United States
Environmental Protection
Agency

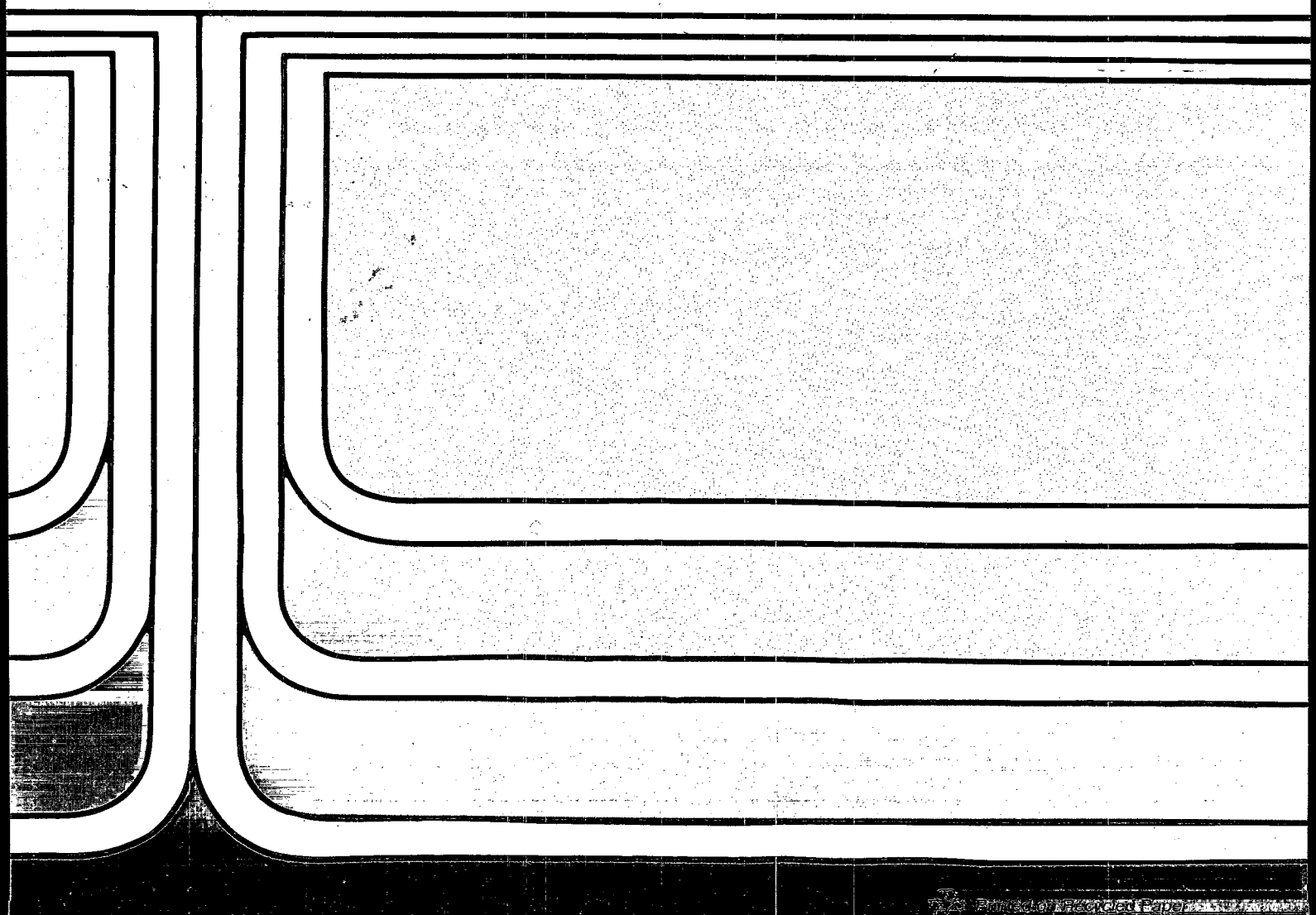
Office Of Water
(4602)

EPA 440/6-90-003
May 1990

EPA

Guide To Ground-Water Supply Contingency Planning For Local And State Governments

Technical Assistance Document



GUIDE TO GROUND-WATER SUPPLY CONTINGENCY PLANNING FOR LOCAL AND STATE GOVERNMENTS

OFFICE OF WATER
OFFICE OF GROUND-WATER PROTECTION
U.S. ENVIRONMENTAL PROTECTION AGENCY

MAY 1990

Printed on Recycled Paper

ACKNOWLEDGEMENTS

This document was prepared for the Environmental Protection Agency, Office of Ground-Water Protection (OGWP) under contract number 68-C8-0003. It is based in part on a document prepared earlier under contract number 68-01-7332. Mr. Kevin McCormack and Mr. Steven Roy of OGWP served as Task Managers for this project with assistance from Dr. Norbert Dee.

