

W · R · D
PROJECT
AND
REPORT
MANAGEMENT
GUIDE

By Jack H. Green



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INTRODUCTION

In 1879, an act of the U.S. Congress created the U.S. Geological Survey. That act required the Survey to publish the results of its investigations promptly and to make them available to the public. The written report, when published, fulfills that requirement because it documents and disseminates the results of our investigations and provides an archival record of our work.

REQUIREMENT to publish

The need to prepare and publish timely reports has been recognized throughout the Water Resources Division's history, and numerous efforts have been made toward achieving that goal. In 1958, the Temporary Committee on Reports and Publications Problems in the Water Resources Division said, "We believe this awareness [of the need to produce reports] must be emphasized more in the initial planning and scheduling stage of a project and extended through to publication of the final report." Other committees at other times have recommended the same necessity of planning and follow-through. One way to increase productivity and to maintain the high quality of publications is to plan and manage projects in a better manner. Also, there is a need to improve the preparation, planning, and management of reports.

Timely publications

Purpose

The purpose of this "Guide" is to describe a systematic method for Division personnel to plan and manage projects and reports. The instructions given here are time-proven methods (but not panaceas) that have been used by Division personnel to plan and manage projects and reports.

Better planning

Better management

Many of the Division's report problems are due to the failure to plan the report adequately at the start of the project, poor work plans, and ineffectual management. Properly used, this "Guide" will improve the productivity and efficiency of project personnel, which ultimately will improve the timeliness, technical quality, readability, and attractiveness of Division publications. This "Guide" stresses that necessity and outlines a means to accomplish the production of high-quality reports on time.

HIGH-QUALITY REPORTS ON TIME

Scope

This "Guide" summarizes most of the information needed to plan and manage a project; and to plan, prepare, and manage a report (exhibit 1A). The four major Guide sections: "Project Planning," "Project Management," "Report Planning and Preparation," and "Report Management," deal with these topics and are organized roughly in the order that they are dealt with during the course of most projects.

"Project Planning" discusses the order and methods used to create a functioning technical project. It describes the step-by-step mechanics to assist even inexperienced personnel through the entire route from project inception to project approval. This section does not attempt, however, to assist anyone through the complex maneuvers needed to procure adequate funding and personnel.

"Project Management" describes the methods used to keep the project operating efficiently and on time--of course, after having been provided with the necessary funds and personnel. The suggestions, which are in no particular order, are mostly of the how-to-do-it type. By its nature, management is a continuing responsibility for the full term of the project.

"Report Planning and Preparation" shows the technical author how to present the results of a project in a usable and readable publication--on time. As much as possible, the suggestions are sequential--from inception to product. Emphasis is placed on the need for simultaneous planning of the project and the report.

"Report Management" describes the details of the review and the approval processes from the author's "final draft" through publication.

History of the "Guide"

The original version of this "Guide" was developed by John E. Moore largely from lecture notes and handouts that were used in a series of training classes, "Project Planning and Management," that began in 1977. That "Guide" served students and instructors in training sessions that ranged from those emphasizing project planning and management to those emphasizing report planning and management. During the period of that "Guide's" use, several significant changes have occurred. As new examples and ideas were developed or became available, they were added to the "Guide."

STEPS	PRO CH	DIS	REG	HQ	CO- OP
<i>Long-range plan</i>		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
Illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Functioning technical project

Efficient project operation

Readable publication on time

Original guide

In 1982, these changes prompted the revision of the "Guide" into what was commonly called the "Orange Book," by John E. Moore and Edith B. Chase. For several more years, this book was a valuable class reference for trainees and desk reference for former trainees. However, time and progress necessitated yet another change. This current version (1991) is a complete revision of the 1982 "Orange Book." The principal change is in its organization, but significant improvements also have been made by complete rewriting, deletion of unnecessary or repetitive material, addition of new material, and uniform printing of text, and exhibits.

First "Orange Book"

Water Resources Division Mission

The mission of the Water Resources Division is to provide the hydrologic information and understanding needed for the best management and use of the Nation's water resources for the benefit of the people of the United States. This mission generally is accomplished by the following:

Mission statement

1. Systematically collecting data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.
2. Conducting analytical and interpretive water-resources appraisals to describe the occurrence, availability, and physical, chemical, and biological characteristics of surface and ground water and their inter-relationship.
3. Conducting supportive basic and problem-oriented research in hydraulics, hydrology, and related fields of science and engineering to improve the basis for field investigations and measurement techniques and to understand hydrologic systems sufficiently well to predict quantitatively their response to stress, either natural or manmade.
4. Disseminating water data and the results of investigations and research through reports, maps, computerized information services, and other forms of public releases.
5. Coordinating the activities of all Federal agencies in the acquisition of certain water data.
6. Providing scientific and technical assistance in hydrologic fields to State, local, and other Federal agencies, to licensees of the Federal Energy Regulatory Commission, and, on behalf of the U.S. Department of State, to international agencies.

7. Acquiring, developing, and disseminating information on water-related natural hazards such as droughts, floods, landslides, land subsidence, mudflows, and volcanoes.
8. Administering the provisions of the Water Resources Research Act of 1984 which include the State Water Resources Research Institutes and the Research Grants and Contracts programs.
9. Supporting the provisions of the National Environmental Policy Act of 1969 and managing Geological Survey conduct of natural-resources surveys in response to the comprehensive Environmental Response, Compensation, and Liability Act (Superfund Act) of 1980.

Nearly every aspect of this mission is accomplished by individual projects that have been planned and managed in offices throughout the United States. It is important in project planning to review this mission statement before seeking approval for new projects.

Report Production

In 1979, the Survey celebrated its 100th birthday. During those 100 years, the Survey established and maintained an excellent reputation as a scientific organization. This reputation is due to a tradition of providing high-quality, timely, and unbiased reports and maps. It also is based on the release of information to everyone at the same time.

Reputation based on PRODUCTS

In the Survey's second century, the workload is increasing because of a growing need for hydrologic information by an expanding audience. However, the workforce is not keeping pace with our workload due to personnel ceilings and budget limitations. Thus, although the Survey is proud of past accomplishments, productivity must increase and improve.

The Division is the Nation's lead agency in the collection of water data and the dissemination of information on water resources. The Division releases this information through numerous publication series of the U.S. Government, cooperator publications, and technical journals. Since 1896, when the first Water-Supply Paper was published, reports about water resources have increased steadily in type and number. In recent years, the Water-Resources Investigations Report and the Open-File Report series have been the most frequently used for release of Division reports.

Increasing report production

Acknowledgments

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Suggested Reading

Cochran, Wendell, Fenner, Peter, and Hill, Mary, eds., 1984, *Geowriting--A guide to writing, editing, and printing in earth science* (4th ed.): Alexandria, Va., American Geological Institute, 80 p.

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U.S. Geological Survey, 1958, *Suggestions to authors of the reports of the United States Geological Survey* (5th ed.): Washington, D.C., U.S. Government Printing Office, 255 p.

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_____, 1991, *Suggestion to authors of reports of the U.S. Geological Survey* (7th ed.): Washington, D.C., U.S. Government Printing Office, xxxp.

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Major Steps of Project and Report Management

Steps	Project Chief	District	Region	Head-quarters	Coop-erators
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline Illustrations & tables	X	X			
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publications		X		X	X

PROJECT PLANNING

Need for Planning

Successful projects result when project chiefs thoroughly plan what they and the project personnel will be doing before they start to do it. Objectives must be specific. Plans must be well organized. Deadlines must be definite. Funding must be adequate. Difficulties must be anticipated. Otherwise, the project chief, the project personnel, and the project may be at the mercy of circumstances.

Project failures and delinquent projects might be avoided if all problems could be anticipated or if plans could always bend to accommodate various contingencies. By looking ahead, project planners can avoid many problems and sometimes allow for a new course or gain time to arrange plans. A project chief who looks ahead, anticipating events and deciding how to handle them, quickly develops and maintains control of the project.

A good project planner also reviews past accomplishments, failures, data, policies, and limiting factors before starting. This type of review may reveal difficulties and suggest alternative plans.

A systematic approach to project planning can improve the performance of Division employees and the quality of Division reports. Inadequate planning, however, is a frequent cause for technical deficiencies and delayed completion of reports. Project planning and report planning go together and should begin at the same time. A systematic project plan includes consideration of the District's long-range plan, a 5-year plan (exhibit 2A), a sound project proposal (exhibit 2B), a project description (exhibit 2C), a detailed work schedule (exhibit 2D), and a preliminary outline with a detailed annotated outline including a complete list of illustrations and tables (exhibit 2E). Sound planning will enable the project chief to design and complete the project and the report within the allotted time and budget.

All projects that require expenditure of public funds should be sufficiently planned to ensure the most economic use of dollars, time, and personnel. In actuality, time and personnel also can be considered in terms of dollars. A good project plan if followed ensures that everyone concerned is fully aware of what has been accomplished and what is to be expected further. In itself, a plan does not guarantee progress or completion of a project; it does, however, provide a means for project personnel, supervisors, cooperators, and even taxpayers to monitor progress.

Plan thoroughly

Anticipate problems

CAUSES OF PROJECT FAILURE

- Poorly prepared proposals
- Nonspecific objectives and approach
- Cost cutting to make project more attractive.
- Failure to reduce scope of project if full funding not obtained
- Not adhering to sound principles of cost estimations

Review the past

PROJECT-PLANNING STEPS

- Long-range plan
- Project proposal
- Project description
- Detailed work plan
- Report plan
 - Topic outline
 - Annotated outline
 - List of illustrations
 - List of tables

Dollar economy

It may be necessary to precede a proposed investigation of complex water problems, complicated hydrologic systems, or areas that have unevaluated data, for example, with a preliminary study. Preliminary work might consist of a thorough background review, an evaluation of the adequacy or representativeness of existing data, and the development of alternative means to obtain needed information or to achieve the project objectives. Some of these alternative means might require different scope of study and approaches, study elements, duration or intensity of study, personnel needs, and, possibly, costs. The findings of the preliminary study would be used to develop an effective plan for the more comprehensive effort.

Preliminary study

Alternative plans

Project planning has many benefits; here are some of the more prominent ones:

1. Helps the project chief and the Division meet deadlines and honor commitments.
2. Provides a means to measure employee efficiency.
3. Facilitates delegation of work.
4. Helps eliminate duplications and detect omissions.

The usual first step in planning is to define the hydrologic problems, to ascertain the need for hydrologic or water-related information, and to state the precise purpose of the project. The second step is to consider the variability of the water resources in quantity, quality, time, and areal distribution. The third is to list the current water problems and problems that might occur as the result of any changes to the hydrologic system. The fourth is to consider courses of action necessary to investigate alternate solutions to problems. The fifth is to list the kinds of information needed to accomplish the above.

Define problems

Project purpose

Inception

Ideas for good projects can come from many sources-- from the field technicians, scientists, taxpayers, and U.S. Congressmen. Regardless of the point of origin, however, everyone involved may have significant input into the planning, management, and funding of the project. Many ideas begin with a simple "I wonder why..." or "Is it possible that...?"

Project ideas

Simple questions coupled with expanded intellectual curiosity often lead to solutions of old problems or sometimes to a better and (or) quicker way to get needed information. Everyone should be aware of scientific and technical needs that could be fulfilled by a project of any size. At the District, Region, or Headquarters level, projects can be initiated in discussions with cooperators or other Federal agencies or in talks with other Survey personnel. Project ideas also may come from Congress, quickly reach the Department level, and become one or more of the "thrust programs."

District Long-Range Plan

The District long-range plan identifies general scientific and technical program categories (thrusts) supplemented by specific program elements (projects). It includes ongoing and proposed studies for the next 5 to 10 fiscal years. This long-range plan can be used as a short-range planning tool because many of the ongoing projects are expected to continue throughout some of or all the planning period. Changing needs for water information demand that ongoing studies be reassessed annually for their relative priorities in the District program.

Ideally, the plan is updated each year, with the current year planned in detail and plans for subsequent years being more general. The long-range plan usually is prepared by the district chief, or equivalent official, in consultation with senior technical and administrative staff. Most new projects probably will fit into this established plan. Not all new ideas and new needs however, will fit the plan. In such cases, the plan itself may need to be revised to incorporate the new priorities.

In developing the long-range plan, the needs and the missions of the other Federal and State agencies in the water-resources field must be considered. Needs of other Federal agencies are expressed in the Office of Water Data Coordination plan.

Each program category in the District's long-range plan should be defined by a brief statement of its objectives. Although these objectives are not necessarily time-related, time is an important element in all plans and must be an integral part of planning in each category. Of necessity, the timeframe is rather loose near the later years of the plan, especially for categories that are not funded. Program categories encompass a mix of national, regional, and State goals with due consideration of future water problems, priorities, and constraints.

Scientific needs

Technical needs

Current objectives

Future objectives

Combined objectives

Updated objectives

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
Illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Program objectives

Specific current and proposed District projects will provide information to meet the objectives of some of the program categories. These projects should be described briefly, preferably in one sentence. Special attention should be given to planning the program for the following year. This planning must provide a realistic framework to establish funding priorities.

Project objectives

The District should prepare a 5-year plan (exhibit 2A) to unify the objectives and to link the ongoing projects identified in the long-range plan to the proposed projects. Another purpose of the plan is to show an orderly progression of projects and the relations (or possible links) of planned projects. Such an approach should aid in programming alternatives to meet known constraints and unforeseen events.

5-year plan

The District long-range plan always considers national needs, policies, and benefits. Questions concerning these considerations are listed as follows:

National needs

Needs:

1. Does the proposed program and the specific projects within it contribute to the objectives of the priority programs (thrusts) of the Division?
2. Will the program contribute to the solution of urgent local, regional, or national water problems?
3. Does the problem require an immediate solution or is it a potential problem to be considered now and solved in the future?
4. Does the proposed work offer distinct possibilities for solution of a hydrologic problem?

Policies:

1. Does the proposed program fall within the mission of the U.S. Geological Survey?
2. Does the proposed program infringe upon the functions or the responsibilities of other Federal agencies?
3. Does the proposed program duplicate work of other agencies or private institutions? If so, is the duplication justified?
4. Are there any political considerations that would reflect favorably or unfavorably on the Division or the Survey?
5. Does the nature of the work require conclusions (social, aesthetic, and so forth) that would go beyond the concept of hydrologic feasibility?

6. Is the Survey best qualified to do the work?
7. Are the personnel available?

Benefits:

1. Are specific, identifiable, and quantifiable benefits expected to accrue from the proposed work?
2. Will specific data compilations or reports result from the proposed work?
3. Will the anticipated results have transfer value?
4. Can positive results be expected within a reasonable time?

The Ideal Project

The ideal project will have a specific objective, limited duration, adequate staffing, and sufficient funding. As a result, its personnel will produce a high-quality technical report on time (exhibit 2F).

Objectives should point to the solution of a specific problem or the acquisition of specific technical information. If the objectives are clear, then the proper approach can be selected. Otherwise the project personnel may not be employed effectively and the report may fail to satisfy stated needs. Indefinite objectives commonly lead to lost time, irrelevant investigations, and neglect of crucial details.

Time overruns are common in long projects. The ideal project usually lasts no more than 3 years.

Staffing must be continuous. An adequate plan must identify all technical specialties needed and account for their use at the proper time in the project schedule.

Sufficient funding is an absolute necessity for project success. Some project chiefs tend to "sell" projects by cutting costs to make them appear to be more attractive to their supervisors and their cooperators. Cost cutting in the planning stages can lead to cost overruns (obviously), slippage of completion dates, and substandard reports.

The following is a checklist for the necessary ingredients of an ideal project:

Definition

Scientific objectives

Limited duration

Continuous staffing

Sufficient funding

1. Clear and unchanging objectives.
2. Adequate planning.
3. Reasonable goals.
4. Adequate supervision and quality control.
5. Reasonable schedule and budget.
6. Good report outline.
7. On-time, outside services and help.
8. Continuity of staff.
9. Adequate technical capabilities of staff.
10. Sufficient and continuous funding.
11. Good project description.
12. All problems anticipated.

CAUSES OF NON-IDEAL PROJECTS

Unclear project objectives
 Inadequate project planning
 Unreasonable project goals
 Inadequate supervision
 Over-optimistic schedule or budget
 No report outline
 Delays in outside services
 Changes in project staff
 Technical roadblocks
 Funding cuts
 Poor project proposal or description
 Inadequate technical quality control
 Failure to anticipate problems
 Failure to use outside expertise
 Personnel diversion to other tasks

Planning Assistance

Project planning often needs the perspective of other experienced personnel to detect potential problems. A team approach to project planning may be useful. Technical and management assistance can, and should, be requested from Region and Headquarters.

Topics and sources of possible assistance in the planning stage of a project are listed below:

1. Local hydrologic systems;
 District technical specialist.
 Published reports on study area.
2. Political and policy considerations;
 District chief.
3. Background information;
 Colleagues.
 District project supervisor.
 Technical file.
 Published reports.
4. Project objectives;
 District chief.
 Cooperators and concerned agencies.
 Region staff.
5. Technical concerns;
 Technical specialists.
 Research staff.
 On-site consultants.
6. Duration of project;
 District chief.
 District project supervisor.
 Cooperators.
7. Budget planning;
 District administrative officer.
 Region administrative officer.
8. Personnel;
 District chief.

Help is available

9. Design of plan;
 - District program officer.
 - Region program officer.
10. Report planning;
 - District report specialist.
 - Region report specialist.
 - District report staff.
 - Cooperators.

Assistance with the initial phases of a project can help the project chief to:

1. Profit from the experience of others who have successfully planned and managed similar projects.
2. Organize concepts and test ideas.
3. Obtain adequate background information.
4. Understand previous accomplishments, failures, data, policies, and limiting factors.
5. Focus on essentials and to avoid incidentals.
6. Avoid over-organization.

Project-Planning Steps

Preliminary planning of new-project ideas can make it much easier to prepare the formal project proposal and project description. This preliminary planning also will help determine whether the project fits into the Division and the District long-range plans or whether further consideration must be given to project priorities. The eight steps listed below will help solidify and evaluate project ideas.

1. Consider what information is needed to make a quantitative appraisal of the water resources considering time and distribution. Try to answer the questions: Why?, When? Where? How? and How Much?
2. List all current water problems.
3. List the possible and probable hydrologic changes that might result from planned or anticipated changes imposed on the system.
4. Investigate possible solutions to problems that will be compatible with the hydrologic system. This step should provide information on courses of action and anticipated results of those actions.

Assistance benefits

SUMMARY OF DISTRICT PLANNING AND MANAGEMENT PROBLEMS

No work plan with milestone dates
 Not enough time to write and process report
 No annotated outline, list of illustrations, or list of tables early in project
 No consideration of audience, format, or publication series
 No project-management file
 Authors did not prepare project proposal
 Author diverted to other work
 Environment not suitable to report writing
 Author transfers or retires too soon
 Authors do not receive WRD report memos
 Failure to use outline
 Report unit understaffed
 Planned format not followed
 Report not discussed at quarterly reviews
 Author waits too long to start report
 Project chief disagrees with objectives
 Report unit not consulted early enough
 Poor colleague review
 Review guidelines not followed
 Slow response to review comments
 Report sent to colleagues too early
 Author selective on review response
 Inadequate response to review comments
 Lack of trained, experienced writers
 Little time to design attractive reports
 Lack of interim reports
 Premature release of reports
 Poorly written and long reports

5. List the kinds of data, information, and analyses necessary to address all problems, possible changes in the system, and solutions.
6. Reconsider the Why?, When?, Where?, How?, and How Much? on the basis of any newly acquired knowledge. Take care not to propose an intensive investigation unless needed. Develop estimates and quantify as necessary.
7. Select those critical problems that are in most need of study and solution.. These must be the problems (and solutions) that will have the most benefit to the Federal Government and the citizens.
8. Prepare a report outline and plan data collection and analyses with emphasis on solving the selected problems. In the report, acquaint the readers with all the problems, but attempt to solve only those selected. Advise (without recommending) readers that additional work will be needed to solve any remaining problems. Be certain that the project report will add to previous knowledge.

Project Proposal

A project proposal is an offer to accomplish a definite technical objective within a definite period of time for a fixed amount of money (exhibit 2B). It is used to promote the project concept and to seek commitment of funds, personnel, and time to achieve the stated objectives.

Project proposals that originate at the District level or lower always require scrutiny at a higher level to assure technical adequacy, availability of personnel, and funding. Project proposals are of two types--"idea" which is expressed informally in a page or two, and "standard" that follows an established format.

The idea proposal briefly describes the what, why, where, when, how, and how much in a short narration to be reviewed within the District for quick appraisal. This type of proposal should contain enough background hydrologic information so that the reviewing specialists will have adequate information to recommend either approval or disapproval. With approval by the District Chief and specialists, a standard proposal is then prepared for submittal to the Region.

A standard proposal should be clear and concise. It should elaborate on the questions of the District proposal. The proposal should follow a standard format that supplies the reviewers with clear and direct information necessary to evaluate the proposal. Although a standard format is advocated, it does not require mechanical

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
Illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Idea project

What? Why? Where? When? How? How much?

Standard proposal

use of standard elements. Instead, the development of elements requires careful thought, thorough background study, specific problem identification, precise definition of purpose and scope, and flexibility to consider alternatives.

A project proposal always should reflect a genuine need for technical information and identify the uses and the benefits of that information. It usually is (and should be) prepared by the designated project chief and usually with the help and advice of district technical specialists. The proposed cooperator(s) will provide valuable input to the proposal in the preparation stage.

The questions listed below will help the project chief evaluate the proposed project and ideas for the project proposal.

1. Is the hydrologic problem significant and adequately stated?
2. Are the objectives clear?
3. Will accomplished objectives help solve the problem?
4. Are the objectives within the Survey's purview and competence?
5. What prior work has been done?
6. Have all known sources of pertinent data been searched?
7. Have all pertinent studies and reports been collected, examined, and analyzed?
8. Is a sound method available to solve the problem?
9. Is a complete conceptual model of the hydrologic system available?
10. What hydrologic data will be required?
11. Is the approach sufficiently detailed to understand exactly what will be done?
12. Will the approach satisfy the objectives?
13. Is this the best way? Have alternatives been considered?
14. Is the planned staffing adequate?
15. Will the anticipated funding cover all work items?
16. Is the scheduling realistic?
17. Are the planned reports appropriate and adequate?

Standard Project Proposal

The term "standard project proposal" does not mean to imply a rigid format. Rather, the standard proposal will include most of the usual elements listed below and may include others. It must contain all the items necessary to convey complete knowledge of what is proposed. The most usual elements of a standard proposal are as follows:

PROPOSAL CONSIDERATIONS

Problem and need
National and State priorities
Geological Survey and Division missions
Non-consulting nature
Transferability of information
Report audience
Political implications

Proposal elements

- Title**--Choose a title that relates to the purpose, the scope, and that location of the proposed study. Ideally, it should closely resemble the title of the proposed principal report that will result from the study. It should be concise.
- Need**--Explain why the project deserves the proposed commitment of time and money. The need must be greater than simply the need to satisfy intellectual curiosity.
- Purpose and objectives**--Tell exactly why the project is to be conducted. Relate the proposed technical results to the the expressed need for those results. The project must produce results worthy of taxpayer support. State specific goals as concisely as possible. Relate each objective to each Need. This is one of the most important factors in evaluating the project proposal.
- Scope**--Define the technical content (and the limitations) and the areal extent of the study. Be specific so that neither can expand or shrink during the course of the study.
- Approach and methods**--Describe how and by what means the project objectives will be addressed. If old (and proven) approaches and methods are proposed, then a very brief description will suffice. If either is new or untested, then a more detailed description will be needed for evaluation.
- Relation to District long-range plan**--Tell how objectives relate to established District objectives. In some cases, new-project objectives may necessitate reevaluation of established objectives.
- Relation to State and Division Programs**--Tell how objectives relate to established State and Division objectives. Again, new-project objectives may necessitate re-evaluation of established objectives.
- Project Benefits**--Explain exactly how the project will fulfill all or part of those needs. Relate this back to the "need" section.
- Reports**--Describe planned reports. State the probable report titles and author-completion dates. Remember that the author must submit a complete "final report" several months before the end of project funding.
- Work schedule**--Schedule starting and completion dates for each work element. Remember that some elements may be concurrent and that some must be completed before others can be started.
- Personnel**--List personnel needs by speciality, grade, and time. Note that all must be available at the time needed in the work schedule. Note, too, the possible need for outside advisors and consultants.

Budget--Itemize costs for each fiscal year with adequate reference to plans, schedule, and personnel. Be certain that the budget is adequate to cover all planned project activities, use of people, and time needed for each phase of the project. Also consider other costs and activities that do not relate directly to the accomplishment of the project objectives (leave, Headquarters and District technical charges, benefits, and so forth).

Project costs continue to increase because of inflation, increasing technical capabilities, and planned salary increases. These factors must be carefully considered before the final commitment of project costs in the project description. For uniformity, the cost estimates for the proposed project must be stated in the object classes of the Federal Financial System (exhibit 2G).

Review and Approval

A standard project proposal receives a thorough review in the District by the immediate supervisor, the discipline specialists, the report specialist, the computer specialist, the administrative officer, and the District Chief (exhibit 2H). All the questions following should be used to evaluate the proposed project in the District.

1. What is the priority of the project in the District and in the Region?
2. What are the Federal and the State interests in the project?
3. Will the project deal with a part of a major national need?
4. Will the project results contribute to the solution of the problem?
5. Will the project results have worthwhile transfer value?
6. Will the data-collection sites serve multiple needs?
7. Could the study be considered "site specific" and in the realm of the consultant?
8. Can we do the job?
9. Will the project conflict with projects or plans of any other agency?
10. Are there any political concerns related to the project?
11. Is the technical approach sound?
12. Is the project planning and management plan efficient?

Increasing costs

Object-class costs

District review

PROJECT PROPOSAL REVIEW
ROUTING SHEET

Proposal No. _____ Project Proposal No. _____
 Proposal Title _____
 Author/Project Chief _____

This form is to be used for the routing of all project proposals before formal transmittal of the proposal to the cooperator or to the Region

Section Chief/Supervisor _____	Comments _____
(signature)	
Date _____	
Discipline Specialist _____	Comments _____
(signature)	
Date _____	
Discipline Specialist _____	Comments _____
(signature)	
Date _____	
Report Specialist _____	Comments _____
(signature)	
Date _____	
Administrative Officer _____	Comments _____
(signature)	
Date _____	
Assistant District Chief _____	Comments _____
(signature)	
Date _____	
District Chief _____	Comments _____
(signature)	
Date _____	
*Conference of above _____	Recommendation _____
Date _____	
*Optional _____	

13. Will the results of the project justify the cost?
14. Who will finance the project?
15. Do the proposed funds cover all facets of the project, including preparation, review, and publication and printing of the report?
16. Can personnel needs be met?
17. Is additional training needed?
18. Will a personnel ceiling affect personnel availability?
19. Can the project be conducted by personnel other than those of the Survey?
20. Can personnel needs be reduced by use of outside personnel?

Two documents should accompany the project proposal through District review. The review sheet should be used to record the comments of each person in the review process. A proposal "cover sheet" (exhibit 2I) gives the reviewers a quick summary of the project title, the project chief, the proposal dates, the project number, starting and completion dates, and the funding by source and year. After approval by the District Chief, the proposal is sent to the Region for review and approval.

Review in the Region is very similar to that in the District. Many of the same questions are asked, and, others may be added. The Region may, of course, return the proposal to the District for resolution of any unanswered or inadequately answered questions before approval. The following general considerations probably will be a part of all proposal reviews at the Region level:

1. Is the project within the Survey mission?
2. Will the project contribute to high-priority programs of the Division, the Survey, and the Department?
3. Will the project help solve urgent water problems?
4. Are personnel available?
5. Will the project results have transfer value?
6. Has the principal audience been identified?
7. Are the planned reports appropriate?
8. Will the project duplicate the work of others?
9. Will the project encroach on the "turf" of others?
10. Are there political considerations?
11. Should we undertake the project?

