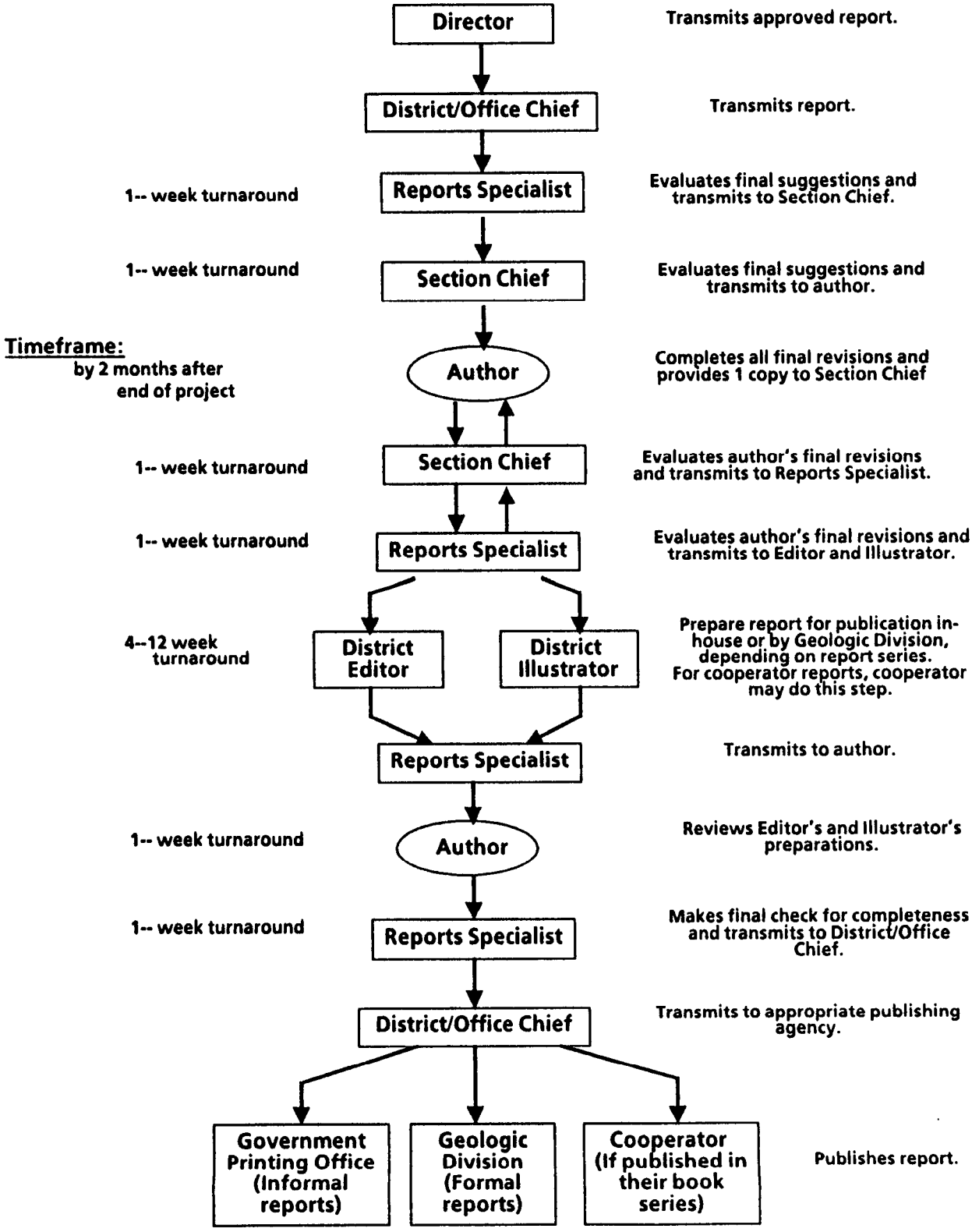


EXHIBIT 7

REPORTS PROCESSING IN MID-ATLANTIC DISTRICT
PUBLICATIONS STEPS



*U.S. G.P.O.:1993-301-077:80032