Marian Mlay
Director

Office of Ground-Water Protection

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

APPENDICES (continued)

EXECUTIVE SUMMARY

The purpose of this Technical Assistance Document is to assist States and local communities in establishing, providing, maintaining, and updating certain emergency response procedures that may become necessary if a partial or total loss of public water supply service occurs. The development and integration of these emergency response procedures into a workable plan constitutes the Contingency Planning Process.

The Contingency Planning Process is an integral part of EPA's Wellhead Protection Program, established under the 1986 Amendments to the Safe Drinking Water Act. The Wellhead Protection Program was developed primarily to protect the ground waters that supply wells and wellfields that contribute drinking water to public water supply systems. The basic purposes of the program are to recognize and address the essential need to protect ground-water drinking water supplies, and to meet the goals of the Safe Drinking Water Act.

Inherent in this combined approach is the need to consider the unique hydrogeologic environments and potential sources of contaminants or physical disruptions to which these ground-water drinking water supplies may be exposed and the right of the State and local entities to determine how matters of land use and water allocations are best resolved for individual locations.

The periodic occurrence of natural disasters, chemical contamination, physical disruptions, and civil disorders all threaten the supply and distribution network of public drinking water supplies to some degree. These potential problems may range from a few hours' inconvenience to a small service area caused by a water main break to the contamination of an entire aquifer supplying drinking water to a major metropolitan service area. In either case, the minimization of impact on the public and the timely restoration of water supply service to an affected area depends on an updated, efficient, and effective water supply service contingency plan.

INTRODUCTION

Although the goal of wellhead protection is to prevent the contamination of underground drinking water supplies, periodic water supply disruptions may occur. When they do, the most effective way to ensure the continued supply of potable water is to have a contingency plan on hand to direct a coordinated and timely response.

- A tank truck carrying a full load of vinyl chloride overturns on a highway located within the recharge zone for the shallow aquifer serving as a town's principal water supply.
- Severe summer lightning storms knock out the generator operating the pumps for a community's largest producing wells.
- As a result of a waste disposal enforcement action, the State identifies an extensive plume of hazardous leachate moving toward a city's wellfield.
- Extensive seasonal flooding destroys the pumphouses on a town's wells, all located in a floodplain.

Incidents like these are reminders that public water supply systems are vulnerable to disruption from many different threats. Although threats such as flooding and power outages have always been present, incidents involving contamination of ground-water supplies are becoming a more common occurrence. Given that ground-water supplies serve 50 percent of the U.S. population, the severity of these threats becomes clear.

The vulnerability of ground-water supplies points out the need for thoughtful contingency planning to ensure that vital water supplies and public health are safeguarded. Contingency planning is the only way to ensure the effective and quick coordination of the wide variety of technical, communications, financial, and administrative activities involved in responding to a water supply emergency.

What Is Contingency Planning?

The simple answer to this question is that contingency planning is common sense. More fully, planning is the identification of potential threats to a community's ground-water supplies and the development of procedures to be followed when such threats materialize. Contingency plans help communities answer such questions as:

- What are the most likely threats to local ground-water supplies?
- What specific steps must be taken to address these threats?
- Who is responsible for each step and how will response actions be coordinated?
- Where can replacement water supplies be obtained?

Other Federal Requirements for Contingency Planning

In addition to the Wellhead Protection Program, there are other Federal requirements for contingency planning. Section 1413(a)(5) of the 1974 Safe Drinking Water Act required that a State must have "adopted ... an adequate plan for the provision of safe drinking water under emergency circumstances ..." in order to be granted primary enforcement responsibility for public water systems by EPA. As a consequence, many States that have attained primacy under the Act have established emergency plans for the provision of alternate water supplies. In addition to these emergency planning requirements, Federal Regulations (40 CFR 141.24(g)) require monitoring and vulnerability assessments of Public Water Supply Systems (PWSSs) in order to address contamination by volatile organic compounds (VOCs). Many of the features of these ongoing planning and other water supply protection efforts can be incorporated into the contingency planning element of the WHP Program required by the 1986 SDWA Amendments.