After approval by the Region, a copy of the approved proposal is sent to the cooperator for final review. The cooperator usually is involved with planning and preparation of the proposal but is not brought into the review process until after Region approval. At this time, Districts should review ongoing cooperative and other

PROJECT PROPOSAL COVER SHEET

WRD Region: _____	Proposal no. _____
District/Project office _____	Initial date _____
Project title _____	Revised date _____
_____	Project no. _____
MIS short title (type of investigation, location, 35 sp. maximum) _____	Begin date (mo/yr): _____
_____	End date (mo/yr) _____
Project chief: _____	Research, or resource appraisal _____

ESTIMATED PROJECT FUNDING

	Firm	Probable	Possible
CUSTOMER NAME(S)/NUMBER(S) _____			
Fiscal year _____			
OFA/FED _____	\$ _____	\$ _____	\$ _____
COOP repay _____	\$ _____	\$ _____	\$ _____
COOP direct _____	_____	_____	_____
COOP unmatched _____	_____	_____	_____
COOP total: _____	\$ _____	\$ _____	\$ _____
FMF _____	\$ _____	\$ _____	\$ _____
Total for FY _____	\$ _____	\$ _____	\$ _____

REMARKS:

Author: _____	Date _____
District endorsement _____	Date _____
Region endorsement _____	Date _____
Approved by: _____	Date _____

Region review

Cooperator review

Federal agency programs to determine any need to modify, expand, reduce, or terminate other activities.

Project Description

The first step after Region approval (and if funding is assured) is the preparation of a project description. This description puts the project into the Management Information System (MIS) and gives the project official status. The project chief is responsible for the preparation of the original description, revisions of the description in the event the project has major changes before completion, and annual progress updates to the Description (exhibit 2C).

Information from the Project Description forms is sent directly to the Region Office by District personnel, by using District computer terminals. The information is entered through MUPPUT (MIS Update Utility), (exhibit 2J), which is a system of programs now installed on each District and Region PRIME. MUPPUT looks at project status, determines what items are required, and insists that they be entered correctly. A significant benefit of MUPPUT is more accurate input and storage of data without repeated proofreading and the consequent loss of time. After approval by the Region and Headquarters, the description is entered into the Headquarters MIS data files.

Publicity

Areal-type projects often can benefit from local publicity in and near the project area. An informed public generally appreciates interest in its area and usually will support most project efforts. News releases describing the project can be sent to newspapers that have subscribers in the project area. The cooperating agency may want to release this news through their own customary channels.

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
Illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

MUPPUT

Public support

Summary of DO's.....and DON'T's

Propose valid ideas for projects	Disregard project possibilities
Plan project thoroughly	Let project plans evolve
Be systematic and businesslike	Plan to plan later
Review District long-range plan	Neglect previous commitments
Relate project to ongoing program	Be a loner
Assure adequate supervision	Ignore experience of others
Review the past	Disregard background and history
Look ahead--anticipate problems	Just hope for the best
Review Survey and Division policies	Overlook absolute necessities
Have a definite project objective	Study the Universe
Set reasonable goals	Overextend expectations
Be aware of scientific needs	Fail to recognize worthwhile projects
Identify project benefits	Propose intellectual exercises
Prepare adequate project proposal	Let the boss do it
Review available data	Hope for data around someplace
Plan finite project duration	Utilize geologic time
Staff adequately for needs	Promise results without adequate personnel
Secure adequate and assured funding	Cut costs to sell project
Schedule work precisely	Impose impossible time constraints
Establish definite deadlines	Hope things are on time
Consider alternative approaches and methods	Be inflexible
Build flexibility into plan	Engrave plans in stone
Plan continuous staffing	Allow revolving-door traffic
Limit technical scope	Pursue intellectual freedom
Limit geographic areas	Roam around interesting places
Consider outside services	Keep it in the family
Make best use of funds	Spend lavishly - hope for more
Ask for technical assistance	Do it alone
Plan report early in project	Delay outlines and illustrations lists
Prepare report outline	Put it off until later
Prepare annotated outline	Let the administrative officer do it
Prepare adequate project description	Overlook public support
Consider local publicity	

PLAN FOR ACTIVE AND PROPOSED HYDROLOGIC STUDIES

Study Element: Active 
 Proposed 

1. HYDROLOGIC DATA BASE


























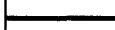















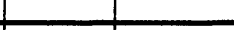

















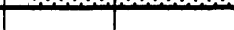








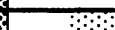






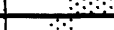


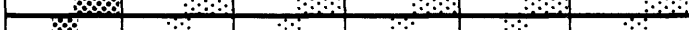











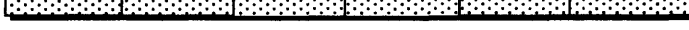





- SR 00-001 Surface-water records-C
- SR 00-002 Ground-water records-C
- SR 00-003 Quality-water records-C
- SR 70-068 Small streams - DOT
- SR 74-075 Water Use - SEGS
- SR 75-079 Remote data acquisition-DNR
- Proposed Network evaluation - DNR

II. INFORMATION ON FLOOD HAZARD

- SR 73-006 Flood-Insurance Studies-HUD
- SR 74-076 Regional Flood Frequency-DOT
- SR 76-091 Urban Effect on Flooding-DNR
- Proposed Analysis of Large Floods-DNR
- Proposed Floods & Water Quality
- Proposed Modeling-SEPC Basin

III. IMPROVED COMMUNICATIONS

- SR 71-072 Annual Summary-DNR
- SR 76-097 Lay Reader Rpt-SRGS
- Proposed Annual Program Report
- Proposed Annual Program Conference
- Proposed Information Center

Current Year	19XX	19XX	19XX	19XX	19XX
					
					
					
					
					
					
					
					
					
					
					
					
					
					
					
					

COOPERATION: C = Combined Agencies NWS = National Weather Service
 DOT = Dept of Transportation SCS = Soil Conservation Service
 DNR = Dept of Natural Resources SEGS = Southeastern Geological Survey
 HUD = Housing & Urban Development SEPC = Southeastern Planning Commission

Sample Project Proposal

WRD Region: Northeastern	Proposal No. RI 88a
District or Project Office: New England Subdistrict Office: Rhode Island	Initial ____ Date: June 10, 1989
Project Title: Development Alternatives in the Usquepaug-Queen Ground-Water Reservoir, Rhode Island	Revised ____ Date: Project No.:
Short Title: Usquepaug-Queen Development	Begin date: 10/87 End date: 9/90
Project Chief: Hydrologist, GS 12	Research ____ Resource Appraisal ____

Source of funds:	Expenditures by fiscal year:	
Fed ____ Coop <u>X</u> OFA ____ Other ____		
	<u>Total</u>	<u>Direct</u>
	1988	\$ 57,000
Cooperating Agency:	1989	137,530
Rhode Island Water Resources Board	1990	144,400
Customer No(s): RI-03	1991	
	1992	_____
	Total	\$338,930

Location and size of area: **Exeter, Richmond, South Kingston, and West Greenwich, In
Washington County, Rhode Island (36 square miles)**

Proposed by: David C. Dickerman and Herbert E. Johnston	June 10, 1987
Endorsed by:	August 27, 1989
Approved by:	1987

NEW ENGLAND DISTRICT (RHODE ISLAND) PROJECT PROPOSAL

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 years 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 lithologic 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 probably 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. Collect and analyze additional geohydrologic data needed to develop a model of the Usquepaug-Queen ground-water reservoir.
2. Construct and calibrate a two-dimensional ground-water-flow model.
3. Use the model 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 data, 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).

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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 three 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 by 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 sampled 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 1.-Summary of proposed water-quality analyses for inorganic constituents

Lab code	WATSTORE code	Constituent
0012	00915	CALCIUM, DISSOLVED
0027	70300	ROE, DISSOLVED AT 180°C
0031	00950	FLUORIDE, DISSOLVED
0040	00925	MAGNESIUM, DISSOLVED
0041	01055	MANGANESE, TOTAL
0042	01056	MANGANESE, DISSOLVED
0054	00935	POTASSIUM, DISSOLVED
0056	00955	SILICA, DISSOLVED
0059	00930	SODIUM, DISSOLVED
0068	00403	PH (LABORATORY)
0069	90095	SPECIFIC CONDUCTANCE (LAB)
0070	90410	ALKALINITY, TOTAL AS CaCO_3 (LAB)
0128	00666	PHOSPHORUS, DISSOLVED
0172	01046	IRON, DISSOLVED
0189	01045	IRON, TOTAL
0228	00631	NITROGEN, DISSOLVED NITRITE + NITRATE
1200	00945	SULFATE, DISSOLVED
1231	00940	CHLORIDE, DISSOLVED

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

Lab code	WATSTORE code	Constituent
1287	34030	BENZENE, TOTAL
1288	32104	BROMOFORM, TOTAL
1289	32102	CARBON TETRACHLORIDE, TOTAL
1290	34301	CHLOROBENZENE, TOTAL
1291	32105	CHLORODIBROMOMETHANE, TOTAL
1292	34311	CHLOROETHANE, TOTAL
1293	34576	2-CL-ETHYLVINYL-ETHER, TOTAL
1294	32106	CHLOROFORM, TOTAL
1295	32101	DICHLOROBROMOMETHANE, TOTAL
1296	34668	DICHLORODIFLUOROMETHANE, TOTAL
1297	34496	1,1-DICHLOROETHANE, TOTAL
1298	32103	1,2-DICHLOROETHANE, TOTAL
1299	34501	1,1-DICHLORETHYLENE, TOTAL
1300	34546	1,2-TRANS-DICHLOROETHYLENE, TOTAL
1301	34541	1,2-DICHLOROPROPANE, TOTAL
1302	34561	1,3-DICHLOROPROPENE, TOTAL
1303	34371	ETHYLBENZENE, TOTAL
1304	34413	METHYLBROMIDE, TOTAL
1305	34423	METHYLENE CHLORIDE, TOTAL
1306	34516	1,1,2,2-TETRACHLOROETHANE, TOTAL
1307	34475	TETRACHLOROETHYLENE, TOTAL
1308	34010	TOLUENE, TOTAL
1309	34506	1,1,1-TRICHLOROETHANE, TOTAL
1310	34511	1,1,2-TRICHLOROETHANE, TOTAL
1311	39180	TRICHLOROETHYLENE, TOTAL
1312	34488	TRICHLOROFLUOROMETHANE, TOTAL
1313	39175	VINYL CHLORIDE, TOTAL
1314	34536	1,2-DICHLOROBENZENE, TOTAL
1315	34566	1,3-DICHLOROBENZENE, TOTAL
1316	34571	1,4-DICHLOROBENZENE, TOTAL
1317	39082	1,2-DIBROMOETHANE, TOTAL
1318	34418	CHLOROMETHANE, TOTAL
1326	34704	CIS-1,2-DICHLOROPROPENE, TOTAL
1327	34699	TRANS-1,2-DICHLOROPROPENE, TOTAL
1328	77128	STYRENE, TOTAL
1330	81551	XYLENE, TOTAL

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Table 3.-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
1335	00000C	OXAMYL
1337	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:

	<u>FY 88</u>	<u>FY 89</u>	<u>FY 90</u>
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 (GG 7) are available.

RI 88A / September 1, 1987 / DCD HEJ

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

	<u>FY 88</u>	<u>FY 89</u>	<u>FY 90</u>
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	<u>5,700</u>	<u>13,750</u>	<u>14,440</u>
TOTAL	\$ 57,000	\$137,530	\$144,400

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

SELECTED REFERENCES:

- Allen, W. B., Hahn, G. W., and Brackley, R. A., 1966, Availability of ground water, upper Pawcatuck River basin, Rhode Island: U.S. Geological Survey Water-Supply Paper 1821, 66p.
- Allen, W. B., Hahn, G. W., and Tuttle, C. R., 1963, Geohydrological data for the upper Pawcatuck River basin, Rhode Island: Rhode Island Water Resources Coordinating Board Geological Bulletin No. 13, 68 p.
- Baier, J. H., and Moran, D., 1981, Status report on aldicarb contamination of ground water as of September 1981: Suffolk County Department of Health Services, Bureau of Water Resources.
- Baier, J. H., and Rykbost, K. A., 1976, The contribution of fertilizer to the ground water of Long Island: Ground Water, v.16, no. 6, p. 439-447.
- Bierschenk, W. H., 1956, Ground-water resources of the Kingston quadrangle, Rhode Island: Rhode Island Development Council Geological Bulletin No. 9. 60 p.
- Dickerman, D.C., and Ozilgin, M. M., 1985, Hydrogeology, water quality, and ground-water alternatives in the Beaver-Pasquisset ground-water reservoir: U.S. Geological Survey Water-Resources Investigations Report 85-4190, 104 p.
- Johnston, H. E., and Dickerman, D. C., 1985, Hydrology, water quality, and ground-water development alternatives in the chipuxet ground-water reservoir, Rhode Island: U.S. Geological Survey Water-Resources Investigations Report 84-4254, 100 p.
- Kaye, C. A., 1960, Surficial geology of the Kingston quadrangle, Rhode Island: U.S. Geological Survey Geological Bulletin 1071-I, p. 341-396

RI 88a/ September 1, 1987/ DCD HEJ

McDonald, M. G., and Harbaugh, A. W., 1984, A modular three-dimensional finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 83-875, 528 p.

Moore, G. E., Jr., 1964, Bedrock geology of the Kingston quadrangle, Rhode Island: U.S. Geological Survey Bulletin 1158-E, 21 p.

Power, W. R., Jr., 1957, Surficial geology of the Slocum quadrangle, Rhode Island: U.S. Geological Survey Geologic Quadrangle Map GQ-106.

_____ 1959, Bedrock geology of the Slocum quadrangle, Rhode Island: U.S. Geological Survey Geologic Quadrangle Map GQ-114.

Riggs, H. C., 1969, Mean streamflow from discharge measurements: Bulletin of the International Association of Scientific Hydrology, v. XIV, no. 4, p. 95-110.

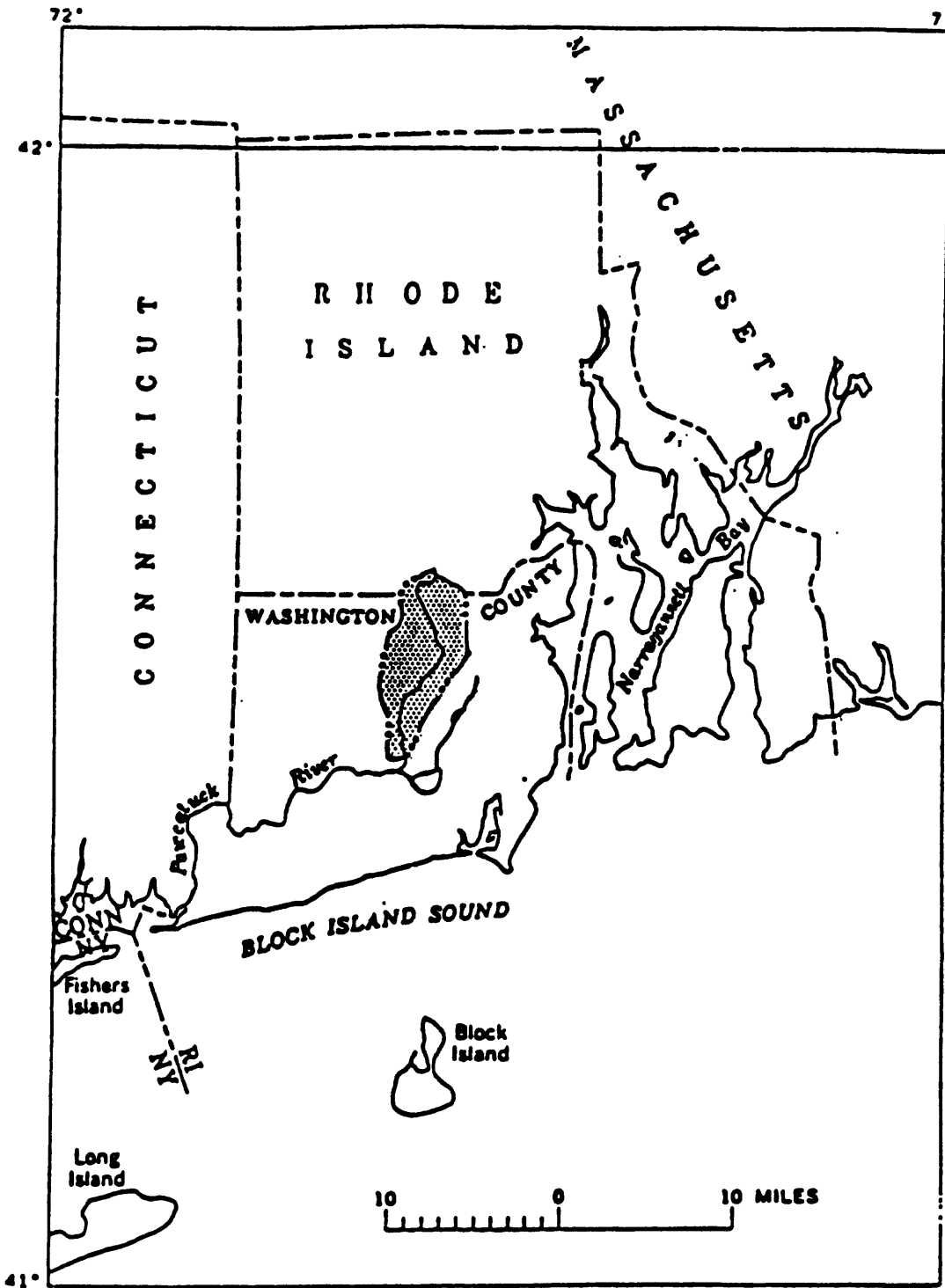


Figure 1.--Proposed Usquepaug-Queen study area.

RI 88a / June 12, 1987 / DCD HEJ

The information on this page has been entered via Datapoint TSO Date _____

USGS—WRD
Form 9-1686-A
Rev. April 1981

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Project no. _____

Revision date _____ / _____ / _____
yr mo day

Proposal no. _____

PROJECT DESCRIPTION - PART A

(1) Project number **A1A** ◀ - ▶
State or region FY Serial no

(1a) Begins **B6** ◀ / ▶ Ends **B7** ◀ / ▶
yr mo yr mo

Former Project no. _____ (if applicable) (1b) (if or MIS use only) **A1** ◀ - ▶ **B8** ◀ ▶

(2) Project title **A2** ◀ _____ ▶

(2a) Short title **A2A** ◀ _____ ▶
(Do not exceed 35 spaces, use standard abbreviations)

(3) Region (if or MIS use only) **A3** ◀ ▶
NR 4 SR 5 CR 6 WR 7 WD 0

(4) Office (Project chief's headquarters) **A4** ◀ _____ ▶
Street

A4A ◀ _____ , ▶ **A4B** ◀ ▶
City State (Alpha code) Zip code

(5) Problem **B1** ◀ _____ ▶

(6) Objectives **B2** ◀ _____ ▶

(7) Approach **B3** ◀ _____ ▶

(8) Project chief **C1** ◀ _____ , _____ ▶
Last name First name Initial

F = WRD Codes
C = State
O = Other Federal Agency
G = Other Div. of USGS

(8a) Soc. Sec. No. **C3** ◀ ▶

(8b) Employer **C4** ◀ ▶

Approval date _____ / _____ / _____
yr mo day

Approved by (Signature) _____

USGS-WRD
Form 9-1686-B
Rev. July 1975

PROJECT DESCRIPTION - PART B

Project no. _____

Revision date / /
 yr mo day

(9) Manpower narrative G ◀

(10) Type of project - Circle appropriate code (one only).

OA1 Research OB1 Areal appraisal OB2 Collection basic records OC1 Administrative

(10a) (For MIS use only) Q ◀

(11) Field of study - Give percentage of project funds to be expended on each major category listed below. Select from LIST C as many fields of study as appropriate. Place codes in boxes.

General hydrology

CE ◀ [] [] [] % ▶

Surface water

CB ◀ [] [] [] % ▶

Ground water

CC ◀ [] [] [] % ▶

Water quality

CD ◀ [] [] [] % ▶

[C] []

[C] []

[C] []

[C] []

[C] [] ◀

Other (Specify) _____ ▶

List single most important code C ◀ [C] [] ▶

(12) WRD and COWWR categories - Select one category from LIST D and record code in box provided. Write title of item next to code in space provided.

K ◀ [] [] [] ▶

Name of category _____

(12a) (For MIS use only) K [] [] [] []

(13) Index terms - Select up to 10 terms that categorize this project (the Water Resources Thesaurus may be used as a reference).

TM ◀ _____

(14) Use to be made of data acquired - Select from LIST F the primary and secondary uses to be made of the data acquired. Place codes in boxes.

V [] [] ◀ Primary ▶
Code

Use _____

V [] [] ◀ Secondary ▶
Code

Use _____

(14a) (For MIS use only) V ◀

(15) General remarks RR ◀

USGS - WRD
Form 9-1686 E
Rev. July 1975

PROJECT DESCRIPTION - PART E

Project no.
1 2 4 9

Revision date _____
yr mo day

U.S. GOVERNMENT PRINTING OFFICE 16-53803-1

(16) Location **B1A** ◀

(17) Total area in square miles **ZA** ◀ ▶

(18) Areal extent of project (circle only one)

- U01** Project headquarters (21&22)
- U03** Site - less than county (19-22)
- U04** Countywide (19-22)
- U05** Multicounty (19-22)
- U08** Statewide (19)
- U07** Multistate (19-22)
- U08** WRC region (20)
- U11** International (see instructions)

For items 19-22 below, complete only those items that are indicated in the parentheses following the description of the U__ code that was circled in item 18

(For MIS use only) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	(circle only one descriptor)	NEW 15	UPDATE 15
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(19) State (s), with % of project in each

	State	%
S		
S		
S		
S		
S		
S		

11 13 22

(20) Hydrologic unit (s), with % of project in each WRC region

	Region	Subregion	Accounting	Catalog	%
H					
H					
H					
H					
H					
H					
H					
H					

11 13 22

(21) Congressional districts, with % of project in each

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(22) Counties within (or partially within) project area

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UBGS-WRD
 Form 9-1686-F
 Rev. July 1975

PROJECT DESCRIPTION - PART F

Account no. _____

ESTIMATED FUTURE FUNDING

Project no. _____

(36) Funding-Fill in the following table for each source of funds. Customer numbers (agency codes) are given in U.S.G.S. Customer number equivalence table.

HEADER CARD (Punch only one card for each project)	TYPE CODES
<p>For MIS use only</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 60px; height: 20px; display: flex;"> 1 2 4 9 </div> <div style="text-align: center;"> <p>Current FY</p> <div style="border: 1px solid black; width: 20px; height: 15px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">11</div> </div> <div style="text-align: center;"> <p>Preparation Date</p> <div style="border: 1px solid black; width: 100px; height: 20px; display: flex;"> <div style="width: 20px; border-right: 1px solid black; display: flex; align-items: center; justify-content: center;">73 <small>yr</small></div> <div style="width: 40px; border-right: 1px solid black; display: flex; align-items: center; justify-content: center;">/ /</div> <div style="width: 20px; display: flex; align-items: center; justify-content: center;">80 <small>day</small></div> </div> </div> </div>	<p>F = Federal (Regular) Ø = ØFAØ (Other than Interior)</p> <p>R = Coop (Reimb.) I = ØFAI (Within Interior)</p> <p>D = Direct P = FPCL</p> <p>U = Unmatched G = USGS (Other than WRD)</p> <p>C = Federal (Coop) S = Total Funds</p>

DATA CARDS (Duplicate columns 1-9 for each card)

Type Code	Customer No	Next Year FY	2nd Year FY	3rd Year FY	Customer Name
11	13 16	48 54	56 62	64 70	
S	FUND				Total Funds
11	13 16	48 54	56 62	64 70	

U.S. Government Printing Office: 1983-403-561

UBGS-WRD
Form 9-1686-G
Rev. April 1981

The information on this page has been entered via Datapoint TSO Date _____

PROJECT DESCRIPTION - PART G

Project no. _____

(23) **GDATE** ◀ [] [] [] / [] [] [] / [] [] [] ▶
yr mo day

(23a) **GFDATE** ◀ [] [] ▶
FY

(24) Progress and significant results **PS** ◀

 (24a) Brief statement of progress **S** ◀

 (for CBR projects) ◀ Active sites: continuous, other ▶
 (25) Plans for next year **PL** ◀

 (25a) Notice of project status (Circle one and give date)
 (Needed) (Planned) (Completed) (Complete except report) (Suspended) (Terminated) _____ ◀ [] [] [] / [] [] [] ▶
yr mo day

(25b) Reason for termination or suspension **TS** ◀

(26) Planned reports

	Code	Year	Pages
PLN [] [] []	◀ [] []	[] []	[] [] [] []
PLN [] [] []	◀ [] []	[] []	[] [] [] []
PLN [] [] []	◀ [] []	[] []	[] [] [] []
PLN [] [] []	◀ [] []	[] []	[] [] [] []

(27) Manpower narrative **G** ◀

 (28) General remarks **RR** ◀

USQUEPAUG-QUEEN WORK PLAN

Work Unit	1ST YEAR		2ND YEAR		3RD YEAR	
	OND	JFMAMJJAS	OND	JFMAMJJAS	OND	JFMAMJJAS
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	

**SAMPLE REPORT OUTLINE:
HYDROGEOLOGY AND WATER CHEMISTRY IN THE
GRACES QUARTERS AREA OF ABERDEEN
PROVING GROUND, MARYLAND**

by F. J. Tenbus and J. D. Blomquist

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CONVERSION FACTORS, VERTICAL DATUM,
ACRONYMS AND ABBREVIATIONS

HYDROGEOLOGY AND WATER CHEMISTRY IN THE GRACES QUARTERS AREA OF ABERDEEN PROVING GROUND, MARYLAND

ABSTRACT

INTRODUCTION

The Edgewood area of the Aberdeen Proving Ground (APG), Maryland, has been used to develop, manufacture, and test military-related chemicals and munitions since World War I. Some of the munitions and chemical agents include smoke munitions (WP), nerve agent (GB, VX), blister agent (HD, lewisite), vomiting agent (DM), tear agent (CN, CS), and incapacitating agent (BZ). An environmental survey of the Edgewood Area was conducted by the U.S. Army toxic and Hazardous Materials Agency (USATHAMA) during 1977 and 1978 to determine the effect of past manufacturing and testing operations on the environment (Nemeth and other, 1983). The report from this environmental survey identified several areas that were contaminated to some degree, including Canal Creek, O-Field, J-Field, Carroll Island, and Graces Quarters (fig. 1).

Figure 1.--Near here

In 1986, the U.S. Environmental Protection Agency (USEPA) issued a Resource Conservation and Recovery Act (RCRA) permit (MD3-21-002-1355) to address solid-waste management units (SWMU's) in the Edgewood area of APG. Solid waste management units are those sites which contain hazardous materials and thus have a potential to affect the environment. the RCRA permit required that a hydrogeologic assessment (HGA) be performed at each of the sites that contained SWMU's. Graces quarters was identified as one of the Edgewood area sites that contain SWMU's.

In October 1986, at the request of the Environmental Management Office of APG, U.S. Department of Defense, the U.S. Geological Survey began a study to collect the data needed for an HGA of Graces Quarters. the purpose of the HGA was to collect hydrologic data in the vicinity of SWMU's in order to provide a framework for characterizing any release and movement of contaminants. The HGA was also supposed to provide information about chemical-agent test sites, including the type of chemical agent tested and the period in which testing took place.

In 1988, the RCRA permit was renewed. The requirements for RCRA had changed, and the HGA became the RFI, or RCRA Facility Investigation. The RFI had a broader scope than the HGA, but much of the same data was still necessary. The data collection requirements included the establishment of an observation well network to determine the directions and rates of ground-water movement, and the concentrations and spatial distributions of certain constituents and indicator compounds in the ground water. These data were necessary for the development of predictive systems to assess the effects of any remediation efforts that may be needed. Data collection also included a surface-water sampling network to provide information on the concentrations and spatial distributions of constituents and indicator compounds in this medium.

In February 1990, the Edgewood Area of APG was placed on the USEPA National Priority List. Since that time, the Edgewood Area studies have been under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidelines. The data and reports from this study will be used to fulfill some of the CERCLA requirements for the remedial investigation at Graces Quarters.

Purpose and Scope

The purpose of this report is to (1) present the location of disposal sites and test areas, and describe the extent of historical activities at these sites; (2) describe the hydrogeologic system of Graces quarters, including the major aquifers, confining units, and flow paths; (3) describe the inorganic and organic constituents of the ground water and surface water in the Graces quarters area; and (4) make preliminary inferences as to the source of the organic and inorganic constituents in the water.

Three test areas and four disposal sites on Graces Quarters have been identified as potential sources of environmental contamination. The hydrogeologic assessment was designed primarily to address chemical releases from these potential sources, and to describe and evaluate potential migration pathways from the test areas and disposal sites.

The test areas and disposal sites were identified from aerial photos, field investigations, and existing literature. Locations and dimensions of burial pits within the disposal sites were determined using magnetometer surveys.

The occurrence and flow of surface water on Graces Quarters was noted during field visits. Soils were examined by comparing data from the county soil survey (Reybold and Matthews, 1976) with field observations and borehole logs. The lithology and hydrogeology of the aquifers and confining units was examined through the use of test holes and observation wells.

Five test holes (140-180 feet deep) were drilled on Graces quarters for lithologic correlations. Twenty-six observation wells were drilled and were used for lithologic correlations, aquifer tests, water-level measurement, and ground-water sampling. Lithologic correlations were done from split-spoon samples collected at discrete intervals in the test holes, from continuous cores collected during the drilling of the observation wells, and from geophysical logs collected during the drilling of both types of boreholes. Slug tests were performed on 15 of the observation wells in the surficial and confined aquifers to determine aquifer properties. Water levels in all of the wells were measured once per month from March 1988 through March 1989, and again in June and August 1989. Automatic water-level recorders were installed on 11 wells to record water levels continuously at 15-min (minute) intervals.

The observation-well network was designed to intercept potential contaminants from the SWMU's and test areas. Observation wells were placed near the test areas and disposal sites to determine if these sites were releasing chemicals into the environment. Electromagnetic induction (EM) data were collected to assist in well placement. Five pre-existing wells from an earlier study (Nemeth and others, 1983) were also used in this study. Two rounds of sampling for ground water and surface water were done, to compare the wet season (winter and spring) with the dry season (summer and fall). Ground-water samples were collected for chemical analysis from all of the new and pre-existing wells. Surface-water samples were collected from seven sites in and around the test areas and disposal sites, three sites in the Gunpowder River, and one site in Dundee Creek.

Previous Investigations

- Nemeth and others, 1983, Environmental Survey of the Edgewood Area of APG.
- Nemeth, 1989, RCRA Facility Assessment for the Edgewood Area of APG.

Acknowledgments

- Gary Nemeth, U.S. Army Environmental Hygiene Agency.
- U.S. Army Technical Escort Unit.
- The U.S. Army Corps of Engineers.
- Cindy couch and Don Green, U.S. Army directorate of Safety, Health, and Environment.
- Eric Kauffman and Ira May, U.S. Army toxic and Hazardous Materials Agency.

Description of Study Area

Physiographic Setting

- Location of APG and Graces Quarters.
- Climate, precipitation, topography and land cover in the area.
- Surface water in the Graces Quarters area.
- Regional geology (very general).
- Human activity (including water use) in the Graces Quarters area.

Figure 2
 Table 1

Location and Historical Use of Solid Waste Management Units and Chemical-Agent Test Areas

- Historical summary of testing and disposal practices on Graces Quarters.
- Location and approximate size of test areas and disposal sites.
- Methods of testing, chemicals used, amounts, years in which testing was done.

Figure 3
 ***Table 2 ***

Methodology

Geophysics

- Use of EM to help determine locations for observation wells.
- Use of gamma logs and electric logs in selecting screen depths for wells and in filling in the gaps in lithologic logs.
- Use of magnetometers for safety and for definition of burial pits.

Figure 4

Drilling

- Drilling of test holes for preliminary lithologic correlations.
- Use of mud-rotary methods for drilling test holes.
- Use of remote drilling to reduce the danger from unexploded ordnance.
- Location of observation well sites and well clusters.
- Use of hollow-stem augers for drilling observation wells.
- Lithologic core sampling.

Figure 5

Water-Quality Sampling

- General sampling strategy.
- Frequency of sampling.
- Location of surface-water sampling sites.
- Sampling methods (purging the well and use of bailers for ground water; grab samples and peristaltic pumps for surface water; order of samples taken).
- Chemical analyses.

Figure 6

Hydrologic Testing

- Slug tests to determine aquifer properties.
- Use of lithologic samples to estimate hydraulic conductivity (Shelby tubes, split-spoon samples).

HYDROGEOLOGY

Regional Setting

- Discussion of the hydrogeologic units present in the Graces Quarters area, including lithologic information and the economic importance of the formations.

Local Hydrologic System

- Definition of the components of the hydrologic system, including surface water, soils, and the aquifers and confining unit.
- Description of factors that affect each component of the system

Surface water

- Occurrence and flow of surface water on Graces Quarters.

Figure 7

Soils

- Definition of soil categorical terms and hydrological terms.
- Sources of soil data for this study.

Lithology and Distribution

- Permeability and drainage properties of the soils.
- Comparison of SCS soil map to borehole information at each SWMU and test area.

Aquifers and Confining Units

- Definition of units and the uncertainties involved in the definitions.
- Classification of the spatial variation of the units within the study area.

Figure 9
Figure 10
Figure 11
Figure 12
Figure 13

Surficial Aquifer

- Characteristics of the surficial aquifer.

Lithology and thickness

- Thickness and orientation of strata in the aquifer.
- Lithologic descriptions of aquifer material and spatial variations of properties such as aquifer thickness, grain size, and mineralogy.

Figure 14

Head distribution and flow direction

- Discussion of areal head distribution during spring and fall, 1988.
- Discussion of directions of ground-water flow and magnitude of hydraulic gradient.

Figure 15

Figure 16

Head fluctuations

- Discussion of ground-water head fluctuations in the surficial aquifer as affected by seasonal rainfall variations.

Figure 17

Hydraulic properties

- Discussion of horizontal hydraulic conductivity in the surficial aquifer.

Table 3

Upper Confining Unit

- Lithologic description of confining unit material.
- Discussion of thickness, distribution and continuity of confining unit.

Figure 18

Confined Aquifer

Lithology and thickness

- Thickness and orientation of strata in aquifer.
- Lithologic descriptions of aquifer material and spatial variations of properties such as grain size and mineralogy.

Figure 19

Head distribution and flow direction

- Discussion of areal head distribution during winter, spring, and summer 1988.
- Discussion of directions of ground-water flow.

Figure 20

Figure 21

Figure 22

Head Fluctuations

-Discussion of ground-water head fluctuations in the confined aquifer as affected by seasonal rainfall variations, tidal influences, and pumpage.

Figure 23

Hydraulic Properties

-Discussion of horizontal hydraulic conductivity in the aquifer.

WATER CHEMISTRY

Inorganic Constituents

Figure 24

Major Ions

- List of ions that were detected.
- Discussion of the natural occurrence of the major ions in ground-water and surface-water systems.
- Use Stiff and Piper diagrams for discussion of the distribution of ions in ground water and surface water.
- Discussion of some of the possible sources and processes occurring, including natural vs. manmade sources and possible source areas.

Table 4

Table 5

Figure 26

Figure 27

Figure 28

Minor Constituents

- Discussion of the minor ions present, concentrating on heavy metals.
- Discussion of the natural occurrence of minor ions in ground-water and surface water systems.
- Discussion of the distribution of minor constituents in the ground water and surface water.
- Discussion of probable sources and processes.

Organic Constituents

- Discussion of classes of organic compounds.
- Distribution to total organic carbon.

Volatile Compounds

- Discussion of the distribution of volatile compounds in ground water and surface water.
- Discussion of some of the possible sources and processes occurring.

Table 6
Table 7
Figure 29

Semivolatile compounds

- Discussion of the distribution of semivolatile compounds in ground water and surface water.
- Discussion of some of the possible sources and processes occurring.

Table 8
Table 9
Figure 30

SUMMARY AND CONCLUSIONS

REFERENCES CITED

APPENDIX: WATER CHEMISTRY DATA

- Water chemistry data from the spring 1989 sampling run, listed in tabular form.

Table 10
Table 11

"THE IDEAL PROJECT" — ITS PLANNING AND SUPERVISION

By JOHN E. MOORE and HUGH H. HUDSON (Staff Hydrologists, Lakewood, Colo.)

(SUMMARY OF A TALK PRESENTED AT THE ROCKY MOUNTAIN REGION DISTRICT CHIEFS WORKSHOP ON APRIL 19, 1972)

INTRODUCTION

Project orientation, planning, supervision, and timely completion are all areas that are receiving increasing attention at Regional, Division, and Director's levels. This emphasis has been strongly indicated by the Director's public statements regarding improving the usefulness of Survey reports and by publication of priority guidelines in Water Resources Division memorandums. Valid criticisms have been directed at the Geological Survey regarding lack of timeliness and relevance of our reports. This condition can be corrected by improved project design, supervision, and management.

Today, there is increased competition for project funds and for skilled personnel. It is logical to assume that funds and personnel will be assigned to those projects that meet the criteria of technical quality, relevance to current and potential needs, and adequate management to assure that these needs are fulfilled.

Before getting into specifics, the following is given for perspective. Within the total Water Resources Division program there are about 1,500 projects. The number of reports from these projects that were prepared for Director's approval in 1970 was more than 800. Twenty years ago there were only 300.

In the 12-State Rocky Mountain Region, there are about 230 interpretive projects that will produce reports. The total funding of work in this Region in Fiscal Year 1972 is \$19 million. Interpretive projects use \$10 million of the money (areal appraisal and applied research). Areal appraisal projects consumed nearly \$4.5 million this fiscal year. Clearly, project planning and management represent substantial investments in people and money and call for a business-like approach.

DEFINITION OF IDEAL PROJECT

The purpose of this paper is to list guidelines for better project planning and supervision. Obviously these guidelines should not be considered as a panacea to resolve all the problems related to projects. Before presenting these guidelines, we offer the following as our definition of the "ideal project."

Specific Objectives

The objectives should point to the solution of specific problems. If the objectives are not clear, the approach cannot be determined and the project is in danger of aimless roaming in search of its objective. Fuzzy definition of the project goal leads to uncertainty about the merits of each step taken during the project execution. Uncertainty frequently leads to time misspent in collecting, cataloging, and interpreting trivia.

Limited Duration

Ideally, the length of a project should be 24 to 36 months. Projects which are longer frequently run into problems of completing reports on schedule and maintaining staff continuity. If this span of time appears impracticable, the project should be broken into phases of relatively brief duration with a specified goal and report for each phase.

Full-time and Continuous Staffing

Full-time and continuous staffing is essential to efficient project operation and management. The probability of staffing interruptions by transfer and priority changes by the cooperator is decreased with shorter projects. Full-time participation, particularly by the project chief, is almost essential. For the project chief to be required to divide his time between projects is patently inefficient, and he may be tempted to play one deadline off against the other and delay completion of both projects. If possible, an interdisciplinary team approach is recommended. Many of the new projects in the Water Resources Division include full- or part-time input from ground water, surface water, and water quality disciplines. An ideal project requires a widely diversified experience, interest, and capability. The project leader is responsible for assembling, guiding, and using technical talents of his staff.

Adequate Funding

Lack of adequate funds is probably the major cause of failure. Although the absolute necessity of adequate funding cannot be denied, inadequate funding is a surprisingly common pitfall. We tend to be somewhat overzealous in "selling" projects and suc-

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cumb to the temptation to make the job more attractive to the cooperator by cutting costs to the bone.

Financing must be at a level adequate for achieving stated goals. Continuing surveillance of progress by the district chief is required so that the cooperator can be advised if the original goals are within budget constraints. If financing is a basic problem to successful completion, efforts should be made immediately to revise either the objective or the budget level. Symptoms of an underfunded project are frequent cost overruns, slippage of completion date, and substandard technical report.

Meets Objectives

It goes without saying that the ideal project is completed on schedule, is technically acceptable, and meets the stated objectives. The project should produce reports that reach and are understood by the intended audience.

Is the "ideal" project attainable? Emphatically yes, with proper attention to the details that go into planning, supervision, and report management.

PROJECT PLANNING

There are no hard and fast rules for planning a project. Many planning details depend on the uniqueness or difficulty of the job and the experience available within the district from similar projects. If the project under consideration is a county study adjacent to a just-completed county, the planning phase may be a relatively simple modification of the earlier study, provided the earlier experience was successful and documented. Documentation is a requirement for adequate management and will be discussed under Supervision.

Project planning usually begins when the project proposal is prepared for the cooperator. The proposal should list specific objectives, point out the hydrologic complexities in the area, and list the major water-related problems. The district should obtain assistance from the Regional office, research projects, or other districts for review of these proposals.

Planning Report

Many districts prepare a pre-project planning report before any field work is started. Some districts prepare the report as a separate project while others put aside the first 3 to 6 months of the project to prepare a planning report. A planning report is highly recommended for projects that have had no predecessor in the district, and for those that are above average in difficulty.

The basic planning report should include (as a minimum) a clear statement of objectives, the proposed approach, a conceptual hydrologic description, data available, data needs, work schedule, report plans, and references. The report should receive a detailed review by the cooperator, Regional office, and in some cases Division staff members. Some districts have had success in using a brainstorming technique to prepare parts of the report. For example, a group of hydrologists with diverse interests and background is assembled. They express

the possible objectives, approaches, and project priorities. The cost of a project planning report ranges from \$3,000 to \$8,000 and commonly requires one week to three months to complete.

The North Dakota district recently prepared such a report. Projects that had been routinely requested by the cooperator were the traditional county ground-water reconnaissance studies. Then, the Corps of Engineers came up with plans for a reservoir on the Sheyenne River overlying an important aquifer. The question the Corps asked was what effects the reservoir would have on the local and regional ground-water environment. A secondary question was what would be the effects of the proposed reservoir on nearby seeps and springs.

The district office developed a planning report to prepare for this project. It included the following: introduction, purpose of study, hydrogeology, method of study, available data, data needs, estimated costs, work schedule, selected references, a map showing the location of study area and a hydrogeologic section.

After the report was initially drafted, a meeting was held in Denver involving representatives of the Bismarck office, the Regional staff, and two consultants from the Arkansas district who were chosen because of their experience with a similar problem. The original work plan was then modified on the basis of advice and recommendations obtained at this meeting. The revised work plan served as the basis for preparing (and became a part of) the formal project proposal. About three months elapsed between the inception of the project and its approval. The time could have been shortened considerably, if necessary.

Planning major projects in New Mexico is done in a slightly different way. The method used is a pre-project project. The purpose of this project is specifically for planning. The project chief is assigned the job of assessing the problem, the hydrologic situation, developing the conceptual model, reviewing the literature and the state of the art, assessing the data base, determining data needs, and preparing a work plan. The end product is a highly detailed project proposal that serves as the basis of the agreement with the cooperator as to costs, approach, duration of study, and type of report. The detailed project proposal is abstracted for and becomes a part of the formal project proposal. Such an approach costs in the neighborhood of \$6,000 to \$12,000, and is money well spent when the final project may cost in the \$300,000 to \$900,000 range. Moreover, cost overruns from inadequately planned projects may consume several times the cost of detailed planning.

Technical Assistance

The North Dakota district's project report was substantially changed and improved because of consulting assistance provided by the Regional office and by the Arkansas district. Much of the cost of the assistance was paid from the Region's consulting fund. Districts should make use of these funds to review project plans during the formulation stage.

Project personnel should enlist the aid of other district personnel, the Branches, and research spe-

cialists, in the design of quantitative studies. Where predictive models are contemplated the Analog Model Unit, the Hydrologic Systems Laboratory Group, or a similar research group should be consulted for technical advice beginning with the project planning. Where technical expertise in the project needs bolstering, consultations or short assignments by appropriate individuals should be sought. Such needs should be identified during the project planning phase.

Identification of Specific Objectives

The definition of specific project objectives is probably the most important part of planning. It is recommended that a list be prepared of desirable objectives, then select those objectives that are practical to achieve. Finally, the objectives should be balanced with the need for information in the study area. The selection of goals should be based on an awareness of the complexity of hydrologic and water-supply problems. The most critical unknowns should be tackled first. The limits of the project area, the information needed, and the type of report should be established during the first few weeks of the project.

Documentation of Project

The preparation of a formal project description should be made by the project chief. There are times when the project chief is not on board or selected

at the time the project is conceived. Ideally, he should be a part of the planning team, but if not, he should be given the opportunity to review, modify, and otherwise imprint the project with his own personal touch. The preparation of project documents as an administrative chore, remote from the project chief, is strongly discouraged. These documents should be used to prepare the work plan and budget.

PROJECT SUPERVISION

The ideal project is now underway and its plan becomes a management tool. The following is a list of general guidelines for the supervision of projects. It includes guidelines for the project chief and district supervisors.

Work Plan

A detailed work plan containing a list of the major items of project work, completion dates, manpower requirements, and expenses should be prepared by the project chief during the first part of the project (1 to 3 months). It is prepared after the needs for data, research support, and special studies have been defined. The work effort should first be subdivided into logical units with realistic completion dates for each. An example of a project work plan is shown in figure 1. The work plan should include a listing of maps, tables, and other items to be generated by the project.

No.	Work unit	Description of work unit	Completion date	Manpower required	Expenses
1.	Project description				
2.	Preliminary report				
3.	Project work plan				
4.	Draft of introduction and objectives for final product				
5.	Base map of study area				
6.	Collation of previous data				
7.	Construction or installation of instruments				
8.	Data collection				
9.	Data processing				
10.	Basic data report				
11.	Data analysis				
12.	Topical outline of final report				
13.	Illustrations and tables				
14.	Draft of report				

Figure 1.--Example of project work plan.

Project	Report	Project description	Preliminary report	Work plan	Draft	Base map	Collation	Construction	Data collection	Data processing	Data report	Data analysis	Outline	Illustrations	Draft of report
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Statewide															
Lakes & reservoirs															
Mine drainage	Circ.														
Small watersheds	Open file														
Urban	Open file														
High Plains	HA														
	WSP														
	Circ.														
Mtn Parks	Open file														
Missouri Basin	HA														

Figure 2.--District project progress chart.

Project Control

The project chief should be required to give an oral or written progress report to his supervisor on a regular schedule. Some districts require a report on progress and plans each month. One very useful method of keeping track of progress is to prepare a project progress chart. Actual progress is charted against the listed completion date shown on the work plan. The chart serves two purposes, it provides a visual display of progress and gives an early warning of schedule slippage. Another use of the chart is to provide a basis for estimating cost and time requirements for future projects. An example of a district project progress chart is given in figure 2. A recommended alternative chart would be the same items of work as those in item 29, Part D, of the project description.

Reconnaissance Phase

Reconnaissance work during early phases of project should identify variability of hydrologic systems, data availability, and the principal controls on the occurrence and movement of water. Reconnaissance information should be used to update project work plans, guiding intensity and distribution of field effort to define the significant unknowns.

Technical Quality Control

A systematic technical review schedule is an essential element of effective project management. It is the responsibility of the supervisor to review the technical aspects of the project frequently. The review should consider the progress, plans, and resolution of objectives. If needed, the work plan should be revised and work effort and goals rescheduled.

You've no doubt heard of the district chief who gave a project leader his assignment like this: "Here's your project--now don't let me see you again for three years." It probably never happened, but there are indications of infrequent or irregular internal project reviews within the district. Effective management requires close contact with the project staff. This contact consists mainly of periodic and regular technical reviews. A team approach to review has merit, particularly if the problem is interdisciplinary.

Review at three- to six-month intervals, especially during the first year, is an effective way to sense problems, progress, and to utilize decision points if changes appear to be in order. Such reviews may be a part of regular staff meetings, or at district technical seminar sessions. These reviews not only provide technical guidance, but identify the amount of time

being expended on each part of the project. Some project chiefs frequently expend too much effort on that phase of the project where they personally have the greatest interest or expertise.

The supervisor should also visit the field. There is no substitute for his understanding the field problems. The district chief should seek outside assistance from the Region, the Branches, research, or outside the Survey to assist in technical review. Outside help is especially needed on projects that are a new approach for the district.

Oral Presentation

The project personnel should be encouraged to present talks to cooperators, technical societies, and community groups. The advantages gained from this are many. For example, it provides good public relations for the district, should improve the report, and may result in expansion or change in project objectives.

Professional Environment

It is the basic responsibility of the district chief to provide a productive environment for the employee. Key points here are the opportunity for the project personnel to take an active part in project planning, to freely exercise imagination in obtaining, interpreting, and presenting results, and to communicate freely on technical problems with peers in other projects, districts, and agencies. Stated in a slightly different way, project personnel should be given opportunity for professional growth through assigned responsibility rather than through a tightly restricted set of duties.

Project personnel should be made aware of their responsibilities by frequent consultations with the supervisor, continuing review of project progress by district officials results in commendations, where warranted. Project personnel should be surrounded by an attitude that stresses getting the job done.

REPORT MANAGEMENT

Report management is a subject that should receive separate treatment all its own, however, reports cannot be separated or ignored in project planning or supervision. Reports can be improved by giving more attention to colleague review, making them less stereotyped, releasing them more rapidly, and preparing more reports related to the water user. The following is a list of a few guidelines for improving and better management of reports.

Report Planning

Report planning is continuing process. Some suggestions for planning reports are as follows. A pre-

liminary report should be prepared during the first 10 percent of project life which outlines main hydrologic features of study area (using data available), suggests work needed to eliminate deficiencies, and analytical techniques to be applied. A series of short internal reports covering successive phases of project work are valuable for training in report writing, and can be composited for the final report.

Report preparation should never be handled as a chore to be done just before the project is concluded. Work on the outline and parts of the final report should be done in steps as field work reaches identifiable conclusions throughout the life of the project.

The project chief should submit the first draft of the report not later than six months before the end of the project. Frequently, project schedules allow report preparation to continue up to the time the project money runs out. This almost inevitable leads to cost overruns and delays. The project leader should identify the audience for the report and kind of publication early in the report planning.

Report Outline

The project chief should prepare a report outline, table of contents, and list of illustrations in the first three months of the project. He should refine this outline as necessary based on information obtained during the progress of the study. The report outline should be accompanied by a "thesis statement" that lists purpose and scope.

The plan of study and report outline should be furnished to the district reports specialist to serve as his guide in ordering base-map material, anticipating typing, review, and other reports processing requirements.

Report Review

Ideally, the report should receive two reviews within the district and two outside. The Region will help in the selection of reviewers in other Regions and in research projects. The district should develop a routine for checking tables, illustrations, and text. Some districts have used an internal routing sheet to assist in quality control of manuscripts (see fig. 3).

The author must give review and revisions of his reports top priority over other tasks or interests. This is sometimes easier said than done, especially if the cooperator has what he needs out of the investigation and has little interest in the final report. But, there is a Federal obligation that must be fulfilled, and abandonment or excessive delays in the report jeopardize or void that obligation.

Author(s):													Project No.					
Title:													No. pages (incl. tables)					
Type of Report (WSP, HA, Circ. etc.)													No. illustrations					
													No. tables					
Signature	Date in	Date out	Hours spent	Sections reviewed	Purpose and scope of report is clear	Purpose and scope compat. with coop. commit.	Sound hydrologic theory employed	Interpretation valid and complete	Work items were independently checked	Check computations	Illus. complete, correct	Summary covers only material in text	Conclus. supported clearly by info/text	References complete and properly shown	Tables, illus., text cross-checked	Acknowledgments	Enter next routing here	

Figure 3.--Intraoffice manuscript routing sheet.

CONCLUSION

The goal for new projects should be to develop studies and present results that give planners the data and analyses they need to make intelligent decisions. More attention to planning and management using the guidelines given in this paper will result in more successful and meaningful projects. The elements that should be emphasized in planning and supervising projects are:

1. Allowance for unforeseen problems.
2. Early identification of specific project objectives.
3. Provide adequate funding.
4. Call for technical assistance.
5. Establishment and adherence to deadlines for various phases.
6. Early identification of audience for report.
7. Realistic goals and schedules.
8. Periodic review of progress.
9. Establish a productive working environment for employees.
10. Provide for technical quality control.

ACKNOWLEDGMENT

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JOHN E. MOORE



HUGH H. HUDSON

#

PROJECT FINANCIAL PLANNING

PROJECT NAME _____
 PROJECT NO. _____
 COOPERATOR _____
 PROJECT CHIEF _____
 GROSS FUNDS _____

SECTION /UNIT _____
 DATE _____
 COOPERATOR _____
 CONTACT PERSON _____
 USGS FUNDS _____
 OTHER FUNDS _____

	OBJECT CLASS	FIRST	SECOND	THIRD	FOURTH	TOTAL
Salary (list by person/pp below)	01-23	4,500	5,280			9,780
Indirect	C9	3,697	2,303			6,000
Travel transportation	41-49	2,100				2,100
Communications rents, utilities	50-57					
Services and supplies	A2, 59, All. 60-69 75,76,77					
Equipment	80,81,82	700				700
Vehicle	A3	960				960
Computer	A5		800			800
Lab (Central)	B5	1,500				1,500
Lab (District)	A9					
Direct State services	70					
Other						
WOTSC (11% Coop 16.5% other Fed agencies)	C1	1,480	992			2,402
Total		14,937	9,305			24,242

PROJECT SALARY PLANNING SHEET

PROJECT NAME _____ SECTION _____
 PROJECT NO. _____ DATE + INI _____
 PROJECT CHIEF _____ COOPERATORS _____

Name and grade	Est. Time	Salary Rate	Total
Professional and technical:			
Support and clerical:			
Total salaries			

Remarks:

PROJECT LABORATORY PLANNING SHEET

PROJECT NAME _____
 PROJECT NO. _____
 PROJECT CHIEF _____
 LABORATORIES USED _____

SECTION _____
 DATE + INI _____
 COOPERATORS _____

Type of analysis or constituent	Price per Unit	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total Cost
Totals						

PROJECT PROPOSAL REVIEW
ROUTING SHEET

Proposal No. _____ Project Proposal No.: _____

Proposal Title: _____

Author/Project Chief: _____

This form is to be used for the routing of all project proposals before formal transmittal of the proposal to the cooperator or to the Region.

Section Chief/Supervisor _____
Comments _____

(signature)

Date: _____

Discipline Specialist _____
Comments _____

(signature)

Date: _____

Discipline Specialist _____
Comments _____

(signature)

Date: _____

Report Specialist _____
Comments _____

(signature)

Date: _____

Administrative Officer _____
Comments _____

(signature)

Date: _____

Assistant District Chief _____
Comments _____

(signature)

Date: _____

District Chief _____
Comments _____

(signature)

Date: _____

* Conference of above. _____
Recommendation _____

Date: _____

* Optional _____

PROJECT PROPOSAL COVER SHEET

WRD Region: _____ Proposal no.: _____
 District/Project office: _____ Initial date: _____
 Project title: _____ Revised date: _____
 _____ Project no.: _____
 MIS short title (type of investigation, location, 35 sp. maximum) Begin date (mo/yr): _____
 End date (mo/yr): _____
 Project chief: _____ Research __, or resource appraisal _____

ESTIMATED PROJECT FUNDING

	Firm	Probable	Possible		
CUSTOMER NAME(S)/NUMBER(S):	_____				
Fiscal year:	_____	_____	_____	_____	_____
OFA/FED:	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
COOP repay:	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
COOP direct:	_____	_____	_____	_____	_____
COOP unmatched:	_____	_____	_____	_____	_____
COOP total:	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
FMF:	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
Total for FY:	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____

REMARKS:

Author: _____ Date: _____
 District endorsement: _____ Date: _____
 Region endorsement: _____ Date: _____
 Approved by: _____ Date: _____

SAMPLE
MIS Utility Update (MUPPUT)

MISID: RI028

ENTRY DATE
88/11/22

FISCAL YEAR
89

BEGIN DATE
88/10

END DATE
91/09

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

SHORT TITLE
Usquepaug-Queen Development

REGION
4

STREET ADDRESS
Room 237 Pastore Federal Bldg & USPO

CITY AND STATE CODE
Providence, RI

ZIP CODE
02903

PROBLEM
The Usquepaug-Queen aquifer is one of five aquifers in the Pawcatuck River basin in which the State is testing and purchasing well sites for future municipal supply use. Improper location and operation of wells could cause substantial lowering of water levels in the aquifer, in overlying ponds and pumps, and could cause undesirable depletion of low streamflow. There is potential for surface water and ground water contamination by pesticides applied to commercially cultivated fields overlying the aquifer. There is also potential for interbasin transfer of ground water between subbasins in the Pawcatuck River basin.