Another important Federal statute, the Emergency Planning and Community Right-to-Know Act of 1986, enacted as Title III of the Superfund Amendments and Reauthorization Act (SARA), requires contingency planning of a broader nature. Title III establishes a network of State Emergency Response Commissions (SERCs) and Local Emergency Planning Committees (LEPCs) charged with planning for responses to emergency releases of hazardous chemicals. In addition, Title III requires extensive public reporting by industrial facilities concerning the presence, quantity, and management of hazardous chemicals. Title III complements the SDWA ground-water contingency planning requirements in several important ways:

- The local plans developed under Title III (Section 303) should take into account threats to ground-water and thereby provide a starting point for contingency plans focused specifically on ground-water;

- The "community right-to-know" reporting (Sections 311 and 312) and toxic release inventory (Section 313) requirements of Title III provide a valuable source of information concerning potential contamination threats to ground-water supplies; and

- Public interest and participation generated by Title III implementation efforts should provide a strong foundation for similar public involvement in ground-water protection and planning efforts.

Appendix A provides the statutory language related to the WHP Program, the Section 1413 emergency plans, and SARA Title III.

Purpose of this Technical Assistance Document

This Technical Assistance Document (TAD) can help States and communities satisfy the contingency planning requirements of the 1986 SDWA Amendments, as well as SARA Title III requirements and the monitoring and vulnerability assessment activities required of PWSSs. This TAD specifically focuses on planning for public ground-water supplies. However, the planning framework presented here is, for the most part, equally applicable to surface-water systems. This TAD also is designed for use primarily by smaller communities that lack extensive planning or technical resources, with the belief that larger communities will have the resources necessary to develop plans specialized for their own particular needs. Finally, because it is more efficient to plan for all types of disruption at one time, this TAD addresses contingency planning for all water supply disruptions, not just those related to contamination as specifically required under the SDWA.

Local communities differ with respect to political, institutional, and hydrologic conditions, as well as technical and financial capabilities. Such differences must be taken into account in determining how (and by whom) a plan will be developed, on which supply disruption threats planning efforts will be focused, and in defining the procedures to be followed in responding to those threats. This TAD does not provide a planning recipe that must be followed to ensure success; instead, it identifies a broad range of planning considerations and describes a structured process through which a community can target those considerations most relevant to local conditions and needs.

The initial draft of this TAD was completed in 1987. Using the draft TAD, EPA undertook six pilot contingency planning projects in towns and cities across the nation, including: Corning, New York; Palmer, Massachusetts; Jackson, Tennessee; Sioux Falls, South Dakota; Oakley, Kansas; and Tucson, Arizona. Working with local officials from these communities, EPA gained valuable insight into local preferences and needs and the assets and shortcomings of the TAD itself. The "lessons learned" in those projects have been incorporated throughout this document.[1] (Appendix C provides brief descriptions of each of these projects.)

Organization of this TAD

This TAD is divided into three sections -- the first focuses on local contingency planning, the second on planning at the State level, and the third on the process of reviewing and updating contingency plans. The organization of the first two sections is parallel:

- The initial chapter of each section (Chapters 1 and 3) focuses on organizing the planning process. Specific topics include organizing the planning team, selecting a team leader, setting planning priorities, identifying planning resources, and assigning planning responsibilities.

- The second chapter of each section (Chapters 2 and 4) focuses on the concrete steps of developing a contingency plan. Specific steps include gathering background information, specifying response procedures, and identifying future steps to be taken to prevent emergencies, educate the public, and update the plan.

- Finally, Section 3 describes procedures for reviewing and updating a plan. Several review techniques are presented as are different methods of exercising the plan. Section 3 also addresses plan review in the aftermath of a supply disruption.

Following the main body of this TAD, there are a series of appendices providing more detailed information on many of the topics covered in the text as well as other materials such as bibliographies of useful publications and lists of funding sources.

[1] This TAD also incorporates information gathered from a varied group of Federal, State, and local water supply and emergency response experts who participated in a contingency planning workshop held in Washington, D.C. on January 27-28, 1988. A list of workshop participants is provided in Appendix B.