OBJECTIVE
(1) Collect and analyze additional geohydrologic data needed to develop a model of the Usquepaug-Queen ground-water reservoir. (2) Construct and calibrate a ground-water flow model of the stream-aquifer system. (3) Use the model to assess the impacts of alternative pumping schemes on water levels, streamflow, and swamps. (4) Evaluate the quality of ground water with regard to its use for public supply.

APPROACH

Lithologic logs, well construction data, and aquifer tests available from 1960 to 1990 will be analyzed to assess the hydraulic characteristics of the aquifer. These and other data will be used to modify maps of the water table, bedrock surface, saturated thickness, and hydraulic conductivity of the stratified-drift aquifer. Water level and streamflow data collected monthly during 1959 will be used to calibrate the model. Monthly water level data in 40 wells and at 11 stream sites will be used to verify the ground-water flow model. The U.S. Geological Survey modular ground-water flow model, with a modified stream package, will be used. Changes in chemical quality of ground water and surface water between 1958 and 1990 will be assessed. Ground water downgradient from commercially cultivated fields will be analyzed for pesticides and inorganic chemicals. Some wells will be sampled for volatile organic chemicals.

PROJECT CHIEF

Dickerman, David C.

EMPLOYER CODE

F

PROJECT TYPE

QB1

GENERAL HYDROLOGY (GH)

20%

SURFACE WATER (SW)

10%

GROUND WATER (GW)

60%

WATER QUALITY (QW)

10%

FIELD OF STUDY

CO7

FIELD OF STUDY

C39

FIELD OF STUDY

C56

FIELD OF STUDY

C64

FIELD OF STUDY

C83

SINGLE MOST IMPORTANT FIELD
C64

WRD OR COWWR CATEGORY

INDEX TERMS
DIGITAL MODEL
AQUIFER PROPERTIES
AQUIFER SIMULATIONS
GROUND WATER
INFILTRATION
STREAMFLOW
WATER QUALITY
HYDROLOGIC IMPACTS
RESERVOIR

PRIMARY USE
V25

SECONDARY USE
V06

PLANS FOR NEXT YEAR

Establish network of 40 observation wells to obtain monthly water-level data. Establish four or five partial-record streamflow sites on streams that flow onto the ground-water reservoir from areas of till-covered bedrock to obtain monthly measurements of streamflow. Install 25 two-inch observation wells as part of the network of 40 observation wells. Collect geohydrologic data from well construction records of wells drilled within the study area since 1960.

NOTICE OF PROJECT STATUS
A

PLANNED REPORTS

PLN001

SL 90 200

Geohydrologic Data for the Usquepaug-Queen Ground-Water Reservoir, Rhode Island.

PLANNED REPORTS

PLN002

RI 91 150

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

MANPOWER NARRATIVE

Project chief, hydrologist GS-12, existing staff, part time, 75 percent; hydrologist GS-9, project assistant, existing staff, part time 56 percent; and hydrologic technician GS-6, project assistant, existing staff, part time 70 percent.

AREAL EXTENT
03

SITE
RI

STATE %
100

WRC
0.1

WRC%
100

HUC CODES
01090005

CONGRESSIONAL DISTRICT
RI102

CONGRESSIONAL DIST %
100.0

COUNTY
RI009

LOCATION
Exeter, Richmond, S. Kingstown, W. Greenwich

TOTAL AREA
36

PROJECT MANAGEMENT

Need for Management

Project management begins with proper project planning, as previously discussed, and succeeds with implementation of those plans. Management is considered to be the establishment and achievement of project objectives with available funds, personnel, time, and equipment. Properly managed projects will meet technical objectives and produce adequate reports. Conversely, without proper management, projects often fail to meet technical objectives, exceed time and budget restraints, and produce inadequate reports.

Management by Objectives

Management by Objectives (MBO) is a management technique used in government and the private sector. Properly used, MBO helps define objectives and provides a means to monitor progress. It is a simple and effective method of management. MBO documents the following:

1. Project objectives.
2. How and when project work elements necessary to accomplishing objectives are to be completed (exhibits 2D and 3A).
3. Itemized project costs.
4. Personnel responsibilities.
5. Performance standards for personnel.
6. Project progress (exhibit 3B).
7. Modification to project plans.
8. Results and decisions of periodic reviews.

Budget

Sound financial management is an integral part of good project management. Project operations reach maximum effectiveness when project chiefs and other supervisory personnel have a reliable method to monitor and control project spending.

Sound financial management depends, in part, on a well-conceived and thoroughly documented financial plan. The basics of this plan were developed in the project proposal. This section discusses the management of project finances and the usefulness of the budget.

Implementation of plan

Survey uses MBO

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline Illus. & tables	X	X			
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Monitor spending

Documented financial plan

The budget has the following characteristics:

1. It is the basis of the financial management of the project.
2. It probably will be refined after the project is approved, funding is assured, and a detailed work plan is completed .
3. Costs are determined on a quarterly, or perhaps even monthly, basis.
4. The budget always must be available for review.

The project chief should review financial records from the accounting system every month. Higher supervisory personnel and the administrative officers should review them at least quarterly. With these routine reviews, financial problems should be detected quickly and necessary changes can be made before real problems begin.

Project Staff

Continuous staffing is essential to efficient project management. Although, ideally, the project chief should work on the project continuously, other technical personnel may not be required full time. Maintaining staff continuity is more likely with shorter projects because of decreased probability of interruptions by transfers.

Many of the new projects in the Division include participation by ground-water, surface-water, and quality-of-water specialists. Where feasible and necessary, this interdisciplinary team approach is recommended. The ideal project team incorporates diverse experience, interest, and capability. The project chief is responsible for assembling, guiding, and using the technical talents of the staff.

Project File

A project-management file should be established at the beginning of the project (MBO requires this). This file will contain all documents that are needed to monitor the progress of the project and reports. Suggested contents are listed as follows:

1. Project proposal.
2. Project description.
3. List of project milestones (exhibit 3A).
4. Work plan.
5. Budget.
6. Report outline and annotated outline(exhibit 2E).

Review financial records

Staff continuity

Interdisciplinary staff

Project documents

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline Illus. & tables	X	X			
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

7. Personnel plan
8. List of illustrations and tables.
9. Publication plan.
10. List of prospective report reviewers and routing sheet.
11. Report draft(s).
12. Summaries of quarterly project reviews.

District Reviews

Periodic reviews (exhibit 3B) are a vital part of any project-management system and are an important activity in the District and the Region. Written and oral reviews of project progress are needed at least quarterly. These quarterly reviews usually are scheduled individually. However, other opportunities for review are possible at staff meetings, technical seminars, cooperator briefings, and so forth. An essential part of the MBO system is a periodic progress report that covers findings, problems and possible solutions, and financial status, as well as plans for the next period.

Project progress must be reviewed regularly so that the cooperator and the Division can be advised if the original goals, budget, or time estimates need revision. If so, then the objectives must be revised immediately or additional funding must be secured. If the report schedule begins to slip, then efforts should be made to get an extension of time.

District reviewers examine individual projects to assure technical adequacy, personnel performance, training needs, and financial status. District reviews may be occasional or at regular intervals. Each review should be followed by a written progress report, a financial summary, a work plan for the next review period, a discussion and resolution of any problems, and a comprehensive examination of the report status (exhibit 3B). Most Districts find it beneficial to maintain a chart showing the progress of all projects.

Some advantages of District review are as follows:

1. Helps keep the project on schedule.
2. Provides guidance for the project chief.
3. Helps keep the report on schedule.
4. Identifies problems, such as personnel, time, technical, financial, and so forth.
5. Educates District managers.
6. Improves morale.
7. Provides technical quality control.

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline illus. & tables	X	X			
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Review EVERYTHING

Written progress report

QUARTERLY PROJECT REVIEW

Project name _____
 Project number _____ Period of project _____
 Cooperator _____ Project chief _____
 Purpose of Project: _____

Plans for next quarter:

Status of planned reports:

- 1.
- 2.

Significant finding to date:

Status of funding

Needs for help:

- 1.
- 2.
- 3.

Region Review

The Region reviews all ongoing projects annually and all new projects when proposed. Their reviews consider Division priorities, and funds are allocated accordingly. In addition to annual project reviews to ensure Division priorities, Regions review projects to accomplish the following objectives:

1. Maintain and improve acceptability of the project.
2. Anticipate training and personnel needs.
3. Encourage improved management techniques.
4. Provide support for the District.
5. Provide technical quality control.

Review by the Region will cover, at least, the following topics:

1. Project proposal and description.
2. Project objectives, in detail.
3. Project progress.
4. Project budget.
5. Personnel.
6. Project problems.
7. Plans for future project operations.
8. Report plans and progress.
9. Suggestions of project staff advisor.

The Region also will want to review District discipline capabilities, the annual District program plan, and the minutes of the District program meetings with cooperators.

Annual project review

Review plans and capabilities

Typical Project Milestones

1. Project proposal
2. Project description
3. Planning-management document
4. Work plan
5. Report outline
6. Base-map order
7. Annotated-report outline, with list of illustrations and tables.
8. Preliminary report
9. Construction of hydrologic stations
10. Data collection and record compilation
11. Data processing
12. Data analysis
13. Illustration preparation
14. First draft of complete manuscript
15. Report review in District (section, reports, District Chief, discipline specialists, and so forth)
16. Report review by outside colleagues
17. Incorporation of review corrections and comments
18. Review of report by Region
19. Review of report by Headquarters
20. Report approval and publication

QUARTERLY PROJECT REVIEW

Date of review _____

Project name _____

Project number _____ Period of project _____

Cooperator _____ Project chief _____

Purpose of project:

Progress last quarter:

Plans for next quarter:

Status of planned reports:

- 1.
- 2.

Significant findings to date:

Status of funding:

Needs for help:

- 1.
- 2.
- 3.

REPORT PLANNING AND PREPARATION

Policies

The act of Congress that created the U.S. Geological Survey established the Survey's obligation to make public the results of its investigations and research. These results almost always are compiled into reports that are conveyed to the public in the form of books or maps. Thus, reports are our most important tangible product. As such, they must be of the highest technical and editorial quality, without bias, on time, attractively designed, available to everyone at the same time, and must follow established policy guidelines.

Policy guidelines

The integrity of the Survey was established, and continues to be maintained, because of our technical excellence and a policy of objectivity and impartiality. Some of the most important technical and policy guidelines are discussed as follows:

1. We do not recommend anything; if possible, we present alternatives. Although we may describe the probable response of a hydrologic system (to a hypothetical development or stress on the system), we do not say what "should" be done.
2. We present only facts and unbiased interpretations of those facts.
3. We maintain a neutral position regarding cooperators, consultants, sister agencies, and other scientists. We neither praise nor criticize.
4. We restrict our investigations to the public domain and do not compete with the private sector. "Consulting-type" investigations are avoided.
5. We do not compete (or appear to compete) with sister agencies, State organizations, or the local/municipal sector.
6. We release our reports simultaneously to all interested parties. Release usually is announced by a notice in the press.
7. We give proper credit for financial cooperation, technical assistance, and use of copyrighted material.

Obligation to report

GOALS FOR GEOLOGICAL SURVEY REPORTS

Relevant
Timely
Impartial
Technically correct
Editorially correct
Readable
Attractive

Objective and impartial

GUIDELINES FOR IMPROVED SURVEY REPORTS

1. Integrate project planning and support.
2. Use project-management documents.
3. Establish report-management system.
4. Increase authority of report specialist.
5. Recognize excellence
6. Improve colleague review.
7. Use best report format.
8. Emphasize report-writing training.

Good reports result from the combination of all the elements listed as follows:

1. Well-prepared project proposals.
2. Good project planning.
3. Adequate report planning that begins at the time of project planning.
4. Author fully involved in planning.
5. Adequate funding.
6. Good supervision at all levels.
7. Proper interdisciplinary approach.
8. Use of consultants when needed.
9. Development and use of a good annotated outline.
10. Availability and use of pertinent data.
11. Adequate project and report reviews.
12. Adequate colleague (technical) review.
13. Proper response to report reviews.
14. Supervisory checks of review quality.
15. Proper training of authors and reviewers.
16. Adequate verification review.
17. No policy violations.

The Survey's leadership in the field of water-resources investigations is maintained by an excellent publication program. Below the Headquarters level, part of this excellence is assured by quality control which is described as follows:

Publication program

1. We try to select a publication medium that is best suited to the information being released and the needs of the intended audience. Material of major importance, or with a high degree of transfer value, usually is published as a Water-Supply Paper, a Professional Paper, or as an article in a technical journal. Reports that have general technical or geographic significance usually appear in the Water Resources Information Report series. Administrative Reports (released to other Federal agencies only) and Open-File Reports are kept to a minimum.
2. Authors are responsible for ALL aspects of their reports through final approval and until it is printed. This is especially important regarding TECHNICAL and EDITORIAL EXCELLENCE (exhibit 4A).
3. We make every attempt to produce our reports on time.
4. We try to maintain continuity of project personnel throughout the life of the project. In particular, the author should remain assigned to the project through Director's approval.
5. We try to schedule adequate time for data collection, data interpretation, report preparation, and report review.

6. We expect personnel to give report preparation, reviews, and revisions high priority.
7. We require prompt and thorough colleague reviews.
8. We assign to the District Chief or program manager the responsibility to review and obtain adequate colleague reviews of every report. Supervisors are responsible for ensuring that reports are prepared and reviewed in conformance with Survey policies.

References on report policy

The following references are available for authors and reviewers. They will assist authors in making most decisions related to the public release of all types of technical information:

1. WRD Policy Statement No. 1, June 4, 1959, by Luna B. Leopold. This discusses report attainment goals and report responsibility (exhibit 4A).
2. WRD Memorandum No. 79.43, December 22, 1978, "Policy of Water Resources Division regarding written reports." This updates, but does not change, Policy Statement No. 1 (exhibit 4B).
3. Suggestions to Authors Vol. 5, 1958, Vol. 6, 1978, and Vol. 7, 1991. These define Survey publications policy and author responsibility.
4. Geological Survey Manual 500.9, July 15, 1976, "Outside publication and oral presentation--clearance from the Director." This requires Headquarter's approval, before release, of all publications that show U.S. Geological Survey affiliation (exhibit 4C).
5. Geological Survey Manual 500.14, (formerly Survey Order 202), January 28, 1980, "Safeguard and release of U.S. Geological Survey information" (exhibit 4D). This lists policy regarding release of U.S. Geological Survey information.
6. Geological Survey Manual 500.5, October 7, 1977. "Policy on release of written information to the news media" (exhibit 4E).
7. WRD Publications Guide, Vol. 1, 1986. Section 1 provides detailed information on policy (exhibit 4F).

Policy references

REPORT POLICY DOs AND DON'Ts

- DO - Maintain impartiality, objectivity, and integrity.
- DO - Make report available to everyone at same time.
- DO - Acknowledge all cooperation and borrowed data. Give cooperator credit on cover and title page. Acknowledge all significant assistance. Acknowledge copyrighted material.
- DO - Obtain written permission to use copyrighted material, borrowed data or conclusions, and confidential information.
- DO - Avoid use of trade names or use statement of disclaimer.
- DO - Be accurate.
- DO - Finish work promptly.
-
- DON'T - Compete with the private sector. (Avoid site-specific reports. Avoid even apparent competition.)
- DON'T - Assume position of advocacy. (Use dispassionate approach. Don't tell reader what should be done. Give reader alternatives.)
- DON'T - Criticize anything or anyone (especially cooperators, consultants, sister agencies or others working in our field.)
- DON'T - Tread on other areas of expertise.

Planning

The major elements of report planning are a well-prepared project proposal, a detailed report schedule (exhibit 4G), an annotated outline, and a schedule of reviews of report progress. Other than the proposal, which was discussed in the section "Project Proposal," these items are discussed as follows:

1. As soon as the project is approved, consider the intended report audience, probable publication series, report content, scientific significance, and publication costs.
2. Establish target dates for completion of various manuscript components. The authors' complete draft should be submitted 6 months before project-termination date.
3. Schedule adequate time for secretarial and cartographic support. Consult these people as early as possible in the project.
4. Illustrations should be planned early in the project. Base maps should be obtained as soon as possible.
5. The "Introduction," the "Purpose," and the "Scope" should be written very early in the project and referred to frequently.
6. A "Contents" type outline should be prepared very early in the project, ideally as soon as the project is approved (exhibit 2E).
7. An annotated outline should be prepared during the first few weeks of the project. It should be revised continually, with supervisory help and approval, as often as needed.
8. For ready reference by the authors and others, the project file should always contain the report schedule, the annotated outline, the list of tables and illustrations, and the statements of "Purpose" and "Scope."

Publication series

One of the first considerations in report planning is the identification of the report audience in terms of technical level, geographic distribution, and size. This identification is a major factor in determining the level of writing and, consequently, publication format and series.

Authors of Division reports have a wide choice of publication series from which to choose. The choice almost always is mandated by the anticipated audience and the intended format of the technical material to be published. Also to be considered are required publication

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
Illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Type of report

Target dates

Office support

Plan illustrations

Begin immediately

Topic outline

Annotated outline

Project file

Identify audience

Report format

time, printing quality, report significance, publisher's requirements, need for color, and need for oversize material (exhibit 4H). Early selection of map scales, and so forth, will greatly aid the author(s) in the selection of the proper series. General features of each publication series are described in Section 2 of the WRD Publication Guide (exhibit 4F) and are summarized as follows:

Reports Published by USGS Headquarters, Branch of Central Technical Reports, and Branch of Western Technical Reports:

1. Water-Supply Paper--Significant interpretive results of hydrologic investigations that are considered to be of broad interest. Book format, 8-1/2 x 11 inches. Some flexibility of internal format. Can use color if justified. May contain maps in pocket. Sales item.
2. Professional Paper--Comprehensive or topical reports on any earth-science subject of interest to multidiscipline scientific audiences. Book format, 9-1/4 x 11-3/8 inches. Some flexibility of internal format. Can use color if justified. Sales item.
3. Bulletin--Significant interpretive results of earth-science investigations of broad interest, including computer applications. Book format, 8-1/2 x 11 inches. Can use color if justified. May contain maps in pocket. Sales item.
4. Circular--For timely publication of geohydrologic information of national or international scope of ephemeral interest. Book format, 8-1/2 x 11 inches. Flexible internal format. Can use color if justified. Free.
5. Techniques of Water-Resources Investigations--For description of hydrologic techniques. Book format, 8-1/2 x 11 inches. Quality similar to that of Circular. Sales item.
6. Hydrologic Investigations Atlas --For presentation of hydrologic and geohydrologic information. Very flexible map format. High-quality text and illustrations. Color used as needed. Sales item.
7. Miscellaneous Investigations Map--For geohydrologic and earth-science information. Flexible format. Sales item.
8. Miscellaneous Field Studies Map--For presentation of geohydrologic and related information to geologically oriented audiences. Map format. Limited distribution and availability, black and white only. Sales item.

9. Leaflets, booklets, brochures--"General-interest publication" series--For simplified presentation of facts about Division programs or findings of studies and for education of the public. One color; more if justified. Sold in bulk; up to 50 copies free.
10. Annual State Water-Data Report--Water-year data on streamflow, ground-water levels, and quality of water for each State, Puerto Rico, Virgin Islands, and Trust Territories. Available to the public from the National Technical Information Service.
11. National Water Conditions--Monthly news release summarizing the water situation for all those interested in water resources.
12. Geological Survey Yearbook--One chapter summarizes significant activities of the Division for general audiences.

The following reports are published by District and Research offices:

13. Water-Resources Investigations Report (books and maps)-- Comprehensive or topical reports and maps, mainly of local interest, or short-term interest. Color is permitted on illustrations if justified and with the approval of the Chief, Branch of Scientific Publications. Good-quality printing of text and illustrations. Produced locally by Districts. Hard copy or microfiche. Book format, 8-1/2 x 11 inches. Optimum map size is 26 X 36 inches. Available from USGS Books and Open-File Reports Section in Denver. Sales item.
14. Open-file (books and maps)--For data reports or interpretive reports (that require immediate release) awaiting publication in a formal series. Books are 8-1/2 x 11 inches, map size is flexible. Black and white only. Hard copy or microfiche. Available from the Books and Open-File Reports Section in Denver. Sales item.

The following reports published outside of the Survey:

15. State series--Usually similar to Survey Circulars and Hydrologic Atlases.. Limited distribution. Publication in a State series may be required by cooperator. Usually a sales item.
16. Technical journals--Usually a short technical paper for peer readership. Examples: "Ground Water," "Water Resources Research," "American Water Works Association Journal," and "Geological Society of America Bulletin."

17. Trade Journals--Usually a short paper for a general audience, some journals may have broad readership. Examples: "Water Well Journal," "Cooperative Farmer," and so forth.
18. Administrative reports to other Federal agencies--Property of the purchasing agency, and available only from that agency. May not be cited in other series reports unless released to the public by that agency.

Literature Search

Survey authors should make a bibliographic search early in the project to locate and read pertinent literature and to obtain documents needed for preparation of scientific reports. The search can be done manually or by computer, depending on local resources and the scope of the topic.

The simplest, easiest, and quickest place to start a literature search is around the office and in the scientific section of a library. These sources are especially valuable for literature that is geographically significant. Much of this material may have been researched in preparation of the project proposal.

A second approach to a manual search is to use the index terms (from No. 13 in the section "project description") that define the topic and scope of the project. Other applicable terms may be taken from the "Water Resources Thesaurus" published by the Water Resources Scientific Information Center (WRSIC). Next, obtain an abstracting or indexing guidebook that contains references (with or without abstracts) to literature on the subject. The one used most commonly in Division studies is "Selected Water Resources Abstracts," which is published by WRSIC and issued monthly. Although cumulative author and subject indexes are issued yearly, copies of the monthly index must be retained indefinitely because the annual cumulative indexes do not repeat the abstracts. Additional indexes are available at university and other technical libraries.

A computerized search can retrieve information from machine-readable tapes in computers of commercial information-retrieval systems. Retrieval from the commercial systems can increase the number of indexing terms by an order of magnitude over individual hard-copy indexes. The three main types of files are bibliographic, directory, and statistical. To obtain a computerized search the following two steps must be completed.

Early bibliographic search

Libraries

Index terms

Thesaurus

Abstracts

Computer search

1. Define the topic and choose 5 to 10 index words, and prepare a list of other information that may help define the topic, such as time and geographic limits. The "Water Resources Thesaurus" may be used to select index words; most data bases, however, have their own thesaurus.
2. Write or phone the nearest regional Survey library reference desk to request a literature search. Provide the index words and describe the topic. The search is conducted through an online information-retrieval system. References with or without abstracts (depending on the data base) are printed and mailed to the requester.

The author is responsible for obtaining the actual documents. Most reports produced by Federal Government agencies, including USGS Annual State data reports, are available through the National Technical Information Service (NTIS) or the Superintendent of Documents. All other Survey published reports can be obtained from

Books and Open-File Reports Section
U.S. Geological Survey
Box 25425, Federal Center
Denver, CO 80225

The reports from NTIS are sold on a per-page cost (machine duplicated or microfiche) from

National Technical Information Service
5825 Port Royal Road
Springfield, VA 22161

Documents not available through the above sometimes may be borrowed from the Survey libraries or obtained through the interlibrary loan. In a few cases, direct purchase may be the only way to get a document.

Preparing the Report

Guidelines

Authors and editors must become familiar with and use several basic references to assure easier preparation and faster publication of their reports. Several references that are used regularly are as follows:

Writing references

1. Suggestions to Authors (Vol. 5, 1958, Vol. 6, 1978, and Vol. 7, 1991). All authors should read and study these books to learn Survey policy and the mechanics of report preparation. "Suggestions to Authors" is used extensively outside the Survey.

2. "WRD Publications Guide" (v. 1, 1986 edition). All authors should brief themselves on the table of contents (exhibit 4F) to learn what topics are covered and where to find specific articles.
3. "GPO Style Manual" (1984). This book gives information on typographic style and can save editors and typists a great deal of effort. It is more useful than most style manuals because it provides a large number of examples. Authors should review the sections on capitalization, compounding, spelling, abbreviations, and numbers.
4. "Glossary of Geology" (Bates and Jackson, editors, 1988, American Geological Institute). This dictionary discusses geologic terminology and the sources from which terms were derived.
5. Thesauruses and dictionaries. These are useful to determine the meaning and spelling of words, and to find synonyms.
6. "The Elements of Style" (W. Strunk and E.B. White, 1979, McMillan). This is an entertaining booklet that has been a bestseller for many years. It explains the common phrases to avoid and suggests developing concise sentence structure and logical paragraph organization.
7. "Geowriting" (Cochran, Fenner, and Hill, 1979, American Geological Institute). This is a guide to book publication.
8. "Definitions of Selected Ground-Water Terms" (Lohman and others, 1972, Water-Supply Paper 1988).
9. "General Introduction to Hydrologic Terms" (Langbein and Iseri, 1960, Water-Supply Paper 1541-A).
10. "Study and Interpretation of the Chemical Characteristics of Natural Waters" (Hem, 1985, Water-Supply Paper 2254, 3d ed.).
11. Report planning, preparation, and review guide (Moore, Aronson, Green, and Puente, 1990, U.S. Geological Survey Open-File Report 89-275). Contains useful material not in this "guide."

Preliminary outline

The first step in writing a report is to prepare a preliminary outline. This outline forces the authors to organize thoughts very early in the project. It also helps to maintain organization during the project. First-rank headings in the outline should contain the key words in the report title.

A good report title is the principal means to attract readers. Therefore, it must be accurate and concise, and must convey the maximum amount of information in a

Organize thoughts

Report title

minimum number of words. The title should accomplish the following:

1. Reflect the contents of the report and describe the principal topics of the report.
2. Reflect the order of presentation if there is more than one topic.
3. Indicate the precise geographic location of the study.
4. Indicate the time frame of the study if data are time sensitive.
5. Refrain from recommendations.

After selecting a tentative title, the author should prepare a report outline (exhibit 2E) that can be used as a preliminary report "Contents." This generally will include only major topics but probably will be correct regarding first-, second-, and third-order headings. Additionally, the author will need to prepare lists of planned illustrations and tables.

The author also should prepare a preliminary draft of the "Introduction" including the "Purpose" and the "Scope," early in the project to indicate a complete understanding of the problem, objectives, scope, and approach. Like the outline, these, too, will guide the author and other investigators during the course of the project and the report writing. As in any good outline, a main heading requires at least two subheadings.

Keep in mind that although the items discussed above are preliminary, they must not sound preliminary, even in the early stages of the project. They should be referred to often. If the project purpose, scope, or funding are changed, then these items will have to be reviewed and revised. As the project progresses, all the items above may be expanded.

Annotated Outline

The annotated outline (exhibit 2E) should be prepared very early in the course of the project. It generally is written as a simple expansion of the preliminary outline by writing the topic sentence for each paragraph in the report and a list of all illustrations and table titles.

This type of outline never will be perfect or "final." It is, however, extremely valuable in maintaining proper perspective about the direction of the project and the writing of the report. The importance of this outline cannot be overemphasized--its early preparation and proper use throughout the writing of the report will almost ensure the production of a good technical report on time.

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
Illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Write "Introduction"

Topic sentences

Illustration titles

Table titles

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
Illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	

Preliminary Draft

The preliminary draft is the author's first real attempt to get all pertinent thoughts on paper--as they were organized in earlier outlines. This report will have the complete narrative of technical findings, a complete set of illustrations, and a complete set of tables.

The "Introduction" should be brief. It should describe why the study was done, the purpose and scope of the report, the area and time period involved, and assistance received.

1. Discuss the need for the study early in the "Introduction." Much of this already is in the project proposal. Also describe all cooperation and sources of funds here.
2. The "Purpose" and the "Scope" will describe the intent of the report and put definite technical and geographic limits on the report.
3. The physical and the hydrologic setting may be described in the "Introduction" unless it is necessary to explain in full detail.
4. The "Approach" also may be described in the "Introduction," including what data, what techniques, and what methods were used. It is important to discuss how the methods were used. If the "Approach" needs detailed explanation, it may have to stand as a separate report section.
5. The "Acknowledgements" is the place to credit assistance. Persons and organizations outside the Survey are credited first. Survey personnel are credited only if their assistance was not part of their normal work. Exceptional technical review may be acknowledged. "Suggestions to Authors" gives more detailed information for writing acknowledgements.