Other Information on Wellhead Protection

In response to the 1986 SDWA Amendments, EPA's Office of Ground-Water Protection has developed several TADs, in addition to this document, for State and local governments interested in developing Wellhead Protection Programs:

- *Local Financing for Wellhead Protection* (June 1989);
- *Wellhead Protection Programs: Tools for Local Governments* (April 1989);
- *Developing A State Wellhead Protection Program: A User's Guide to Assist State Agencies Under the Safe Drinking Water Act* (July 1988);
- *Model Assessments for Delineating Wellhead Protection Areas* (May 1988);
- *State Wellhead Protection Program Question and Answer Fact Sheet* (June 1987);
- *Guidelines for the Delineation of Wellhead Protection Areas (1987)*;
- *Guidance For Applicants For State Wellhead Protection Program Assistance Funds Under the Safe Drinking Water Act* (June 1987); and
- *Wellhead Protection: A Decision Makers' Guide* (May 1987).

Additional information can be obtained from EPA Regional Ground-Water Representatives as shown in Exhibit 1-2.

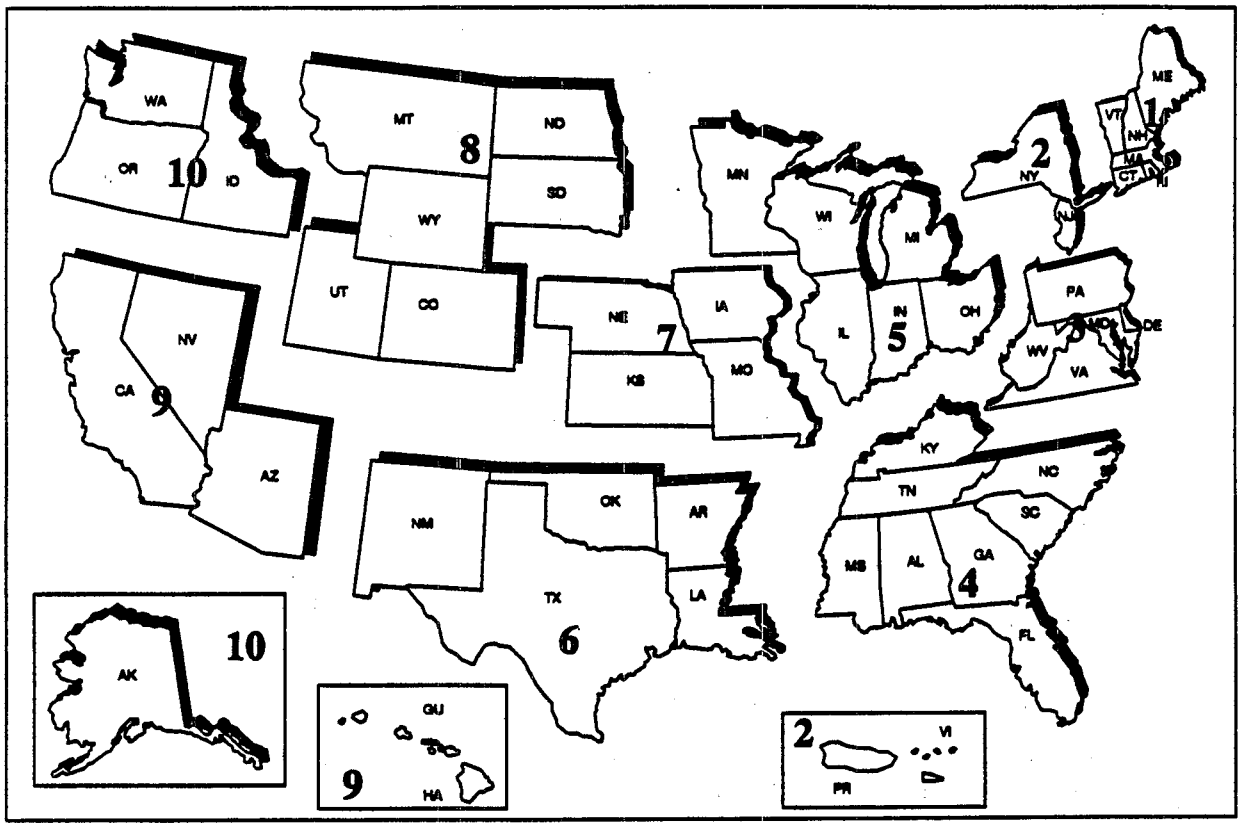
Other Information on Contingency Planning

State and local officials may turn to many other sources for additional guidance in undertaking the contingency planning process. (Appendix D provides a fairly extensive list of such sources.) Particularly helpful is the *Hazardous Materials Emergency Planning Guide*, published by the National Response Team, the body charged with coordinating Federal agency response to hazardous materials emergencies. Although this guide focuses on Title III hazardous materials planning, the suggestions it provides on the planning process and sources of planning information should be useful for water supply planners as well.