The main body of the report describes the technical findings of the study. Here, the author discusses the quantitative results of the study and the significance of those results. Here too, the author will discuss the significance of the material in the illustrations and in the tables. It is very important not to describe the illustrations themselves, but to discuss their meaning and significance. Illustrations and tables must be able to stand alone as complete sources of information.

The "Summary," "Summary and Conclusions," or "Conclusions" should be limited to exactly what the title says. In particular, a "Summary" must be strictly limited to facts already discussed in the main body of the report without the introduction of new technical material. The

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline illus. & tables	X	X			
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Introduction

Need for study

Purpose and scope of report

Physical and Hydrologic setting

Approach

Acknowledgments

Body of report

Quantitative results

Summary

“Conclusions” state how the significant findings relate to the stated purpose of the project and report.

All technical publications used in the preparation of the report must be listed at the back of the report. “Suggestions to Authors” describes the title and the format for this listing. Do not pad the list with general textbooks or the author’s earlier publications, unless actually used in researching the current report.

References

Illustrations

All illustrations must be necessary, must contribute to the understanding of the report, must be complete (able to stand alone), and must be at a size or scale appropriate to the significance of the data--both in quality and quantity. Illustrations include maps, diagrams, photographs, charts, and sketches. The “WRD Publications Guide” (blue book) contains almost all the instructions needed for preparation of illustrations for Survey reports. These instructions have been incorporated in “Standards for illustrations in reports of the U.S. Geological Survey, Water Resources Division” prepared by the Southeastern Region in 1987, and are available from the Scientific Publication Programs in Reston.

Maps, diagrams, etc.

Author-prepared preliminary illustrations should be legible and suitable for all review and approval steps. These illustrations should be exact prototypes of what the author wants to see published. Of course this excludes the final patterns, color, typography, and cartography. The following are some suggestions for the author’s preparation of illustrations:

Author’s original illustrations

1. Neatly sketch and letter illustrations at publication size. Avoid final drafting until after Director’s approval; otherwise, considerable preparation time would be wasted if reviewers suggested major changes or elimination of an illustration.
2. Plan size and position of all lettering.
3. Use only blue-line paper for graphs.
4. On maps, determine if a screened base or color should be suggested. Use only patterns or a color code, unless the final version is suggested to be colored.
5. Consider whether each illustration is adequate. Will two illustrations show the material more clearly? Can two planned illustrations be combined?
6. Use an appropriate base map, adequate but no larger than needed.

7. Be certain illustration titles accurately describe the illustrations.
8. Be certain that the text refers to each illustration.
9. Do not depend on cartographic magic to save a poorly planned and poorly prepared illustration.

Photographs submitted for review should be glossy prints at publication size or larger. This is the only way that photographs can be examined for the quality needed for publication. Mark suggested crop lines on a machine copy of the print.

Glossy prints at size

Tables

Tables may be typed or computer-generated for Region and Headquarters review. Some computer-generated tables are suitable for publication. The format of planned tables generally is flexible. Examples may be examined in recent publications of the Survey. The bodies of tables submitted for review should be double-spaced but may be single-spaced unless extensive editorial work is anticipated. Headnotes and footnotes must be double-spaced. The following are a few helpful suggestions to make table preparation a little easier and quicker:

Author's original tables

1. Titles should describe exactly the table contents.
2. Headings should be concise.
3. Tables of similar data and (or) information should be similar in design.
4. Use facing pages for large tables.
5. Footnotes should precede numbers because they may be mistaken for exponents.

Abstract

The "Abstract" is a digest of the report. Because it will appear in abstract journals and indexing services, it should be written to increase the potential audience of the report. It should be written only after the remainder of the report has been completed.

Digest of report

The "Abstract" should tell what the report contributes and the significance of that contribution (exhibits, 4I, 4J, and 4K). It should not just tell what the report says or what it contains. The "Abstract" indicates the geographic location, purpose, and results of the study. It also may indicate the type of data used and the method of study. If the author reaches any major conclusions, the "Abstract" should present them briefly. Because it is the only part of the report that is read by most people, the author should make every effort to present as much information as possible.

Contribution and significance of report

Other Abstracts

WRSIC Abstract

The Water Resources Scientific Information Center (WRSIC) abstract is required for all published Division reports. Division rules require it to be submitted when technical reports are submitted for approval. It must be double-spaced and no more than 200 words.

Abstracts for seminars and meetings

These abstracts are really summaries. They are used by authors to secure a place on the program at a technical meeting. They require approval if they are to be published.

Editorial considerations

Authors are fully responsible for the editorial condition of their reports. The numerous suggestions below, if followed, will make any report easier to review and approve:

1. Determine the publisher's (Survey or otherwise) style and follow it exactly. Because different publishers have different requirements, they will publish only those reports that meet their specifications.
2. Use a checklist for editorial and technical verification.
3. Use all the reference manuals listed previously, especially "Suggestions to Authors" and "The Elements of Style."
4. Use topic sentences for each paragraph.
5. Use the active voice for all verbs.
6. Present material clearly and concisely.
7. Avoid multiple hyphenated adjectives before nouns.
8. Use parallel construction when comparing two or more items or listing a series of items.
9. Avoid jargon and flowery descriptions.
10. Develop writing skills through practice.

Author responsibility

Publication Design

Design of a report in book or map form requires that the author consider how the text, illustrations, and tables relate to each other. Users and readers benefit when the author produces a product that is pleasing to the eye, as well as easy to use and technically correct. By this stage of report preparation, the author already has chosen the publication medium and has prepared the text and illustrations. Also, the author already has an idea of how the report should look in published form. The following discussions are intended to help the author visualize and prepare suggestions for the printed publication.

Pleasant to look at

Easy to use

Technically correct

Book Format

The information below applies to all reports. Most of it, however, pertains to camera-ready copy prepared by the originating office for publication in the WRIR, Open-File, or possibly cooperator series. Reports in the formal series (Water Supply Papers, Professional Papers, and so forth) follow nearly the same procedure, but the steps usually are handled at Headquarters.

1. Prepare a mock-up (dummy) by cutting up a single-spaced copy of the text and inserting illustrations and tables. A good mock-up will help the author visualize the final report.
2. Remember that books use both sides of the paper. Odd-numbered pages are on the right and even-numbered pages are on the left. Roman numerals are used for the preliminary pages. Beginning with the "Abstract," text pages are numbered in Arabic numerals.
3. Work on a facing-page basis (two-page spread), noting where illustrations or tables may need to be reformatted for better fit relative to text descriptions or appearance.
4. If possible, the image area of text and figures should neatly balance on facing pages.
5. Attach components and add page numbers. Add the numbers to the "Contents."
6. Prepare format-specified components for covers I, II, III, and IV, including backstrap.

Page numbering

Roman and Arabic numbers

Map Format

Map reports are publications that consist of one or more maps or sections on a single sheet or series of sheets; a short text may be included but must be printed on the same sheet. These reports are used when the map

image area is too large and the text too short to be suitable as a book report. They may be black and white or may contain color.

- **Sheet size**--Any standard size within the printer's capability may be used, but sheets should be as small as feasible for economy and convenience. If a map must be extremely large, then divide it into two or more separate sheets. The author will need to be acquainted with the sheet sizes of Survey presses.
- **Color**--Use of color depends on the need of the publication and the publisher's limitations. If the material can be shown clearly in black with one or two patterns or screens of black, then color should not be used. If the data are likely to overlap, then it must be decided whether to present information on one map that has two or more colors or on two or more maps that have black patterns or screened values of black only. This decision should be made in consultation with District and Division staff. Contrasting colors should be used to facilitate review. The author may request final colors. However, in some cases, colors are standard.
- **Mock-up**--Map reports submitted for Division review should include a mock-up that shows the exact position of every component at publication scale and a double-spaced copy of the text and the explanation. Diazo or similar paper prints will suffice for review. The mock-up may be hand lettered, but the lettering size must approximate that to be used in the final version.

A list of essential map components follows:

1. Title
2. Name(s) of author(s)
3. Base credit
4. Mapping credit (if not author's)
5. Publisher
6. Statement of cooperation
7. Report series and number
8. Latitude and longitude
9. Location map
10. Scale
11. Explanation
12. Text (optional)
13. Border
14. North arrow (only if map is not oriented with north toward the top)

UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey
Washington 25, D.C.

WRD POLICY STATEMENT NO. 1

June 4, 1959.

Memorandum

To: All Professional Personnel
From: Chief Hydraulic Engineer
Subject: PUBLICATIONS--Policy of the Water Resources Division

The effectiveness of the Water Resources Division depends largely on its ability to produce reports that meet the great variety of needs for water information. The solution to present and future water problems may well hinge upon the availability, quality, and timeliness of reports. Therefore, we must emphasize the production of reports that will appraise the Nation's water resources, describe techniques and methods to meet water problems, and inform the public generally about water.

Our reports should have the content, quality, and timeliness necessary to establish and maintain leadership in the field of water. Those who are responsible for project planning and execution should plan to use fully all publication media, including the Survey series, publications of cooperating agencies, journals of scientific organizations, and communications outlets to the lay public, such as newspapers, magazines, radio, and television. We must learn 1) to select from our water facts those that are newsworthy, and 2) to present those facts in a manner that will stimulate public interest and satisfy public curiosity.

Much of the success of the Division results from the composite effort of individual authors; therefore, we must continue to recognize the importance of authorship in the Division, and make every effort to aid individuals in their training and growth in proficiency as authors.

Scope of Reports

Goals for reporting during the next decade should reflect the program goals outlined in the Division memorandum, "PROGRAMS AND PLANS: Policy Guides," dated March 27, 1959. The report aspects of those goals are summarized below.

1. Publication of basic data generally will be in one of the following types of presentation:
 - (a) Supporting evidence in a technical report. A technical report will not be used as a vehicle for publishing data in bulk form.
 - (b) In reports designed specifically for the release of basic data, as exemplified by "Surface Water Supply of the United States." For extensive data tabulation, this form is to be used, whether the data are discharge records, well logs, chemical analyses, or others.
2. Comprehensive appraisal reports by basins, aquifers, or regions.
3. Reports on principles and techniques. Publication of these reports would partly fulfill our responsibility for leadership in hydrology. These reports ordinarily would be published in the Survey series, but some might be published in professional journals.
4. Long-range plans for water-resources investigations in a State may be published by the Survey if their contents have general interest.
5. Interim or progress reports may appear either in the Survey's series or in series of the cooperating agencies. These reports would be written for many different readership levels and developed to fulfill better the needs for timely reports for our cooperating agencies.
6. Technical handbooks and manuals describing current investigation methods used in the Division. Would include those for educational and training purposes.
7. Lay-reader reports summarizing, by States, basins, or regions, the Nation's water situation.

8. Nationwide summary reports presenting generalized hydrologic data in map or graphic form to meet general public needs. The National Atlas Series has advantages for this type of material.
9. Hydrologic almanacs, or gazetteers, for each State.
10. Books on hydrology and related fields.
11. News releases, "popular" articles, speeches, and special topics of public interest, using all effective means of communications with lay audiences.

Attainment Guides

Achievement of goals will depend on the willingness of each individual in the Division to accept fully his responsibility. Each individual must also discipline his energies and actions, using the following guides in planning and executing work:

1. Reports are the principle tangible product of the Division; therefore, in the promotion of individuals whose duties include or are related to report preparation, great weight will be given to achievement in report production. In the case of an individual not directly participating in report preparation, report production in his unit and his effectiveness in report review will be considered in promotion. The Division will examine the record of such production in considering any promotion or transfer.
2. Leadership in the field of water is in great part related to our ability to achieve a well-balanced publication program. Therefore, the number of administrative and open-file reports not designed for publication should be kept to a minimum. An administrative report usually will be abstracted from material being prepared for publication.
3. The production of timely, well-written reports results from adequate project planning and scheduling of work to allow time for evaluation of basic data and report writing. It is imperative that an author develop a report outline early in his project, preferably before results and conclusions are available--before work begins, if possible. It is imperative also that maximum use of planning aids (project description, yearly work plan) be made in developing a well-thought-out publication schedule. This schedule should include as many as possible of the various forms of reports, such as lay-reader reports, progress reports, journal articles, and final reports.

4. The responsibility as project chief and as author must be assigned at the beginning of a project and administrative controls should be exercised to assure that the assigned responsibility is fulfilled according to plan.
5. The principal author or authors of a report must remain on their assignment at least until they have completed a manuscript which has had adequate technical review and acceptably meets editorial standards.
6. Work related to manuscript preparation, review, and revision has first priority over most other duties. All personnel who are competent to review manuscripts are expected to do some manuscript review on request. Once review responsibility is assigned, a reviewer must apply himself immediately and diligently to the review task and must meet the deadline mutually agreed upon.
7. The immediate supervisor of an author is responsible to assure that the author's report adequately meets standards before transmitting it to higher levels for review. The Division policy is to provide an author with the assistance and constructive criticism of specialists who are qualified in the subject matter of his report.
8. The effectiveness of a supervisor in generating and handling reports will be judged on the quality of the reports that come out of his office, and this factor will be considered in appraisals of the supervisor's qualifications for greater responsibilities.
9. Within the general policy of the Geological Survey, it is the intent of the Water Resources Division to provide an author with the opportunity to publish his individual ideas, whether or not they are accepted by his colleagues. The author must, however, show that he is acquainted with previous work by others, present a clear and logical argument in defense of his own ideas, and show that he has responded constructively to the comments, suggestions, and criticisms of reviewers.

Responsibility of Author, Supervisor, and Review Personnel

We aim to release from the office of origin only those reports that meet reasonable technical and editorial standards. We intend to accomplish this by providing an author and his supervisor with a workable and constructive procedure for quality control. The basic element in this scheme is to place on the supervisor from whose office a report originates the principal responsibility for these standards. A definition of responsibility at all levels is described in the following paragraphs:

1. It is an author's responsibility to keep his supervisor informed and to seek his help in planning for a report as the project proceeds.

An author bears the primary responsibility for the content of his report, but he is expected to seek and judiciously use the advice

of this supervisor, of his colleagues, and of technical advisors recommended by any administrative level.

An author is expected to keep himself informed on correct editorial practices and to prepare his report conscientiously in accordance with high editorial standards. Review at higher levels shall not be depended upon to compensate for poor work on the part of an author.

When a manuscript is considered to be ready for review, the supervisor will arrange for review by one or more qualified professionals within the Survey (in some cases from outside the Survey). The author may assist his supervisor by suggesting appropriate reviewers. Comments by the reviewers must be considered in the preparation of a final draft to be presented to the author's supervisor for subsequent transmittal through channels toward ultimate publication. The manuscript should be accompanied on its movement to all administrative levels by a brief summary of the comments of each reviewer and of the changes that were made in response to the reviewer's suggestions. This summary should be matter-of-fact and dispassionate. If necessary, the supervisor will prepare the summary. If any significant suggestions made by the reviewers are not accepted, the author will present reasons why he found the suggestions unacceptable.

Regardless of where an author may be during the final stages of the review and publication of his paper, he has the responsibility to do whatever work on his manuscript that may be necessary at any time. Supervisors should assure that commitments on new projects will allow for work on unpublished manuscripts from previous projects.

2. The principal administrative responsibility for the technical and editorial adequacy of an author's report rests with his immediate supervisor. It is not the intent of this policy, however, to make an editor out of a supervisor. Nevertheless, a supervisor will be held accountable if he forwards to higher level a report that clearly is inadequate in any important respect. This responsibility requires that a supervisor will give each report passing through his hands sufficient review to assure himself of the worth of its content, the adequacy of the technical review it has received, and the editorial quality of the manuscript. It cannot be too strongly emphasized that if a supervisor has properly consulted and advised with an investigator throughout the progress of a project and in the planning of the report, little additional burden is imposed by the responsibilities outlined above. The immediate supervisor of an author shall transmit a manuscript to the next highest administrative level along with his comments and recommendations on type of publications.
3. Branch Area Chiefs will receive report manuscripts from originating offices, or project chiefs where appropriate. They will give sufficient review to reports to satisfy themselves that they are adequate in quality. Suitable reports will be forwarded with Area

Chiefs' recommendations to the Branch headquarters through channels specified by the Branch Chief. Report appraisals will be a principal source of information on the performance of District Chiefs and Project Supervisors. A Branch Area Chief, having received a report deemed inadequate either by himself or by the Reports Section of his Branch, will inform himself fully on the nature of the inadequacies and give whatever help he can to the supervisor and to the author in preventing future recurrences of deficiencies, as well as in improving the report in question.

4. The principal purpose of review by the Branch Reports Sections is to judge the scientific and technical quality and the overall adequacy of the reports received, to make editorial and technical improvements of modest character, and to keep adequate records and control of report production and progress. The Branch headquarters will provide Branch Area Chiefs and the Division Chief with quarterly summaries showing the status of reports.

Reports found by a Reports Section to require more than minor adjustments shall be returned promptly to the originating office through appropriate channels.

A Reports Section should make only such technical review of a manuscript as is necessary to judge the overall quality, except in cases where, because of the nature of the subject, a member of the Reports Section staff is a logical technical reviewer. A reports Section is expected to depend largely on the technical reviews made before the report is submitted. A Reports Section, however, must satisfy itself that the technical review has been competent and thorough. In the case of a report which has had inadequate technical review, the Branch should see to it that further review is arranged for. A Branch has the responsibility of setting up standards for appraising the adequacy of technical review, including prior approval of proposed reviewers, if appropriate.

Reports having met all requirements, including those of a Reports Section, shall be forwarded to the Division Publications Officer, through channels prescribed by the Branch.

5. The Division Publications Officer is responsible to assure himself of continuing adequate quality of reports submitted for release or publications. Although the Publications Officer does not have routine technical review functions, he will review reports to the extent necessary to discharge his responsibilities. He will devise and maintain records and control documents needed for constant surveillance of the quality, progress and production schedule of reports.

Reports for which release or publication is desired will be channeled through the Division Publications Officer, who is the central and principal contact with units outside the Division in all matters pertaining to reports. He transmits reports to the Director's Office, for example, and they are routed back through

him from that office. Printer's proofs of reports also pass through the Division Publications Officer.

The Division Publications Officer will make summary quarterly reports to the Office of the Division Chief on the status of reports, and will furnish copies of this report to Branch Chiefs.

Luna B. Leopold

United States Department of the Interior
GEOLOGICAL SURVEY
RESTON, VA. 22092

December 22, 1978

WATER RESOURCES DIVISION MEMORANDUM NO. 79.43

Subject: PUBLICATIONS--Policy of the Water Resources Division Regarding
Written Reports

This memorandum updates WRD Policy Statement No. 1 (June 4, 1959) and amendment (March 7, 1963). My purpose is to reemphasize the importance of the written report, to review and emphasize the placement of responsibility and credit for reports, and to reiterate that authorship enhances professional development and career opportunity.

I have refrained here from discussing the planning and writing of reports, the publications media available for "Survey authors, and the organizational and hierarchical responsibilities and procedures for review and publication. These are important, but they are addressed in the several editions of Suggestions to Authors culminating the sixth Edition, recently published--and in the Publication Guide and technical memorandums of the Water Resources Division, with which you should be familiar.

The Written Report

The Act of Congress which created the U.S. Geological Survey in 1879 established the obligation to make public the results of its investigations. The written report (cartographic or textual) fulfills this obligation for the Survey's program of investigation and research. It serves to archive our findings and to disseminate them.

Three developments during the past dozen or so years--the advent of the computer age, the enlargement and diversification of the user audience, and the effects of inflation on the cost of the traditional Survey book publications--have influenced attitudes toward the written report. These developments have led to a reevaluation of the most suitable form for presenting the results of our work, and have engendered a feeling by some that the written report is being deemphasized as the principal product of the Division. Indeed, the computer printout and computer program are new forms of products, and others are likely to come. However, the written report will continue as a primary vehicle for disseminating and archiving results of research and investigations. Well-written, timely reports are more important than ever because of the enlarged user audience and increased relevance of our work to real world problems.

One Hundred Years of Earth Science in the Public Service

Department of the Interior

GEOLOGICAL SURVEY MANUAL

Program Series	USGS Program Policies
Chapter 9	500.9.1

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- .1 Purpose and Scope. This chapter provides policy and procedures for obtaining clearance of the Director for publication and oral presentation outside of the USGS.
- .2 Policy.
- A. All writings in which the USGS has a proprietary interest, and all writings in which the author's title and USGS affiliation will be shown, must be submitted to the Director for approval or clearance prior to release for outside publication.
 - B. The USGS is considered to have a proprietary interest, in all manuscripts based on research or investigations conducted under USGS auspices, or on data obtained under those auspices which have not already been released to the public.
 - C. Some writings shall include acknowledgment of official authorization, using the wording "PUBLICATION AUTHORIZED BY THE DIRECTOR, U.S. GEOLOGICAL SURVEY," to be determined during the review process.
 - D. Abstracts that are to be published alone must be cleared with the Director in the usual manner, but clearance for an abstract is not required when the paper abstracted has been previously approved for publication.
- .3 Oral Presentations. The rules for clearance by the Director apply in a more limited way to oral presentations before societies or other groups. Speakers must recognize their responsibility for safeguarding the USGS against embarrassment; must use discretion in discussing controversial topics; must not discuss unsettled or unannounced Department of USGS plans and policies, or prematurely disclose the results of investigations. If there can be any doubt as to the propriety of the content or tone of a proposed speech, the statement should be reduced to writing and submitted in advance for review and decision by Division officers and the Director. Divisions may set up Internal requirements for clearance of oral presentations for which referral to the Director is not considered necessary. For procedures regarding the use of Form 9-1185, Notice of Intention and Certificate of Compliance-Nonofficial Expression, refer to SM 370.735.4.
- .4 Administrative Reports. Reports prepared by the USGS for other governmental agencies for which it is doing work (Federal agencies

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only), or with which it is cooperating (Federal, State, or municipal), are released to cooperating agencies in recognition of the proprietary interest those agencies have in them, usually as a result of financial expenditure. Frequently such reports are submitted informally to the cooperating agency for review before they are submitted to the Director for approval and formal transmittal to the other agency. Even though a cooperating agency is entitled at all times to results available from an investigation, it should be made clear to that agency that all results and reports made available to it in the form of administrative reports must not be released to the public in any form and must also be regarded as preliminary until approved by the Director. Exceptions to this provision are reports that contain only factual data normally released to the public without formal approval of the Director (e.g., streamflow records).

- .5 Other Manuscripts. Manuscripts in which the USGS has no proprietary interests and in which the author's official connection with the USGS is not to be shown do not require approval by the USGS prior to publication. For example: employees of USGS may wish to publish the results of some investigation carried on by them under other auspices prior to joining the USGS, and they have prepared the manuscript on their own time and wholly without cost to the USGS. However, the authors should send to their Division Chief (or equivalent supervisor) a memorandum briefly outlining the intention and the circumstances. This course will serve to make the intention a matter of record so as to prevent or lessen the possibility that the propriety will later be questioned.

Responsibility and Credit for Reports

It is Geological Survey policy that its investigators bear primary responsibility for their findings and be credited publicly for their work. This policy stems from recognition that the success of the Survey in carrying out its mission is entirely reliant upon the skill and dedication of its employees. Implementation of this policy requires that Survey investigators document their work and findings, and that authorship of reports be displayed clearly.

The Geological Survey has a proprietary interest in, and is accountable for, the work performed by its employees. Accordingly, supervisors at all levels have the responsibility for assuring that reports prepared under their supervision are accurate, well-written, impartial, and in conformance with Survey policies.

Procedures exist to provide support to authors in the preparation, review, and publication of reports, and to facilitate the carrying out of supervisor's responsibility. Of particular note, because it is part of the nucleus of our system of assuring technical excellence, is the practice in the Water Resources Division of technical reviews by colleagues. As an integral part of their Survey responsibilities, all employees are expected to participate in technical review when asked. Participation in such reviews has priority over other duties, within realistic management as seriously as he does his responsibility for his own reports. The District Chief or Program Manager has primary responsibility for assuring the adequacy of colleague review--at both ends, the author's office and colleague reviewer's office.

Authorship

I emphasize here the benefits of authorship to the individual. Authorship credits professional achievement for it associates, on the record for all to see, the individual and his contribution. There are, of course, other expressions of professional achievement, but none so clear and lasting in our kinds of work as that expressed by authorship. Careers are not made by bibliographies, but professional reputations are enhanced by good work as expressed in high-quality reports. The aid to career advancement should be self-evident.

Summary

The written report will continue to serve the Survey as a most important medium of information transfer to the public. The timeliness and high quality of the written report brings credit to the Survey and enhances

the professional reputation and chances for career advancement of the author. All levels of project and program supervision share the responsibility for assuring the timeliness and quality of our written reports.

J. S. Cragwall, Jr.
Chief Hydrologist

Distribution: A, B, S, FO, PO

Department of the Interior

GEOLOGICAL SURVEY MANUAL

<u>Program Series</u>	<u>USGS Program Policies</u>
Safeguard and Chapter 14 Release of Geological Survey Information	500.14.1

.1 Purpose. Survey Order No. 202, issued on September 25, 1950, enumerates general policies and requirements regarding release of Geological Survey information, including proprietary information received from private sources. the purpose of this chapter is to incorporate Survey Order No. 202, with appropriate revisions, into the Survey Manual.

.2 Background. As a Federal agency dedicated to public service, the Geological Survey is under obligation to conduct its activities and to make the results of its scientific and engineering investigations available in a manner that will best serve the whole public, rather than the interest and benefit of any special group, corporation, or individual.

The widespread respect for Geological Survey's integrity and impartiality, and its consequent value to the Nation, has been built, and will continue to rest, largely upon its careful fulfillment of that obligation.

For guidance of the Survey staff members in their day-to-day tasks and in their dealings with outside groups or persons, certain policies and requirements have been established for practical application of the general ethical standards and of the provision in the Organic Act that "the Director and members of the Geological Survey *** shall execute no surveys or examinations for private parties or corporations."

.3 Safeguarding of unpublished Survey information. All information (particularly information of economic significance) gathered through investigations and observations by the staff of the Geological Survey or by its contractors must be held confidential and not be disclosed to others until the information is made available to all, impartially and simultaneously through Director-approved formal publication or other approved means of public release, except to the extent that such release is mandated by law. (The term "confidential" in these cases is not to be confused with security classification, but merely means protection from disclosure before release to the general public.)

With approval of the Director, the following types of information have been excluded or excepted from the requirement to hold unpublished information confidential:

A. Water Resources Division. Hydrologic measurement resulting from field observations and laboratory analyses, after they have been

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New

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reviewed for accuracy by designated Water Resources Division personnel.

- B. National Mapping Division. Copies of unpublished or partially completed topographic maps, image products, and associated cartographic data in graphic and digital form including geodetic control survey data, elevation data, reproductions of space and aerial photographs, and copies of color feature separates.
- C. Conservation Division. Administrative maps, well information, subsurface interpretations, and related data released to lessees, permittees, and contractors as necessary for enforcement of the mineral leasing laws and promotion of sound prospecting and development practices.

The phrase "Disclosed to others," as used in this chapter, does not include cooperative or other Federal, State, and local governmental agencies and their staffs, to whom, under joint funding agreement or in the public interest, the observations and results of the investigations should be made available. However, it is important that when the results of an investigation are made available to such an agency prior to general release to the public, the Geological Survey shall make it a condition of the release to the other agency that the report must not be released to the public in any form until the report has been released by the Geological Survey or until the Director has authorized release by the other agency.

To satisfy the public need for timely information, formal publication or other approved methods of release should be accomplished as promptly as possible. When there is an immediate demand for Survey data and prompt publication is impossible or unlikely, open-file releases should be appropriately announced, and where applicable, the reports thus released should contain an adequate statement of their preliminary nature and of the fact that they are subject to change.

A long-standing but limited exception permits Survey members to communicate orally with the owner or manager of a mineral property during the progress of its investigation, provided that the information relates to geologic results and observations that may be of value in the development of the property; however, written statements must be avoided, lest they be used for promoting or unduly enhancing values. The propriety of disclosing any such information orally must of course be appraised while considering local conditions and the possibility of misuse of information; no data that might be detrimental to a

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neighboring property owner should be released under this authorization. Individual Survey members must not leave notes or sketches that could be used for promotional or other purposes that could be judged unethical.

Geological Survey policy definitely precludes the making of any promise to the owner or lessee of any property, as a prerequisite condition under which he/she will permit access to and study of that property, that the written report of the observations and conclusions reached about the property will be submitted to him/her for review and will not be published except in a form and with a content approved by the owner or lessee. As an impartial fact-finding and fact-issuing agency, the Survey cannot accede to private censorship over the results of its own official work.

There is no Federal law authorizing employees of the Geological Survey to enter on private land against the wishes of the owner of his/her representatives, and only a few of the States have enacted laws giving such authority. Although fieldwork of the Survey cannot be done without entering on such land, Survey field representatives must bear in mind that in this regard, as well as in the use of information about private properties, they must always respect the rights of the individual. Fieldworkers should respectfully request of the property owner or his/her representative permission to enter on the property as representatives of the U.S. geological Survey to perform an investigation, the results of which are to be used in the preparation of official reports and maps to be published by the Geological Survey for the benefit of the public. In the experience of the Survey, objection to requests for entry has been rare.

.4 Safeguarding proprietary information received from private sources.

Proprietary information such as geological and geophysical data, mine maps, drill records, estimates of reserves, and figures on various categories of production and utilization of water and production of power is supplied by private persons and corporations to the Geological Survey through the following procedures:

- (1) In a volunteer manner,
- (2) in accordance with proprietary terms of contracts, and
- (3) in fulfillment of submittal requirements set forth in appropriate laws such as OCS Land Act, the Mineral Leasing Act of 1920 as amended, and the related regulations.

1/28/80 (Rel. No. 1694)

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GEOLOGICAL SURVEY MANUAL

<u>Program Series</u>	<u>USGS Program Policies</u>
Safeguard and Chapter 14 Release of Geological Survey Information	500.14.4

This information, to the extent it may be exempted from disclosure under the Freedom of Information Act, 5 U.S.C. 552 (b), must be carefully safeguarded in accordance with Survey standards for the transmittal and storage of proprietary data. Proprietary information supplied voluntarily, and information acquired through regulations and contracts (during their proprietary term), must not be disclosed to other Federal Agencies except according to established standards. Proprietary information must not be published or otherwise disclosed outside of the Federal Government unless specific written permission is obtained from the person or organization that furnished the information or unless specific statutes require disclosure. If disclosure is required by statute, the person or organization receiving the information must agree to protect the proprietary nature of the information as required by the statute. (See SM 450.2 for procedures for protecting such information if a Survey member is called upon to testify in court.)

If proprietary information is supplied voluntarily, it is desirable to obtain at the same time a memorandum of agreement which should be explicit in describing the material and the nature of its permissible use. If a letter is written to any supplier of proprietary information requesting permission to include or use that information in a report to be published or otherwise released, a similar procedure should be followed. However, except with specific prior approval of the Director, Survey representatives may not submit to any person or organization the written text of a report or even the part of it based on the information supplied by that person or organization prior to public release of the report.

1/28/80 (Rel. No. 1694)

New

Department of the Interior

GEOLOGICAL SURVEY MANUAL

<u>Program Series</u>	<u>USGS Program Policies</u>
Chapter 5 Policy on Release of Written Information to the News Media	500.5.1

- .1 Purpose and Scope. This chapter establishes USGS policy and procedures for the release of written information to the news media.
- .2 Policy.
- A. The USGS Information Office, through established channels of review and clearance within the USGS and the Department, prepares and distributes most of the USGS's press releases.
- B. Authorization for others to Issue statement to news media is limited to field and staff employees at supervisory levels located outside of the national headquarters area. It applies to statements or information given to news media representatives: reporters, editors, or writers for newspapers, magazines, trade, scientific, or technical publications; and requested by cooperating agencies for their use in drafting such statements to be released by them. In general, statements issued to local or regional media should be factual, noncontroversial, and brief (usually not more than a page or two in length), avoiding highly scientific or technical terminology. Statement that discuss broad policy matters or that are flavored with editorial, endorsement, or similar characteristics, should be referred to higher levels of authority for decision.
- C. Statements should not be used as vehicles for the premature disclosure of new scientific and technical information. Information about results of current USGS programs that has not been incorporated in reports already available to the public must be brief, general, and properly qualified as preliminary and tentative.
- .3 -Procedures.
- A. Copy Identification. A copy of each statement shall be sent to the Information Office through channels, with copies of the statement furnished as required to applicable USGS Offices. Each statement should be identified by the name of the person who released it, the name of the person(s) to whom it was released, the name of the newspaper, magazine, publication, or the radio or television station represented, and the date of preparation.

10-07-77 (Rel. No. 1599)

Department of the Interior

GEOLOGICAL SURVEY MANUAL

Program Series	USGS Program Policies
Chapter 5	500.5.3B

- B. Release. Press releases of all USGS Offices will be issued on the regular USGS letterhead of those offices unless otherwise prescribed by the Information Office and will include the name and phone number of the spokesman for the release and release date, or date of mailing.
- C. Liaison. Employees should be aware that each USGS Division or Office has named a specific person at headquarters to act as liaison to the Information Office. Such liaison helps in the orderly and timely process of assessing subjects or circumstances that require news coverage, reviewing and clearing releases, and, in general, working with the Information Office so that news services can be carried out in an effective manner. If there are questions relating to the issuance of press releases at USGS offices outside the National Center, employees are urged to contact such organizational liaison, or the Information Office, for guidance on subject matter, press release format, content, and distribution.

10-08-77 (Rel. No. 1599)

WATER RESOURCES DIVISION PUBLICATIONS GUIDE

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PROJECT REPORT SCHEDULE

Project _____
 Report Title _____
 Author(s) _____
 Conference Attendees _____
 Intended Audience _____
 Report Type and Publication Medium _____

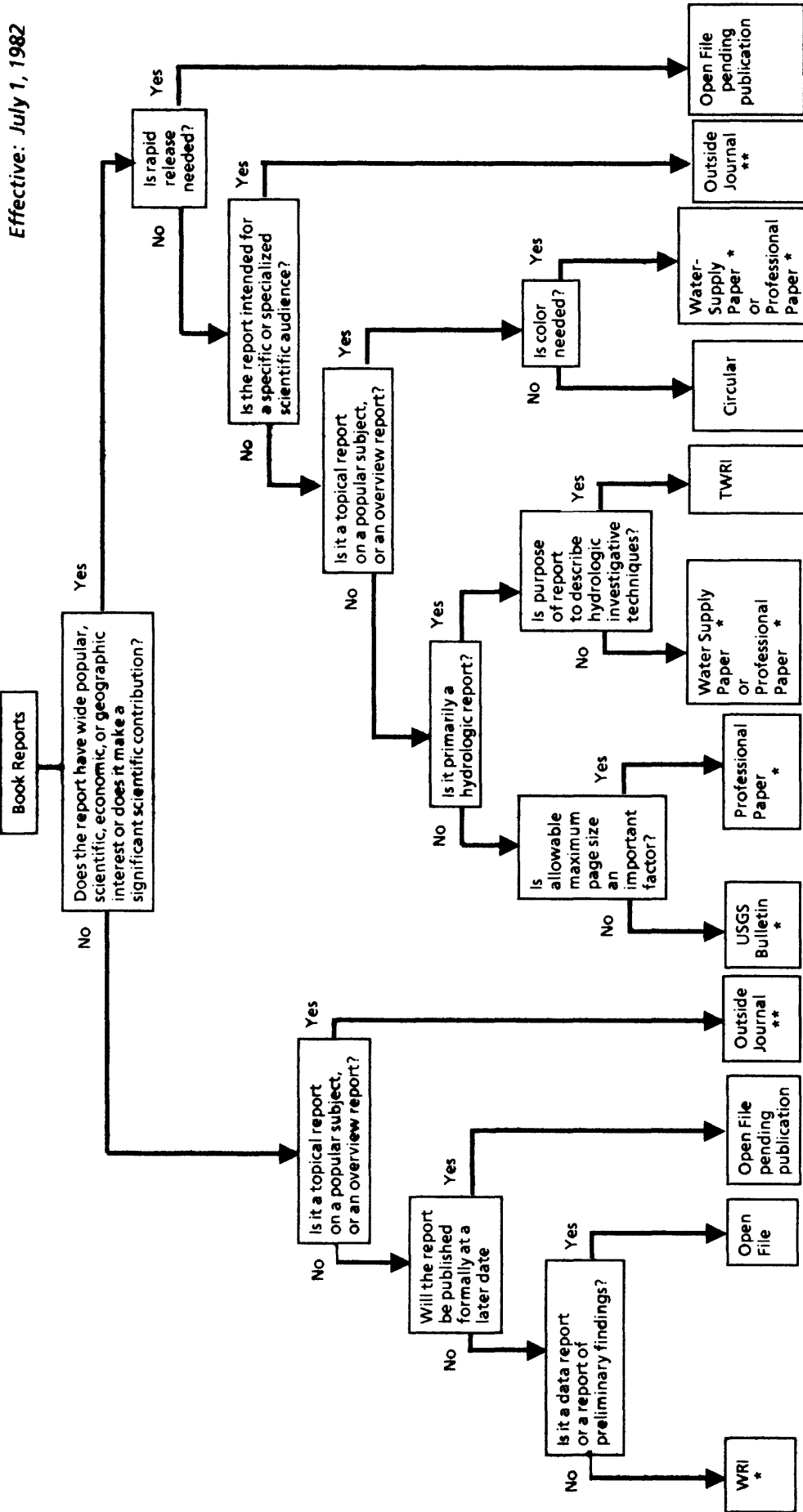
<u>Report Schedule</u>	<u>(Target Date/Completion Date)</u>
Planning and Prewriting	
Preliminary Report Outline	
Base Map Request	
Initial Annotated Outline or Preliminary Report	
Illustration Plan	
Final Annotated Outline or Preliminary Report	
Writing, Self-Editing, Rewriting	
First Draft	
Author's Review and Revision	
First Typing	
Editing and Review	
Editorial Review	
Author's Revision	
Discipline Specialist or Section Chief Review	
Author's Revision	
Section Chief or Discipline Specialist Review	
Author's Revision	
Second Colleague Review	
Author's Revision	
Final Typing and Editing	
District Chief's Review	

PROJECT REPORT SCHEDULE

Report Schedule (Continued)	(Target Date/Completion Date) (Continued)
Approval and Publication	
Transmittal to Region	
Report Approval	
Report Publication	
Support Needed	
Maps _____	
Typing _____	
Drafting _____	
Consultations _____	
Special Illustrations _____	
Report Reviews	
Technical _____	
Editorial _____	
Suggested Reviewers _____	
Report Status _____	
Other _____	

DECISION TREE FOR SELECTING PROPER OUTLET FOR WRD-PREPARED BOOK REPORTS

(Any book or map report released to the public may be published by a cooperating agency. The quality and distribution of book and map report published by cooperating agencies may equal or surpass that of equivalent USGS publications.)

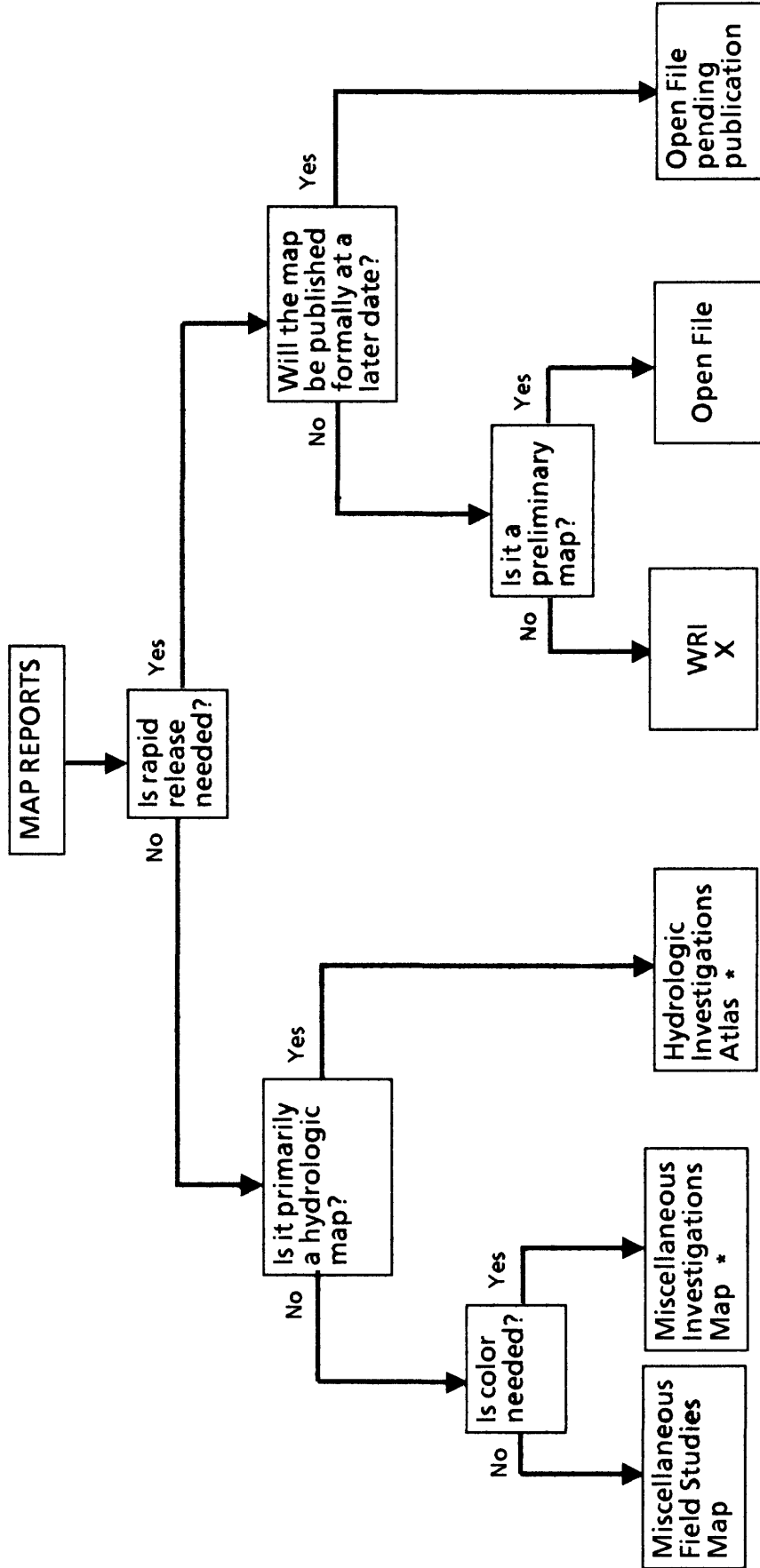


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 ** Use of color, plates or oversize illustrations optional with publisher

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 440 National Center, Reston, Virginia 22092

DECISION TREE FOR SELECTING PROPER OUTLET FOR WRD-PREPARED MAP REPORTS

(Any book or map report released to the public may be published by a cooperating agency. The quality and distribution of book and map reports published by cooperating agencies may equal or surpass that of equivalent USGS publications.)



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440 National Center, Reston, Virginia 22092

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 35, NO. 7 (JULY, 1961), PP. 1660-1680, 10 FIGS., 1 PLATE

GEOLOGICAL NOTES

A SCRUTINY OF THE ABSTRACT¹

KENNETH K. LANDES²
Ann Arbor, Michigan

ABSTRACT

The behavior of editors is discussed. What should be covered by an abstract is considered. The importance of the abstract is described. Dictionary definitions of "abstract" are quoted. At the conclusion a revised abstract is presented.

Presumably new editors, like new senators and small children, should be seen and not heard. But unfortunately the Association has elected (the electorate had no choice) an editor who is a non-conformist. For many years I have fretted over the inadequate abstract, and now perhaps I can do something about it--but not by keeping quiet.

Many of the abstracts appearing in the publications, including the meeting programs, of the A.A.P.G can best be described by the use of a homely word that refers to an infestation by certain minute organisms. The abstract appearing at the beginning of this note is in that category. I regret to say that it is not an extreme case. My collection contains several that are worse. Dean Russell of Louisiana State refers to such abstracts as "expanded titles." They could also be looked upon as a table of contents, in paragraph form with "is discussed" and "is described" added so as to furnish each subject with the verb necessary to complete the sentence. The reader is left completely in the dark not as to what the paper is about but as to what it tells! The information and the interpretation contained therein remain a mystery unless the reader takes the time to read or listen to the entire paper. Such abstracts can be likened to the "teasers" which your local movie manager shows you one week in the hope of bringing you back next week. But the busy geologist is more likely to be vexed than intrigued by the coy abstract.

To many geologists, especially to the tyros in exposition, the writing of the abstract is an unwanted chore required at the last minute by a rule-ridden editor or insisted upon even before the paper has been written by a deadline-bedeveled program chairman. However, in terms of market reached, the abstract is *the most important part of the paper*. For every individual who reads or listens to your entire paper, from ten to five hundred will read the abstract. It is much better to please than to antagonize this great audience. Papers written for oral presentation should be prepared with the deadline the abstract date instead of the delivery date. Later discoveries can be incorporated within the paper-- and they would miss the program abstract anyway.

My dictionary describes an abstract as "a summary of a statement, document, speech, etc." and "that which *concentrates in itself the essential qualities of anything more extensive* or more general, or of several things; essence." The definition I like best has been set in italics. May all writers learn the art (it is not easy) of preparing an abstract containing the *essential qualities* of their compositions! With this goal in mind I append an abstract that I believe to be an improvement over the one appearing at the beginning of this discussion.

ABSTRACT

The abstract is of utmost importance, for it is read by 10 to 500 times more people than hear or read the entire article. It should not be a mere recital of the subjects covered, replete with such expressions as "is discussed" and "is described." It should be a condensation and concentration of the *essential qualities* of the paper.

¹ Manuscript received, May 5, 1951

² Editor of the *Bulletin*.

GEOLOGICAL NOTES

A SCRUTINY OF THE ABSTRACT II¹

KENNETH K. LANDES²

Ann Arbor, Michigan

ABSTRACT

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

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

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

To many writers the preparation of an abstract is an unwanted chore required at the last minute by an editor or insisted upon even before the paper has been written by a deadline-bedeveled program chairman. However, in terms of market reached, the abstract is *the most important part of the paper*. For every individual

who reads or listens to your entire paper, from 10 to 500 will read the abstract.

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

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

ABSTRACT

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

¹Revised from K. K. Landes' "A scrutiny of the Abstract," first published in the *Bulletin* in 1951 (*Bulletin*, v. 35, no. 7, p. 1660). Manuscript received, June 3, 1966; accepted, June 10, 1966.

Editor's note: This abstract is published together with the Royal Society's "Guide for Preparation and

publication of Abstracts" to give *Bulletin* authors two viewpoints on the writing of abstracts.

²Professor of geology and mineralogy, University of Michigan. Past editor of the *Bulletin*.

OPINION

The Abstract Rescrutinized

It would seem that little more could be said about writing abstracts after K. K. Landes's (1951, 1966) concise classics, but an irritating new weakness seems to be creeping into manuscripts, calling for further scrutiny. I refer to the growing tendency of authors to write long, eloquent abstracts that are actually *introductions* rather than summaries. Let me reproduce one sentence (slightly disguised) that begins the "abstract" of an otherwise excellent manuscript I am currently reviewing: "The longstanding concept of the . . . region of . . . as part of the stable craton which has undergone only minor tectonism during the past several hundred million years is being modified in view of accumulating evidence for minor, but widespread Quaternary and recent activity." This preamble is followed by 1 1/2 similar pages, which would be a good introduction but is not a good abstract.

I would like to help authors avoid this problem by adding a few refinements to Landes's maxims. First, start the abstract by telling the reader at once what the paper is: new data, a review of progress, a new technique, a synthesis, or whatever describes the *nature of the paper*. To be sure, this recommendation can in principle be followed by a well-designed title, such as Isachsen's (1975) "Possible evidence for contemporary doming of the Adirondack Mountains, New York, and suggested implications for regional tectonics and seismicity," almost an abstract by itself. But if the title does not make it clear what the paper is, the abstract should, preference the first line: "This paper reports a comparative study of digital enhancement techniques for synthetic aperture radar (SAR) using SIR-B and Seasat images of the Canadian Shield" (Masuoka et al., 1988). This first line should not be a simple restatement of the paper's title.

A second suggestion: write the abstract in a terse, almost telegraphic style, saving your eloquence for the body of the paper. The abstract is not an introduction to the paper, but a freeze-dried version of it, so to speak, intended as a "condensation and concentration of the essential information in the paper" (Landes, 1966). It should be written for quick reading, with the assumption that interested readers can go on to (or look up) the paper itself. Unnecessary descriptive phrases ("critically placed"), qualifiers ("limited number"), and caveats ("it must be pointed out") that may be necessary for completeness in the text should be left out of the abstract if at all possible. (The examples quoted are from actual manuscripts I have recently reviewed.)

A final suggestion: pack as much specific information into the abstract as possible—locations, rock names, temperatures, pressures, anomaly values, stratigraphic thicknesses, petrologic systems, and the like. The way to do this is to cancel temporarily the assumption of the previous paragraph, and to write the abstract as if it were all that would survive the fall of

civilization. There are obviously limits to how much can be included in an abstract, especially without figures, and it may even be necessary to use phrases detested by Landes, such as "is described" or "is presented." But abstracts can be surprisingly informative and self-sufficient if properly written.

A word on timing: I suspect that many authors make the mistake of writing the abstract before the paper. I used to do this myself, until I found I was writing—yes—introductions. The way to avoid this is obviously to write the abstract after the paper is finished, when you will know exactly what you are summarizing.

Following Landes's precedent, I present an abstract of this paper.

This paper presents three suggestions for better scientific abstracts: begin the abstract by briefly describing the *nature of the paper* (new data, review, critique, etc.); write the abstract not as an introduction to the paper but as a *tersely styled summary* of its essential information; and include as much *specific information* (locations, compositions, temperatures, etc.) as possible. Write the abstract after finishing the paper, to avoid the common fault of abstracts that are good introductions but poor summaries.

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REPORT MANAGEMENT

Need

The Survey and the Division have established guidelines and policies to be certain that the author's manuscript becomes an attractive and useful technical publication--a high-quality report. Without these guidelines and policies, the Survey might risk publishing of reports that are technically inadequate and that violate the basic policy of total impartiality. All reports require continuing attention even after the author has submitted what is hoped to be a faultless manuscript.

Each office should maintain a team that is responsible for report management--from original project and report planning through report publication. This team should include the District Chief, section chief, report specialist, illustrator, editor/typist, and the project chief. Each one has defined responsibility and authority in report production. Regular communication between the author and the other members of this group is essential in all phases of report production.

This section of the manual discusses procedures that guide reports through the steps between the author's final draft and the published report (exhibit 5A).

Review

A competent and thorough technical review is the most certain way to improve and ensure the high quality of the final report. Many reports that reach the regional reports improvement advisors and even Headquarters are returned because of technical flaws or policy violations. Many times, the authors have not responded adequately to reviewers' comments or suggestions.

The author has the final responsibility for the report, and the report goes through many reviews; however, no report ever is perfect. Many report problems detected during review may be avoided or lessened by the author's attention to the following suggestions:

1. Submit the best technical and editorial effort possible.
2. After consultation with the supervisor, select one of these three methods of review: concurrent (reports sent to all reviewers at the same time), consecutive (report sent to only one reviewer at a time), or group (a conference of several reviewers).

ATTRIBUTES OF A HIGH-QUALITY REPORT

1. Reads easily.
2. Well organized
3. Technically sound.
4. Reaches intended audience.
5. Attractive format and illustrations.
6. Minimum time in all review steps.

District report-management team

Technical review

Policy problems

Review methods

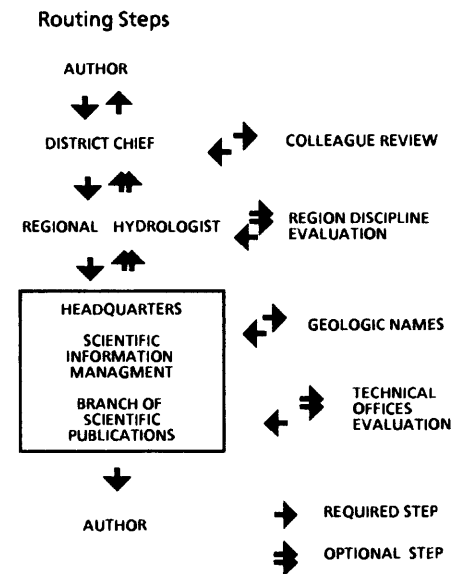
3. Respond quickly and positively to all reviews.
4. Extrapolate specific comments throughout entire report.
5. Give the report an editorial and verification review after each review by another person.
6. Look report over carefully for everything after Headquarters approval.
7. Respond favorably to ALL "Conditional-Approval" comments from the Region and Headquarters.

Types of review

Reviews are of several types; all are necessary before a report is considered to be ready for approval. The four major types of review are discussed briefly below.

- **Editorial** (exhibits 5B and 5C)--This review should consider consistency of terminology and usage, clarity of expression, proper grammar, agreement of "Contents" with headings, illustration titles, and table titles; adherence to the selected publisher's typographic style; consistent use of topic sentences for paragraphs; completeness of all components and support documents; suitability of illustrations for intended publication series; and readability by intended audience.
- **Technical** (exhibits 5D and 5E)--This review considers all technical aspects of the report, such as adequacy of data, appropriateness of methods of investigation, and validity of conclusions.
- **Verification** (exhibit 5F)--This review includes a check of arithmetic in tables, consistency of units, consistency of headings, illustration titles, and table titles; agreement of numbers in text with figures and tables, agreement of cited references in text with list of references; correct pagination; agreement of titles on all support documents; and consistency of data throughout the report.
- **Policy**--This review is a check to assure that the report avoids recommendations of any kind, avoids words like "should" and "must," avoids bias in suggestions for additional work, avoids any type of advocacy, avoids criticism of colleagues or other agencies, and avoids speculation.

REPORT REVIEW AND EVALUATION



STEPS	PRO CH	DIS	REG	HQ	CO-OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
Illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Policy guidelines

The high standard of excellence in the Survey is the result of a group effort that begins with the author, proceeds through a series of reviewers, and ends with the author again. The author's responsibility already has been discussed. The policy guidelines that follow are meant for all reviewers at all levels and for most types of review:

Review policy

1. The only objective of any review is to improve the quality of the report (exhibit 5D).
2. Reviewing a report is a privilege and indicates the professional reputation of the reviewer (exhibits 5D and 5E).
3. Review should be part of the duties and performance standards of all professionals.
4. All professionals should have an opportunity to review the work of more experienced authors. The ability to review is learned by practice.
5. Effective reviewers must have adequate technical background and review skills.
6. Remember that the author is a colleague. Review his or her report as you would like your own manuscript to be reviewed.

General guidelines

The following general guidelines will help reviewers at most levels of review:

1. Examine the routing sheet to see where the report has been. Ascertain that your own review is in the proper order and that the author has responded positively to past reviews.
2. Adopt a system of review and follow it (exhibits 5G and 5H).
3. Communicate with the author by providing written comments in the margin or by memorandum for major questions and comments. If direct and immediate discussion with the author might resolve a point, use the telephone.
4. Check the overall organization.
5. Check for compliance with policies of the Survey and the Division.
6. Be certain that the contents of the "Abstract," the "Purpose," "Scope," "Conclusions," and the news release agree and that they emphasize the proper material in a proper manner.

7. See that the title describes the subject of the report, refers to the proper time and location, and lacks any consulting tone. The title should be the same everywhere: cover, title page, introduction, WRSIC abstract, news release, and all supporting documents submitted with the report.
8. Check to ensure the technical consistency of text, illustrations, and tables.
9. Be certain that the "Abstract" describes the purpose of the investigation and emphasizes all results of the investigation.
10. Be certain that the "Introduction" adequately states the purpose and the scope of the report. Also see that the "Introduction" adequately states the need for the project.
11. Check to see that the approach is described, the methods are adequate, and the techniques are valid.
12. Determine if the report accomplishes its stated purpose and confines itself to the stated technical and geographic scope.
13. Ascertain the report's clarity, readability, and general appearance for the intended audience. Try to eliminate all jargon and cliches.
14. Ascertain whether the report is technically sound and if assumptions and limitations are adequately defined.
15. Ascertain the need for each table and illustration. If needed, ascertain their completeness and understandability.
16. Be certain that all trade names (if needed and used) are properly disclaimed.
17. Cross-check all references for spelling, dates, page numbers, and so forth.
18. Be certain that appreciation is expressed for non-Survey cooperation. Also see that previous work is properly acknowledged from which ideas, facts, illustrations, tables, and data were taken.
19. See that the "Conclusions" are adequately supported by the data and have been derived logically from material presented in the text.
20. Read the news release to see that it is factual, free of jargon, and supported by the report. Note that it should be nonsensational in tone.
21. Ascertain whether the intended publication medium is suitable.