Local planners might also check to see if guidance has been developed by their State water agency. In some States with their own contingency planning requirements, guidance documents have been prepared that address both the specific requirements that must be met as well as more general planning concepts.

Exhibit 1-2

EPA Regional Ground-Water Representatives



Robert Mendoza
Office of Ground Water
Water Management Division
U.S. EPA, Region I
JFK Building, Room 2113
Boston, MA 02203
(617) 565-3600

John Malleck
Office of Ground Water
Water Management Division
U.S. EPA, Region II
26 Federal Plaza
New York, NY 10278
(212) 264-5635

Stuart Kerzner
Office of Ground Water
Water Management Division
U.S. EPA, Region III
841 Chestnut Street
Philadelphia, PA 19106
(215) 597-8826

Stallings Howell
Office of Ground Water
Water Management Division
U.S. EPA, Region IV
345 Courtland Street, NE
Atlanta, GA 30365
(404) 347-3866

Jerri-Anne Garl
Office of Ground Water
Water Management Division
U.S. EPA, Region V
230 S. Dearborn Street
Chicago, IL 60604
(312) 886-1490

Erlece Allen
Office of Ground Water
Water Management Division
U.S. EPA, Region VI
1445 Ross Avenue
Dallas, TX 75202-2733
(214) 655-6446

Don Toensing
Office of Ground Water
Water Management Division
U.S. EPA, Region VII
726 Minnesota Avenue
Kansas City, KS 66101
(913) 236-2970

James Dunn
Office of Ground Water
Water Management Division
U.S. EPA, Region VIII
999 18th Street
Denver, Colorado 80202-2405
(303) 293-1703

Deborah Robinson
Office of Ground Water
Water Management Division
U.S. EPA, Region IX
215 Fremont Street
San Francisco, CA 94105
(415) 974-0831

William Mullen
Office of Ground Water
Water Management Division
U.S. EPA, Region X
1200 6th Avenue
Seattle, WA 98101
(206) 442-1216

SECTION I

CONTINGENCY PLANNING AT THE LOCAL LEVEL

As part of a WHP Program, Section 1428(a) of the SDWA Amendments of 1986 specifies that each public water supplier within a state must provide a contingency plan for the location and provision of alternate drinking water supplies in the event of well or wellfield contamination. This initial section of the TAD focuses on contingency planning at the community level. Because public water supply is predominantly a local government function, most responses to supply disruption will occur at the local level. Section II of the TAD describes the State role in contingency planning. Exhibit 1-3 provides both a flow chart of the planning process as well as a "road map" of Section I:

- Chapter 1 focuses on getting the planning process started; and
- Chapter 2 addresses what to do once the planning process is underway and concludes with some advice on building consensus for the plan.