6. Review by the district chief differs greatly among Districts. At a minimum, the review should satisfy project objectives and compliance with Survey policies.
7. The author and the district chief should select two or more technical colleague reviewers--enough to cover all subjects. At least one reviewer should be from outside the District.
8. The section chief should review the manuscript after the suggestions of the colleague, the Region, and the Headquarters to see that review suggestions have been incorporated by the author. This is to ascertain whether colleague review and author's responses were adequate.
9. After final approval (and probably numerous changes), the author should make one more editorial and verification review.

Two or more colleagues

Colleague Review

The purpose of colleague review is to improve or ensure the technical adequacy of the report. The following suggestions, some of which are probably repeated from previous lists, are intended to improve and assist this phase of report review:

Technical adequacy

1. Choose colleague reviewers who are technically qualified on the principal subjects of the report.
2. Encourage greater use of review outside the Survey.
3. Budget time and expenses for colleague reviewers.
4. Train technical personnel in review skills.
5. The following check will help make the review orderly and complete:

Title: Correct? Concise?

Contents: Organized? Logical?

Abstract: Factual?

Introduction: Problem? Need? Purpose? Scope?

Location? Time? Acknowledgments?

Text: Background? Approach? Data?

Illustrations: Necessary? Legible? Size?

Tables: Necessary? Understandable?

Conclusions: Documented? Relevant?

Reasonable?

Summary: Condensation?

Region Review

The purpose of report review in the Region is to ensure technical adequacy, editorial quality, and conformance with Survey policy. Most of this review is done by the region reports improvement advisors and the region discipline specialists. Noninterpretive reports, abstracts, and refereed Journal articles may be approved at the region level.

At this level, the reviewers are not responsible for correcting technical and editorial problems--although they might be able to correct some policy problems. They reserve the right to return reports to the District for repair of any problems. Remember these reviewers have only a limited amount of time for each report.

Headquarters Review

Headquarters review is the final formal quality check for reports. Here, the report is evaluated for technical quality, adequacy of colleague review, and conformance with Survey policy. A check also is made to ascertain adherence to standards prescribed for geologic names, illustrations, and text. Further evaluation by technical discipline specialists also may be necessary at this time.

All reports submitted to Division Headquarters for publication approval are reviewed by the staff hydrologist for reports in Scientific Information Management (SIM). Of necessity, this review must be rapid because of the large number of reports being looked at by one or two people. The review procedure in SIM is about as follows:

1. Read correspondence, colleague review comments, and author's responses to the reviews.
2. Read the routing sheet for an idea of the time spent in review, the number of reviewers, and who the reviewers were.
3. Carefully read the "Title," the "Abstract," the "Introduction," the "Conclusions," and the news release (looking for agreement between all sections and proper emphasis as discussed earlier).
4. Look at the illustrations and tables.
5. Scan the entire text.

Reports having met all technical, editorial, and policy requirements, will be approved for publication by the staff hydrologist for reports on behalf of the Chief Hydrologist and Director.

Technical adequacy

Policy conformance

Editorial quality

Limited review time

Technical quality

Adequacy of colleague review

Policy conformance

Geologic names

Limited review time

STEPS	PRO CH	DIS	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline illus. & tables	X	X			
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Policy check

Very limited review

Report-Tracking System

The Division has a tracking system to follow all reports from arrival at Headquarters through publication; it also includes Region-approved reports that do not go on to Headquarters. When a report arrives at Headquarters, information from the routing sheet is entered into the data base. Thereafter, the system is kept current and is accessible to all Division personnel. The system also includes MIS bibliographic information for all Division authors. The tracking system can:

1. Track the progress of any report through the system.
2. Be used for Headquarters management summaries, District and Region monitoring of progress, and statistical evaluation.
3. Help authors locate their reports and check on approval dates, retrieve biographical information, and search for topic words in titles.
4. Provide instant information on the status of every report entered into the system since 1980.

Report Availability

The Survey announces the availability of all reports to all interested individuals on equal terms and does not make Headquarters-approved reports available to anyone until copies are available in depositories and have been advertised by news release or in "New Publications of the U.S. Geological Survey" (monthly list). The general policies regarding report availability are discussed briefly below:

1. Data reports may be released after a check for accuracy, approval by the Regional Hydrologist, distribution to depositories, and announcement by news release or the monthly list of new publications
2. Interpretive reports must be released simultaneously to all interested parties or agencies only after Headquarter's approval. The cooperater may have a copy for review, but must not release the information.
3. It is the responsibility of the District Chief or equivalent to ensure that the timely and equal release of reports is assured by announcing their availability in news releases and/or in the Survey's monthly list of new publications.

Equal availability

STEPS	PRO	DIS CH	REG	HQ	CO- OP
Long-range plan		X	X		X
Project proposal	X	X	X		X
Project description	X	X	X	X	
Work schedule	X	X			
Report planning	X	X			
Topic outline	X	X	X		
Annotated outline	X	X			
illus. & tables					
Project file	X	X			
Quarterly reviews	X	X			
Report drafts	X	X			
Report reviews	X	X	X		
Report approval			X	X	
Report publication		X		X	X

Simultaneous release

District Chief responsibility

Reports may be distributed by the following:

1. Superintendent of Documents.
2. Specified depositories.
3. Books and Open-File Services Section at Denver.
4. National Technical Information Service.

Report distribution

News Releases

News releases communicate the results of our investigations through the news media (exhibit 5L). These releases are not just publicity tools, but are an integral part of our mission to publish and disseminate information. They are a means to reach the general public.

Reaching the public

The first draft of the news release should be written by the author so that the most significant findings of the project can be emphasized. It must contain only the facts and the conclusions expressed in the report and not opinions or recommendations. The headline should attract attention without breaching Survey policy.

Only facts and conclusions

No opinions or recommendations

The news release must be structured so that the first paragraph contains the essential findings in the report. Many times, only the first paragraph survives the newspaper-editor's cuts. The second paragraph should identify the report title, author, report series, and contain some additional information from the report. Further paragraphs should present important details about the information presented in the first two paragraphs.

First paragraph

Second paragraph

Further paragraphs

News releases are reviewed at all levels. They may be revised in the Region, in SIM, or even in the Director's office.

Reviewed at all levels

Assistance at Headquarters

The Branch of Scientific Publications in SIM is the Division's center for all report activity. It provides leadership and assistance in preparation, improvement, and publication of all reports. Functions of the three important units are discussed below.

Publications Assistance Unit

1. Improve quality of reports.
2. Review hydrogeologic maps.

3. Coordinate flow of illustrations for formal federal series to units in Madison, Wisconsin, and Denver, Colorado.
4. Typeset special jobs, including reports.
5. Assist with report and illustration design.
6. Prepare illustrations for Headquarters unit authored reports.
7. Advise report specialists.
8. Design exhibits for poster sessions, other events.
9. Prepare Congressional briefing boards.

Publications Management Unit

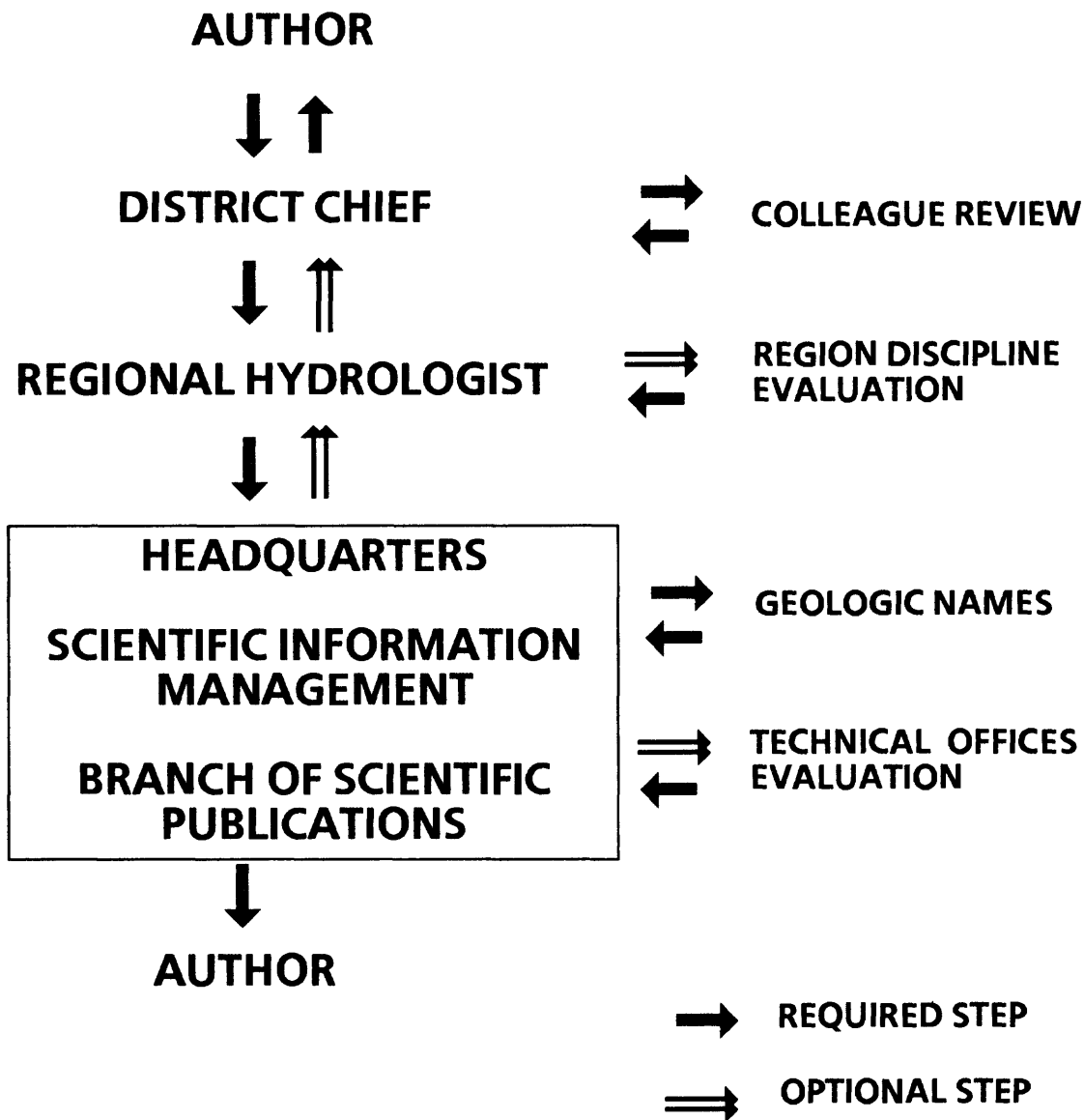
1. Manage Division's publication funds.
2. Maintain the reports tracking system (recording and processing).
3. Update the State data-report guidelines.
4. Edit and publish the "WRD Bulletin."
5. Coordinate with Geologic Division technical reports units in the preparation and publication of WRD formal reports.
6. Coordinate with National Mapping Division in the preparation and publication of WRD formal map reports.
7. Manage distribution of WRD publications.

Hydrologic Information Unit

1. Prepare, edit, and publish the "National Water Conditions."
2. Report significant hydrologic or water-related happenings.
3. Coordinate the Division's contribution to the Director's "Yearbook."
4. Prepare news releases on hydrologic events and hazards.
5. Respond to general and Congressional inquiries.
6. Release general-interest information on water resources..

REPORT REVIEW AND EVALUATION

ROUTING STEPS



TYPOGRAPHICAL ERRORS

The following marks are commonly used by proofreaders to correct typographical errors:

⊙	Insert period	<i>Caps.</i>	Caps—used in margin
↗	Insert comma	≡	Caps—used in text
:	Insert colon	C + SC	Caps & small caps—used in margin
;	Insert semicolon	≡	Caps & small caps—used in text
?	Insert question mark	<i>l.c.</i>	Lowercase—used in margin
!	Insert exclamation mark	/	Used in text to show deletion or substitution
=/	Insert hyphen	<i>w.f.</i>	Wrong font
∩	Insert apostrophe	○	Close up
↔	Insert quotation marks	✂	Delete
⎵	Insert 1-en dash	⊗	Close up and delete
⎶	Insert 1-em dash	⊙	Correct the position
#	Insert space	⊔	Move right
<i>ld</i> >	Insert lead	⊔	Move left
<i>shill</i>	Insert virgule	⊔	Move up
∨	Superior	⊔	Move down
∧	Inferior		Aline vertically
(/)	Parentheses	—	Aline horizontally
[/]	Brackets	⊔⊔	Center horizontally
□	Indent 1 em	⊔	Center vertically
□□	Indent 2 ems	∩	Push down space
¶	Paragraph	∩	Use ligature
<i>no ¶</i>	No paragraph	<i>eq. #</i>	Equalize space—used in margin
<i>tr</i>	Transpose 1—used in margin	∩∩	Equalize space—used in text
∩	Transpose 2—used in text	<i>stet.</i>	Let it stand—used in margin
<i>sp</i>	Spell out	Let it stand—used in text
<i>ital</i>	Italic—used in margin	⊗	Dirty or broken letter
—	Italic—used in text	<i>run over</i>	Carry over to next line
<i>b.f.</i>	Boldface—used in margin	<i>run back</i>	Carry back to preceding line
~~~~	Boldface—used in text	<i>out, see copy</i>	Something omitted—see copy
<i>s.c.</i>	Small caps—used in margin	<i>S/?</i>	Question to author to delete ³
≡	Small caps—used in text	∧	Caret—General indicator used to mark exact position of error in text.
<i>rom.</i>	Roman type		

## CHECKLIST FOR EDITORIAL REVIEW

Policy violation (for example avoid: advocacy, recommendations, reference to future publications, naming of industrial culprits)

"Acknowledgments" are complete and expressed correctly (see "Suggestions to Authors" for guidelines)

Writing is coherent and in reasonably standard English

"Abstract" is consistent with report and conclusions and, tells what report contributes, not what it contains

"Introduction" states problem, physical setting, time period, and approach

"Purpose" and "Scope" sections are consistent with report and conclusions

"Conclusions" follow from text and contain no new ideas or surprises

Organization of topics is logical

Publication series is appropriate, affordable, feasible

References are complete and meet publisher's requirements

Typographic style is consistent and follows publisher's requirements

Title and all headings are explicit and concise; catchy and imaginative where appropriate

Figures and tables meet publisher's specifications, are reproducible, and neatly lettered--shading patterns are clearly distinguishable

Oversize figures (plates) are no larger than necessary and contain no more information or colors than needed

Data in tables match those in illustrations and text

All tables and figures are referred to in text

Table of contents lists all headings, illustrations, captions, and table titles

Conversion table contains all units used in text, tables, and illustrations

Computer tables are preceded by adequate explanation (use of abbreviations, units of measure, site location and period, and so forth)

Pagination is consecutive beginning with cover as page 1

All copy is double spaced



Philosophy of review  
(Henry Barksdale 1960)

The following comments, which are modeled after suggestions expressed in 1960 by Henry Barksdale, discuss the philosophy of review: Be objective! Be direct! Be careful! Be reasonable! Be considerate!

1. Be objective.--Examine your attitude carefully before you begin a review. Examine it at frequent intervals as the review is being made. Are you sincerely trying to improve the report, as part of a team effort, or are you trying to show how smart you are?

Comments made before reading all of a statement are apt to be the result of over-eagerness to inflict criticism. When this type of comment is not corrected after the reviewer has (presumably) read the balance of the statement, it become obvious that the reviewer is more occupied (enamored) with what he has just said than he is with what the author is saying.

There is no proper place for sarcasm on the part of any reviewer.

2. Be direct.--Avoid vagueness. Ask your questions clearly. Make your comments clear and complete. If you can't do these things perhaps you don't understand the situation; so be doubly careful before you criticize. If there isn't room on the page to ask an intelligent question or make an intelligent comment use a separate sheet of paper.

Isolated question marks do not constitute intelligent questions.

3. Be careful.--Are you helping to solve the problem or are you becoming a part of the problem? The author and District Supervisor certainly have a responsibility to submit a report as free from errors as they can possibly make it, and it should be realized that they have eliminated most of the errors before the report is submitted for review. From that point on, the review should be comparatively easy (in most cases). If reviewers compound the troubles by making more errors, or by introducing erroneous or unimportant concepts, nothing is gained by review.

If a reviewer is uncertain about something in a report he should do a little research of his own. If he fails to define any error in the report he should not mark up the report. By implication the reviewer is a person of knowledge and authority. So it behooves him to be sure of himself before he marks up a report. Too much time is spent by authors in educating reviewers after reports have been bounced.

4. Be reasonable.--Constructive suggestions should be appreciated--and most of them are--but it should be obvious to the reviewers that by the time the report gets to Branch review, the work has been done and the allotted time and money have been spent.

5. Be considerate.--Put yourself in the author's shoes.

(From: "SUGGESTIONS TO AUTHORS," 6th ed., p. 11)

#### THE HUMAN FACTORS

Given specific advice as to his paper's deficiencies, the author should be able to do a better job of revision than can anyone else, and he will learn from the experience.

Authors seldom believe it until they become technical critics themselves, but the fact is that nearly all critics are people of good will, genuinely trying to help the author. Criticism is at least a thankless job, done by people who would much rather pursue original research than review manuscripts by others. Rarely, the critic may run across a gem of new thought in his own specialty; if he does, he will be grateful for the critical assignment. More often, his job will be a sterile one for him personally, done in the knowledge that his help is as likely as not to upset or antagonize the one he is trying to help.

The author, then, should approach the critic's comments on his manuscript with an open, cool mind. He must realize every comment deserves his thorough and objective consideration. Some critical comments may seem at first to be so wrong as to imply gross carelessness, if not downright stupidity, on the part of the critic. Such implications are almost certainly wrong. The author must assume that the more "stupid" a critic's comments, the more the original manuscript deserves careful restudy. Surely something in the expression, the facts presented, or the reasoning led the critic astray and caused him to make the "stupid" comment or mark. The critic has read the manuscript more carefully and with more background knowledge than will the ultimate reader; if he missed the author's point, so too will the reader of the published report.

Most differences between author and critic can be resolved by frank discussion face to face, if possible, but in writing if not. Should differences persist, it may be necessary to go to higher authority, to ask for a new review by a disinterested party, or to arrange for a joint study of the original field or laboratory evidence.

Papers by Survey authors that are submitted to outside journals for publication are commonly given an additional round of technical review by the outside organization. The journal editor usually receives many more manuscripts than he can publish, and he must choose those papers that best fit the needs of his particular audience and that fit within the policies and restrictions of his organization. To help him in his decisions, the editor may seek the advice of one or more critics that are specialists in the subject matter of a particular manuscript. The author will be well advised to accede gracefully to the journal editor's policies. If his research and conclusions are sound, they will stand up to additional technical review. And if his paper is accepted, it will probably be published promptly and will be seen by the audience most interested in it.

PRINCIPAL VERIFICATION REVIEW  
NEVADA DISTRICT

For Use Before Transmittal to Regional Hydrologist

Author(s) _____

Short title _____

(Initial each item when complete.)

- ___ Test headings versus "Contents" list: Wording, rank, and page numbers agree.
- ___ Illustration lists: Type of illustration is indicated (Graph showing---, etc). For figures this applies only to list, not to titles beneath figures themselves. In other respects, titles in list are complete or condensed versions of titles beneath illustrations. Page numbers in list are those of principal references in text. Footnote in review manuscript indicates that the page numbers denote location of principal (not necessarily first) references.
- ___ Tables list: Duplicates titles above tables, omitting units of measure. Page numbers in list generally are those of principal references in text. Footnote in review manuscript indicates that the page numbers denote location of principal (not necessarily first) references.
- ___ Units of measure: Except for QW, geophysical, and related units, use all metric or all inch-pound, not a mixture of both. For QW, geophysical, and related items, use metric only. Units of measure are spelled out everywhere, except as follows: abbreviations can be used in tables and illustration "explanations" where space is limited; they also can be used if the unit of measure is lengthy (for example, mg/L for milligrams per liter, acre-ft/yr for acre-feet per year) and appears frequently in a specific manuscript. Where abbreviations are needed, use proper format (for example, ft³/s, not cfs).
- ___ List of conversion factors and abbreviations: Includes all units of measure used in report, and no others. Format correct (plural, etc). Conversion factors correct (to four significant figures). No scientific notation (1.193 x 10⁻³). Proper descriptions of QW, geophysical, and related units of measure (include only those used in text, tables, and illustrations).
- ___ Altitude datum: Explanation is included only if text, tables, or illustrations refer to altitude. Be sure "mean sea level" is replaced with "sea level" throughout manuscript. Exception: on plates, refer to "National Geodetic Vertical Datum of 1929" (or "NGVD of 1929" if space is limited).
- ___ Illustrations and tables: Illustrations and tables themselves are grouped separately, rather than interleaved with text, for easier review. Titles, explanations, column headings, and footnotes are double spaced to facilitate editing. Data within body of table can be single spaced, often with a double space every five lines or so.

- References: All references in text--including those in illustrations and tables--are in list; all references in list are in text (except in list of "Selected references"). Authorship and year of publication agree between text and list. Format in text is correct ("and others" for more than two authors). Format in list is correct (only allowable abbreviations aside from those in title: U.S., v., no., p., and State names).
- Manuscript format: Conforms with that of intended publication medium (for example, Water-Supply Paper, open-file report, State bulletin series, journal).
- Editorial aids: Left margins of text, illustrations and tables show letters identifying references to illustrations, tables, bibliographic citations, and other pages in the manuscript.
- Numerical values in text: Verify agreement with data in tables, illustrations.
- Geographic names: All names in text, tables, and non-map illustrations are shown on a map, unless they are outside the study area and outside the areas covered by maps in the report.
- Trade-name disclaimer: Proper footnote, for first trade name only.
- Year of publication: Last-minute verification of correctness (title page).
- General quality control: the author has a general responsibility for the integrity of his or her work. Maintenance of integrity requires continuous, vigilant review and checking at each step of the study. Were proper field procedures followed? Were data properly analyzed? Were the programs checked for accuracy? Were the computer programs themselves, and procedures for programmable calculators, properly verified for intended results?
- Report title: Adequately identified study topic and study-area location (not just "Nevada," unless study is statewide; however, avoid county names if study area includes more than two counties). Title is as brief as possible, avoiding "the" or "an" as first word. For example, "Ground-water quality in the Talapoosa area, west-central Nevada," rather than "An evaluation of ground-water quality in the Talapoosa area, Nevada."
- Cooperation: Properly expressed credit for cooperation with other Federal or State agency(s) is included on report cover, title page, and, in certain instances, in acknowledgment section (for example, specific individuals), as well as on separate illustrations (plates).

— ***Contents lists:*** Rank of headings and subheadings is correct. Single subheadings are avoided except in unusual circumstances (for example, stratigraphic discussions).

— ***Illustrations list:*** If more than two consecutive figures are of the same type, their titles are combined in the following manner:

7-9. Photographs of Lake Abert showing:

7. Maximum level attained in June 1958 -----
8. Beach line at an altitude of 4,269.7 feet-----
9. Anchored instrument raft-----

Titles in list are properly modified versions of titles beneath the illustrations themselves.

— ***Abstract:*** Contains nothing that isn't in report. Gives all pertinent results (facts) and conclusions, but preferably contains less than 500 words (about two typewritten pages, double spaced). No abbreviations used for units of measure.

— ***Illustrations and tables:*** Each illustration and tables is (1) pertinent to the objectives of the report, (2) worthy of inclusion, and (3) understandable by the intended audience.

— ***Illustrations and tables:*** References in text--including those in illustrations and tables themselves--are correctly numbered.

— ***Illustrations and tables:*** Titles and explanations of similar illustrations have similar wording; likewise for titles and column headings of similar tables. Geographic area is not included in figure and table titles if it is about the same as that given in the report title.

— ***Plates:*** Title identifies type of illustration and geographic location. For example: "MAP SHOWING CANDIDATE SITES FOR WATER-QUALITY NETWORK, LAS VEGAS VALLEY, NEVADA."

— ***Maps:*** Scale included (Publications Guide 3.09.1).  
Land grids (latitude-longitude, township-range) included (3.09.2). Show at least two values each for latitude and longitude.  
North arrow included when required (3.09.6).  
Base-map credit included when required (3.09.4).  
Topographic contour interval and altitude datum included when appropriate.  
Proper credit for geology or hydrology included when appropriate (3.09.5).  
Title and "Explanation" typed, double spaced, on separate sheet attached to map for review purposes.  
Data and site locations proofed against basic data tabulations.

- Map explanations: Format and wording conform with guidelines (Publications Guides 3.06.3, 3.10.2). Proper sequence of items (3.10.2, page 1).
- Photographs: Credit if photographer is not author. Date of photograph included as part of title.
- Tables of computer output: Abbreviations and symbols are explained in headnotes or footnote.
- Page numbers: References to other specific pages in text [for example, "The amount of lake-surface precipitation (page 17) is - - -" or "Recharge estimates are discussed on page 23" checked for correct page number. Generally, such references should be avoided to reduce the possibility of inadvertent errors.
- Calculations: Computer values in text and tables checked for correctness (for example, computer ground-water flow, streamflow averages, dissolved-solids tonnages, etc). Checking preferably not done by person who made original calculations.
- Data and statements in text: Agree with material shown in tables and illustrations, whether specifically referenced or not.
- Significant figures: Calculated values in text, tables, and illustrations shouldn't indicate more significant figures than are justified ( $365.3 \times 25 = 9,100$  rather than 9,132.5). Round off properly.
- Non-USGS material: Written permission to publish, and proper credit, are required for photographs, copyrighted material, and unpublished data supplied from outside Survey.
- Written or oral communications: Acknowledged properly, including affiliation of communicator. For example, "--- according to B. F. Jones (U.S. Geological Survey, written commun., 1975)."
- Quotations: Proofed against original source, word by word (also, verify page numbers in original reference).
- Ground-water site designation: Proper format must be used for the "Local" (Nevada) identification. Complete designation is 108 N13 E25 05ABBB1 (note the zero for section 1 through 9). Abbreviated designations (for example, N13 E 25 05ABBB1, if report discusses only one hydrographic area, or even 5AB or ABBB1, etc., on a map) can be used in all places except well-data and spring-date tables. Fifteen-digit site ID's should be included along with the "local" identifications in the data tables.

## WATER RESOURCES DIVISION BULLETIN

## SUGGESTION TO REVIEWERS

By L. A. Heindl

(Geologist, Office of the Area Hydrologist, ACA, Arlington, Va.)

The Water Resources Division's report-improvement program was initiated to fill the breach left by the elimination of the old Branch Review Sections. With those sections gone, the full weight of responsibility for the quality of our reports was shifted back to the districts--particularly to the District Chiefs or District Supervisors, and to the authors. Simultaneously, the Division realized that with the disbandment of the Review Sections, the districts would need assistance to develop techniques and habits that would help them turn out reports at least equal to the quality of those the districts prepared with the aid of the Review Sections. The report-improvement program represents the Division effort in this regard, and this discussion of techniques of review is a part of this effort.

The report-improvement program initially had--and still has--one principal goal: to improve our reports. The program is working towards this goal along several different lines concurrently--through various training devices, improvement of report-planning techniques, assistance to districts and authors during preparation stages, salvage of completed but inadequate reports, and through facilitated communication between all individuals and sections dealing directly with reports. To implement the program, each Area Hydrologist has a Staff Assistant for report improvement, and each district has--or will have shortly--at least one specially trained Reports Specialist or Reports Advisor.

The process basic to the improvement of reports is review to insure that they meet certain standards of content, style, and format. "Suggestions to Authors" puts review in the framework of the Survey's responsibilities: "The Survey generally exercises its proprietary interest only to the extent of seeing that a report is scientifically and technically sound, will reach the proper audience, and will reflect credit on both the Survey and the author. To these ends, each report is reviewed by the author's fellow workers, supervisors, and staff officials, who bring to bear upon it their specialized knowledge, skill, and judgment to assure a sound product. In its final form each Survey report is the product of team effort in which many persons do their share--even though most of them remain anonymous." Thus, review in the Survey includes critical evaluation of the technical content and the editorial quality of the text, illustrations, and tables, and of the proposed medium of publication.

Because review involves both technical content and editorial quality, and because opinions on editorial quality are always somewhat subjective, the questions of how far editorial review should go and how to distinguish between technical and editorial review are frequently argued among--and between--reviewers and authors. In practice, however, the two are closely related, as described in the following quotation from "Suggestions to Critics," a pamphlet issued in 1949 by the Geologic Division.

"The quality of any scientific manuscript is a function of two commonly unrelated variables--the quality of the research, and the effectiveness of the presentation. The criticism of a manuscript is an equally two-sided problem--examining the soundness of the data, reasoning, and conclusions (reviewing); and helping the author to transmit his ideas into the mind of the reader with a minimum of distortion (one definition of editing). Everyone agrees that the critic's chief duty is to review, in the sense above defined. *** Such editing as the critic feels impelled to do*** should make it possible for the average, even nongeologic, reader to understand what the author is trying to say. *** If editing is defined as making 'more intelligible,' this function is legitimate and should be one of the duties of the critic ***

The close relationship is put more bluntly by the semantacist, Wendell Johnson: "**** clarity is a prerequisite to validity***. (Writing) can be clear without having validity, but if it is unclear its validity cannot well be determined."

For our purposes, editorial review is limited largely to making a report grammatically correct; it includes attention to details such as spelling, punctuation, and word order, and more importantly, to clarity, syntax, and the proper use of words. When done by nonprofessional colleagues, it can be valuable for suggestions as to how to clarify and simplify technical explanation in a report intended for nontechnical readers. But in general, editorial review is mostly a mechanical application of the customs of good English usage and typographical style appropriate to the publication medium. By and large, editorial review should be completed before a report is submitted for technical review.

Technical review, in contrast, has the broader responsibility of making that the report is technically sound and will reach and be clear

to its intended audience. Consequently it involves attention to the validity of both the technical data and its use, to the effectiveness of the organization, and to the clarity of its presentation of the material. Thus technical review includes many editorial functions. These editorial functions, however, should supplement and refine what is already an editorially adequate manuscript.

But how does one review? What is a good report? How does one assure a "sound product"? How does one know that a reviewer has been effective? These questions, and others, are discussed in this summary of review practices, which also recapitulates principles, outlines some techniques, and offers a few criteria for reviewing reports and for evaluating their review.

### What is a Good Report?

A good report, first and most importantly, has something to say to the intended reader. To do this it must be presented at a level of explanation suitable to the certain intended reader and in the proper publication medium. Other characteristics of a good report are outlined below in the general order of importance:

1. It is technically sound.
2. It is well organized.
  - a. The title indicates clearly the subject.
  - b. The purpose is expressed clearly and explicitly.
  - c. The data are pertinent to the purpose.
  - d. The reasoning by which the interpretations and conclusions are reached are given adequately and clearly.
  - e. The conclusions are valid.
  - f. The important factors are properly emphasized and supporting factors are subordinated.
3. It is timely.
4. It is brief, consistent with soundness and clarity.
5. It is attractive.

### When is a Manuscript Ready for Review?

A manuscript is ready for review when an author has done everything possible to make it meet generally accepted standards of technical soundness and editorial adequacy. This implies that he has taken an objective view of the report, made it a rational development of and contribution to the current state of knowledge in its field, and made all the mechanical checks necessary to make the text, tables, and illustrations accurate and mutually consistent. In addition, the manuscript presented for review should be reasonably clean and clear, and it should be accompanied by the background review including information that is pertinent to the review,

including previous reviewers' comments or a digest of them.

## PRINCIPLES OF REVIEW

### Purpose

The purpose of review is to maintain high quality by suggesting needed technical and editorial changes that will improve the report and that will eliminate errors which may lead to the embarrassment of the author and the Survey. In addition, review should help an author improve his subsequent reports, and should acquaint him with procedures he can use himself in the review of the reports of others.

### Qualifications of Reviewers

Reviewers should be, as "Suggestions to Authors" puts it, "specially qualified by their knowledge of, and interest in, the problems discussed." These certainly are the main pre-requisites. But they also should have the confidence to pass judgment on the quality and validity of a report, and to point out deficiencies and suggest improvement. They should remember that their principal objective is to improve the report, and they should do this willingly. Their attitude towards a report should be objective, but nonetheless careful and considerate. Perhaps the attitude is best summed up by the term used somewhere by Robert Louis Stevenson, "respectfully skeptical." In addition, a reviewer should be able to state his opinions clearly, be firm but tactful, and to be willing to accept responsibility for his suggestions. Last but not least, his comments should be legible.

### Responsibilities of Reviewers

All professionals are expected to make a certain amount of time available and to assume responsibility for critically reviewing and discussing a colleague's reports as a normal part of their duties. As a reviewer, the professional's first responsibility is to assure the technical soundness of the report. To do this best, all suggested changes should be constructive and specific, and the reviewer should give reasons for and be prepared to justify his suggestions. He should keep in mind the purpose of the report and whether the report will fulfill its purpose. He, of course, has the responsibility of being professionally honest, regardless of how considerate he may wish to be personally. As far as possible, he should leave the author's "style" alone, commensurate with accuracy, clarity, and brevity.

### Amount of Review

The amount of review needed by a report will depend on the quality of the report. Probably it is not so much a matter of how much review as of how thorough are the reviewers. In general, a report can benefit from comments made by several technical reviewers, and certainly each report should have at



least enough objective review to assure its technical soundness and editorial clarity. If a technical reviewer spots major faults in a report, such as misuse of basic concepts, he should note these and return the report to the author without spending time on details. A report may need editorial review twice--once, when it is the author's final draft; and again, after it has been revised following the final technical review.

### Alternate Methods of Review

Review may be concurrent or consecutive. That is, a number of copies may be sent out to several reviewers simultaneously, or one copy may be sent to several reviewers in turn. The advantage of concurrent review is that it is faster, and the author has an opportunity to compare different reviewers' comments before making his revision; the main disadvantages are that the author may be faced with conflicting suggestions, and the reviewers' time is wasted because several may make the same suggestions; also, usually none of the original reviewers see the revised report. The advantage of consecutive review is that each reviewer, except the first, sees a draft that has been revised with the benefit of earlier reviews; disadvantages are that the method is time-consuming and the author may waste time making unneeded revisions of revision to satisfy successive reviewers' comments.

Review also may be done individually, by small groups, or by small groups including the author. Review is rarely done by a group that does not include the author unless the author is completely unavailable. The advantage of review by individuals is that it is the quickest; the small group has the advantage of bringing together several reviewers' opinions simultaneously; and by including the author the group has the advantage of working out problems with the author as they arise and in effect revising the report as it is reviewed. In addition, review by groups is an excellent mechanism for training reviewers.

Regardless of whether review is concurrent or consecutive, and whether it is done individually or by small groups, critiques should be prepared by the reviewers.

### TECHNIQUES OF REVIEW

Many techniques are involved in the process of review. Guidelines are offered here for two important aspects--mechanics and criteria--which are used concurrently.

#### Mechanics of Review

Review should follow logical procedures as an aid to the reviewer and to assure the author of the most perceptive possible criticism. The procedure suggested here is for the review of a long report and is stylized into steps for convenience of presentation.

The procedure can be condensed for short reports and will vary with different reviewers.

1. Acquaint yourself with the background of the report as detailed in the accompanying letters, memos and critiques of previous reviewers, which should accompany the report.
2. Skim through the whole report to get an overall impression by means of the introduction, conclusions, and abstract in that order; the section headings, tables, and illustrations and their titles; and the topic and terminal sentences of paragraphs and sections.
3. Study and compare the abstract, introduction, and conclusions; are they consistent?
4. Read the body of the report carefully. Check for:
  - a. Technical soundness, including the significance of the precision of quantitative data.
  - b. Consistency between text, illustrations, and tables.
  - c. Presentation--organization, coherence, pertinence, clarity.
  - d. Expression--effectiveness and acceptability.
5. Give the report a second quick scanning to put the report and your comments into perspective and to refocus your attention on the principal problems. Reread the critiques of previous reviewers and prepare your own.

The review of a long report usually results in three types of comments: (1) brief marginal notes and interlinear changes on the manuscript; (2) more extensive comments on separate sheets; and (3) a critique which summarizes general comments and discusses the principal suggested changes. These may be consolidated for short reports, but--except for abstracts--a critique is a must.

Marginal comments should be kept to a minimum; it is far better to indicate the questioned material with a reference number or letter in the margin and to make the comment on a separate sheet. Few things are more discouraging to an author than to see page after page nearly obliterated by comments. The reviewer also should avoid writing with too hard, or too soft, pencils, and using too small a handwriting--combined they lead only to eyestrain, fatigue, and irritation.

Some reviewers and authors believe that the reviewer probably can best aid the author by raising questions rather than making changes. For example, a statement such as, "This sentence seems to imply such and such. Is this consistent with your previous statement on page so-and-so?", is preferred to a direct revision. Other reviewers and authors prefer the changes. The advantage of the question method is that it does not presume to speak for the author and permits the author to work out his own solution to the problem. The disadvantage is that it slows down

revision; the author must think through the reviewer's question--which might be unclear or misinterpreted--and devise his revision accordingly. The advantage of the "revision" method is that it is quicker; the reviewer usually has a ready solution for most questions he raises and has the revision at his pencil point even as he makes his comment. The disadvantage, of course, is that he may not present the author's point of view or may change the author's meaning. Both systems are widely used, and usually the system depends on the subject matter and on the reviewer.

In general, however, technical reviewers should take care that they review rather than revise. If detailed comments and editorial changes become excessive, the report should be returned to the author for additional revision necessary to complete the preparation phase of the report. Whenever possible the reviewer should correspond, or better yet, confer with the author, particularly when extensive changes are suggested.

#### Criteria for Technical Review

Criteria for technical review encompass all aspects of a report--technical soundness, editorial quality, and appropriateness to the intended audience. The principal responsibility of a reviewer, however, lies in making certain the technical quality of a report is high. The criteria are presented in the form of questions because review is basically a questioning process and because it would take far more room to spell out even the main answers.

These questions, and the more specific ones to which they lead in the review of individual reports, provide an idea of the scope of technical review. These questions should be used by authors and their supervisors, as well as by reviewers, in the evaluation of reports, and as will be discussed subsequently--in the evaluation of the reviews themselves. The questions are not in an order of rank, nor are they in the order in which they might present themselves in the review of any particular report.

1. Is the statement of purpose clear and explicit? Can the purpose be fulfilled through the concepts and with the methods available? If not, does the report offer new concepts and methods or does it clearly establish the limitations of the available means? For example, perennial yield of a basin could only be estimated, and then only with the use of empirical and arbitrary assumptions.

2. Is the information worth a report of the type planned? For example, most well-site reports do not warrant the effort needed to make them Water-Supply Papers. On the other hand, is the report adequate for the stated purpose? Will the proposed publication medium reach the intended reader group? A comprehensive river-basin study should not be buried in a short open-file report.

3. Are previous studies adequately referred to and are the methods used and concepts presented up to the current "state of the art"?

4. Are the data adequate to cope with the stated purpose, and has the author done as much with the data as could be done within the scope of the stated purpose?

5. Are proper methods used to reduce the data--that is, to condense, simplify, or abstract pertinent parameters from the raw records? Are the concepts and qualifying assumptions, and the statistical and graphical methods appropriate to the reductions presented? For example, averaged well yields without reference to source rock or geographic distribution cannot be presented as a meaningful index of the potential yield of an area.

6. Are phenomena classified and defined correctly and completely? For example, well yields cannot be equated with formation yields without specific qualification regarding the conditions under which the well yield data were collected.

7. Are data properly weighted as to their reliability and are the limits of reliability presented unequivocally. Are numerical data rounded off to their proper significant figure, particularly in their use in interpretations and conclusions? Are arithmetic and mathematical presentations correct, complete, and limited to their proper scope?

8. Are analogies, extrapolations, and interpolations made within the scope of the data presented? Are abstract concepts made pertinent by being illustrated by concrete examples from the data?

9. Has the method of multiple working hypotheses been used, or has the author restricted himself only to those facts that support single hypothesis?

10. Do the data support the conclusions? Do the data support the inferences and interpretations drawn from them, particularly to the degree implied? Are data, assumptions, opinion, and interpretations properly identified and qualified as to accuracy and completeness? Is each conclusion weighted on the basis of the reliability of the individual components which makeup the conclusion? For example, the reliability of a water budget should be clearly related to the reliability of the weakest assumption that went into its computation.

11. Are all the data necessary to support or corroborate the conclusions presented adequately?

12. Are the recommendations made for further studies justified on the basis of deficiencies in knowledge that showed up during the investigation?

13. Has the author looked beyond the bounds of his particular problem to indicate its relationship to the subject as a whole?

14. Is the report unified? Does all material relate to the purpose? Do text, illustrations, and tables supplement each other? Are all the illustrations and tables necessary? What is irrelevant? superfluous? parenthetic? digressive? just plain padding? Do spot checks indicate consistency of text, tables, and illustrations?

15. Is the report coherent? Is its development, from purpose through data and interpretations to conclusions, rational and thorough? Does the report progress logically from point to point and topic to topic with enough transitional material to show the relationship of its several parts?

16. Does the report emphasize its contents realistically and appropriately in keeping with its stated purpose? Do the principal facts and findings stand out clearly, or are they buried by a wealth of detail describing minor features?

17. Does the report communicate effectively with--gets its message across to--the intended reader? Is it expressed clearly enough so that its validity can be judged fairly? Do the titles of illustrations and tables indicate their purpose and significance, or just list their component parts; do the illustrations and tables show what the author says they do? Is the form of expression, regardless of originality and style, within the bounds of ordinary English grammar, accepted definitions, and the understanding of the intended reader?

18. Does the report present what the title states, and do the section headings outline a representative organization of the material?

19. Does the abstract include the significant findings and present the main contributions of the report? Is it specific in what it offers?

20. Does the report comply with Survey policy?

#### EVALUATION OF REVIEW

Because review is used to assure quality in reports, the quality of the review itself may influence the quality of the report. Consequently, reviews themselves need to be evaluated so as to assure those with the responsibility to forward and approve reports that the reports have received competent professional criticism.

Reviews fall short of being as good as they should be for three general reasons. First, the reviewers concentrate on only a part of their responsibilities; for example, they may revise and pick editorial or arithmetic nits but fail to evaluate the technical concepts or the completeness of the presentation. Second, reviewers may be cursory and complaisant, and fail to give a report the close study a technical review demands. Some reviewers are so familiar with the project or the report that they fail to miss what the report has omitted or unconsciously supply

steps that the report has skipped. Third, reviewers may fail to be objective in their evaluation and condemn the report because it is not in accord with their views or revise it because its style is personally unacceptable.

An author's evaluation of a review, of course, is immediate and direct, but he should summarize his acceptance or rejection of a reviewer's principal comments to facilitate further evaluation of his revised report. District Chiefs and Area Hydrologist, however, have the responsibility of determining whether individual reviewers have fulfilled their responsibility. It should be just as reasonable to reject an unacceptable review as it is to return an unacceptable report.

#### ACKNOWLEDGMENTS

This summary is largely the result of many discussions with the three other Area Staff Assistants, W. L. Burnham, P. E. Dennis, and C. J. Robinove--particularly C. J. Robinove. It is also an outgrowth of my experience working in the Ground-Water Reports Section with C. L. McGuinness, G. H. Davis, and W. D. E. Cardwell, and of many informal exchanges with my colleagues in the Division.

#### REQUEST FOR COMMENTS AND SUGGESTIONS

This report is preliminary and is not to be considered as a statement of review policy. We--the four Area Staff Assistants--need and would appreciate your Comments and suggestions so that eventually we can put out a practical guide to review techniques. Please send them directly to me, Atlantic Coast Area office, Arlington, Virginia, or through the Water Resources Bulletin.

## SUMMARY OF A COLLEAGUE REVIEW

- STEP 1 Acquaint yourself with the report's pertinent background information.
- STEP 2 Skim and scan the entire report.
- STEP 3 Study the introduction for purpose, scope, and methods.
- STEP 4 Study the terminal section for purpose, scope, findings, and conclusions.
- STEP 5 Study the table of contents to make a preliminary assessment of the organization of the report.
- STEP 6 Study the first (second, third, etc.) section of the body of the report for technical accuracy.
- STEP 7 Reevaluate the introduction, the conclusion, and the organization.
- STEP 8 Study the abstract.
- STEP 9 Study the press release.
- STEP 10 Cool the report and your notes for a while.
- STEP 11 Reread all of your notes.
- STEP 12 Reread the entire report and rewrite (add, delete, modify) your notes as you go.
- STEP 13 Write your review memorandum to the author.

U.S. GEOLOGICAL SURVEY  
New York District

November 1980

MANUSCRIPT CHECKLIST FOR AUTHORS

Title _____

Author _____

Publication Series _____ Project no. _____

This form must be completed by the author and signed by his supervisor before the report is submitted to the Publications Unit for processing. The author writes in each box either his initials to indicate OK or a dash if the item is not applicable. The author is expected to be familiar with the pertinent section of STA and WRD Publications Guide.

<b>MANUSCRIPT</b>	
Purpose of study is stated in introduction; report fulfills stated objective	
Publisher's specifications have been obtained and followed: copy of specification sheet for non-Survey reports is included with manuscript	
Preliminary pages and support documents are in correct format. (Refer to Pub. Guide and published samples; cross out those that do not apply) <input type="checkbox"/> cover <span style="margin-left: 150px;"><input type="checkbox"/> conversion table</span> <input type="checkbox"/> title page <span style="margin-left: 150px;"><input type="checkbox"/> text abstract</span> <input type="checkbox"/> table of contents <span style="margin-left: 150px;"><input type="checkbox"/> press release</span> <input type="checkbox"/> list of illustrations & tables	
Title of report is as short and explicit as possible	
Wording of title is same on cover, title page, abstract, and support documents	
Cooperating agencies are named on cover, title page, and in introduction	
List of illustrations identifies each figure as map, graph, photo, etc.	
Conversion table contains all units of measure used in text, illustrations, and tables; conversion factors have been verified	
Use of metric or U.S. Customary units is consistent in text, tables, and figures	
Acknowledgments are in accordance with STA guidelines (6th ed., p. 44)	
Abstract and conclusions contain only information that is given in text; abstract tells what report contributes	
Pagination is consecutive with cover page as 1 (not i)	
Headings and subheads are in publisher's style (see published reports); their rank is indicated by indentation in table of contents	
Each illustration is referred to in text; its location in text is indicated by a "cut-in" following principal reference	
Caption sheet follows the principal reference to each figures, multiple captions are listed on same sheet.	
Wording on caption sheets agree with that in list of illustrations except that phrase "map showing" is deleted	
Entire manuscript is double spaced to allow editorial work	
Routing sheet is complete and up-to-date	

<b>MANUSCRIPT</b>	
WRSIC sheet is double spaced and contains 200 words or less	
Press release (if needed) is lively and written in accordance with Pub. Guide, sec. 17	
Letter of permission to publish has been requested from cooperator (needed from Federal cooperators only)	
<b>ILLUSTRATIONS</b>	
Final illustrations will be done by: <input type="checkbox"/> District draftsman <input type="checkbox"/> Number of figures ____ <input type="checkbox"/> Publisher <input type="checkbox"/> Number of plates ____	
Special presswork (color, oversize, foldout) is within publisher's capability	
Each illustration is essential and is referred to in text	
Illustrations are designed in accordance with Pub. Guide, sec. 3	
Similar illustrations are consistent in format and wording	
Explanations within figures and plates are complete and in accordance with Pub. Guide	
All illustrations (except plates) are page size and reproducible	
Final typeface will not need to be smaller than 8 point (this is 8 point)	
All maps show lat., long., and scale	
General location map is included in first appropriate figure	
Base maps have been discussed with draftsman to determine manner of data presentation Same base is used wherever possible	
Figures are together at end of report, not within text	
Each figure is clearly numbered; caption is attached on a separate page	
<b>TABLES</b>	
All tables are essential and are referred to in text	
Tables headings are as short and descriptive as possible	
Similar tables are consistent in format and wording	
Data in tables have been cross checked against figures and text	
Tables conform to Survey style (STA and recent Survey pubs. contain examples)	
Regular tables follow principal reference in text; lengthy tables and computer printouts are at end of report	
Principal reference to each table is followed by a cut-in notation	

Author's supervisor _____ Date _____

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)		PROJECT NO. (Example VA099)
TITLE		NO. PAGES (INCL. TABLES)
(CHECK ONE) <input type="checkbox"/> INTERPRETIVE REPORT <input type="checkbox"/> DATA REPORT <input type="checkbox"/> ABSTRACT <input type="checkbox"/> OTHER		NO. ILLUSTRATIONS
TYPE OF PUBLICATION (WSP, HA, OPEN FILE, JOURNAL, STATE PUBLICATION, ETC.)		TABLES NO. _____ NO. PAGES _____
COOPERATING AGENCY		DOES REPORT CONTAIN GEOLOGIC NAMES? <input type="checkbox"/> YES <input type="checkbox"/> NO

	NAME (Print or type)	DATE IN	DATE OUT	TOPICS REVIEWED	NO. HRS SPENT	CHECK STEP COMPLETED											ENTER NEXT ROUTING HERE (Print or type)	
						AUTHOR	EDITORIAL REVIEWER	*TECHNICAL REVIEWER	DIST/PROJ CHIEF	REGIONAL	HYDROL	GEOLOGIC NAMES	ADDITIONAL EVALUATION	SCI PUB PROG	SP&DM	DIRECTOR		
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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.



DISTRICT MANUSCRIPT ROUTING SHEET

This form is for District review of all reports before they are given to cooperators or to colleagues. A report should be transmitted to the next step only when there is a "yes" in the "Ready for publication" column.

Signature	Date in	Action Taken				Date Out	Step					Ready for publication	Action required	Next Routing
		Revision Hours	Review Hours	Author	Other		Section Chief	Report Specialist	District Chief					
Proposed colleague reviewers						Name					Location			

## EVALUATION SHEET

Evaluator _____ Technical grade _____ Editorial grade _____

- _____ Title of report is appropriate and accurately describes report content.
- _____ WRSIC abstract, press release, cover page, title page, and back of title page are there and are correctly formatted.
- _____ Table of contents, list of illustrations and list of tables are properly formatted and agree with text headings, and figure and table titles.
- _____ All illustrations have been checked for technical content, compatibility with text, and corrections marked or deficiencies noted.
- _____ A list of conversion factors and abbreviations is included which list those used in report and no others. Factors are correct to four significant figures and no scientific notation is used. All metric or all inch pound units are used throughout the manuscript
- _____ A statement on altitude datum is included if altitude is referred to in report. "Sea level" is used in book reports and National Geodetic Vertical Datum of 1929 (or "NGVD of 1929" if space is limited) is used on map reports.
- _____ Trade-name disclaimer in proper footnote for the first use of a trade name.
- _____ Title, press release, abstracts, purpose, table of contents, and conclusions reflect a uniform train of thought. Conclusions answer purposes and these main thoughts are brought out in title, abstract, press release, and body of report.
- _____ Spot check verifies consistent use of words, numbers, titles, and tables, figures, list of references, table of contents, and manuscript.

Brief evaluation of report and technical or editorial notes to Chief, Branch of Scientific Publications.

## PRESS RELEASES

By Donovan B. Kelly

The writing and distribution of reports fulfills only part of the Survey's general mission to publish and disseminate information about the Nation's natural resources and natural hazards. Another product, the press release, is used regularly to communicate earth-science information to millions of people through the wide variety of print and electronic news media.

In a practical sense, press releases are good for the Geological Survey. In the course of natural events, the Survey is bound to get some bad press. A constant flow of releases can help to explain the wide range of good work we are doing and help to dilute the occasional dose of bad press and misunderstanding.

Press releases are not, however, just publicity tools. They are an integral part and means of fulfilling the Survey's mandate "to publish and disseminate information." They are the major means of reaching the larger lay audience beyond the tight circle of our fellow scientist. They force us to write and explain our technical research and findings in terms that our bosses--the general public, the Congress, and the cooperators--can understand and appreciate. For many citizens, they are the only source of information on the role of the earth sciences.

Press releases are not limited to announcing the results of new reports issued by the Information Office, part of the Director's Office at the U.S. Geological Survey, National Center. Authors of Survey reports have a responsibility to keep the information Office apprised of upcoming reports or other significant events, to help draft words when necessary, and even to issue local basic-data releases through appropriate channels as outlined in the Survey Manual (SM 500.5).

Press releases are not limited to announcing the results of new reports but can announce anything potentially newsworthy for which the Survey is the logical spokesman: new projects, changes in personnel, or the occurrence of natural events, such as floods or earthquakes, to name a few. Additional information or guidance is available from the Information Office.

The release date on the front of the release is an important part of news-media format and operations. Most editors appreciate a set date of release and will honor that date. The set date also lets the reporters know how much time they have to expand on your story before the news will break. If the story is too hot to allow lead time such as when you report current drought conditions--then give the date of preparation. The editors at least know then how old the story is. (If the story is even hotter--today's earthquake magnitude or flood peak--then it should probably be phoned in.)

The following example of a press release format outlines some of the needs, mechanics, and reasons for writing press releases.

(Your address Here)

(Your name here)  
PHONE: (Your phone number here)

For release: (Put here a date at least 3-5 days after mailing)

For release: UPON RECEIPT (Prepared: Put here data of mailing)  
or

BANG! BANG! BANG!  
(Short, catchy, but honest title summarizing the hard news)

Again bang bang bang--catch the editor with the first paragraph: catch him by telling him why this press release is of interest to his readers: why the information is timely and should be used now. You have to do this with facts, not with exuberant adjectives. The editor has been around too long to be impressed by ballyhoo, and he is too busy to read paragraph after paragraph searching for the meat of the release. Catch and hold the editor with the first ten words of the first sentence, and then finish the sentence by giving credit to the U.S. Geological Survey, Department of the Interior.

Now that you have the editor's attention, expand on the news presented in the first paragraph; start filling in the particular who, why, what, when, where, or how that will convince the editor that his readers will want and need to read the hard news contained in the press release.

The second or third paragraph is a good place to acknowledge your cooperators. But don't lose the editor with a lot of backscratching.

According to most press-release writers, "By the time the editor reaches the fourth paragraph, he's looking for some single authority he can quote. Someone who can present the facts in a short pithy way as if he were talking directly to the reader. Someone who can add human interest to the release. Someone who can give the editor quotable--and believable--quotes."

(more)

The release should be written at a level that your wife, your teenage son, and the accountant next door can understand. Read the release aloud to yourself, to your wife, to your secretary. Can they understand your words? Write in short paragraphs. Write in short sentences. Use familiar words. Write to be read.

By now you have given the editor the heart of the story. In the remaining paragraphs you can expand on the hard news, but don't save any vital facts to last. From here on the paragraphs are more and more expendable and may be sacrificed to fit the space available.

To help prevent errors in retyping, complete your paragraphs on a page and don't split words at the end of a line. Double space the first paragraphs to give the editor room to edit and rewrite.

If appropriate, at this point you would list the title, authors, series, and number, and availability of any report: copies of the ___-page report, "Title of Report," by Author's Name and published as U.S. Geological Survey whatever No., are available from _____.

If you have a collection of interesting facts you would like to cram into the release, run them as separate filler items at the end:

- * Whenever possible, include illustrations with a release. Simplified maps and photographs showing scientists in action or visiting dignitaries are a few possibilities.
- * To be fully used, a release must reach all the right editors or desks. Do not send a story just to your favorite reporter; you will lose more media friends than you will make. Do work with the Information Office to develop a good mailing list.
- * If a page is to be followed by another page, put "(more)" at the bottom of the page. and finally, end the release with a mark that lets the editor know that you are done:

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(Note to Editors: Sometimes in this space, between parentheses, there is a "Note to Editors" that might advise them of the availability of a photo or a special contact for additional information.)