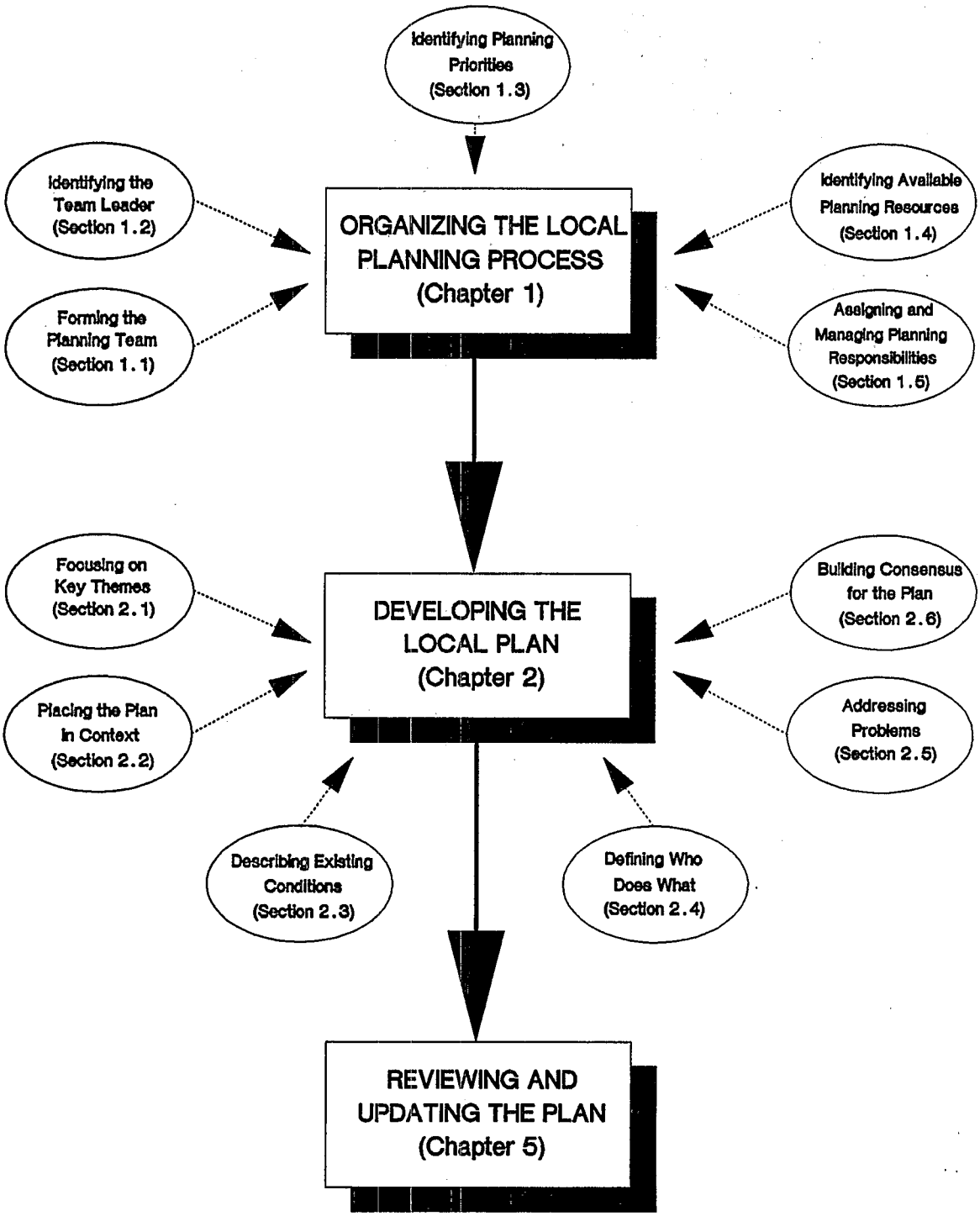
Before discussing the planning process, it is worth previewing several key themes, each based on the experience of contingency planners in many communities, that appear in this TAD:

- Build broad community involvement into the planning effort, including on the planning team all parties who will respond to water supply disruptions;
- Focus planning on the most likely supply disruption threats and tailor response actions to community conditions and resources;
- Take advantage of available planning resources, including local expertise, existing planning documents, and help from State and Federal agencies;
- Think of a contingency plan as a "living" document requiring periodic review and updating to ensure that it continues to reflect community conditions; and
- Use the planning process and the plan itself to identify those immediate and longer-term actions that can be taken to lessen the chances of a water supply disruption and to mitigate the impacts of those disruptions that do occur.

Beginning the planning process with these themes in mind can help to keep the "big picture" in view: the planning process and even the plan itself are both means to an end. The test of successful planning is whether it improves a community's ability to prevent and respond to water supply disruptions.

Exhibit 1-3

OVERVIEW OF THE LOCAL PLANNING PROCESS



STREAMLINING THE LOCAL RESPONSE

In April 1987, a break occurred in a gasoline supply pipeline located directly over a wellfield supplying water to **Sioux Falls, South Dakota**. Although State and local governments dealt with the problem promptly, the process showed a need for improved efficiency and coordination to streamline the response time and procedures. A local legislative representative was instrumental in focusing attention on the need for development of contingency plans for Sioux Falls. This official was able to convince the appropriate municipal program offices (e.g., Health Department, Fire and Rescue, Civil Defense, etc.) that development of a contingency plan should be an integral part of the city's overall emergency preparedness program.

Lessons learned: Even in the face of a real threat to public drinking water supplies from a contamination accident, the response process often can be slow and difficult to orchestrate without significant support at the local level.

CHAPTER 1: ORGANIZING THE LOCAL PLANNING PROCESS

Starting the contingency planning process for public water supplies in the right way will have a significant impact both on the quality of the plan itself and on the efficiency of the process. This chapter provides specific suggestions on the key steps in organizing a productive planning process, including forming the planning team, picking a team leader, identifying planning priorities, identifying available planning resources, and assigning and managing planning responsibilities.

1.1 FORMING THE LOCAL PLANNING TEAM

The State Wellhead Protection Program may identify the local entity responsible for beginning the water supply contingency planning process. The process may be initiated by a single individual, an agency, or perhaps a water utility. However it begins, contingency planning generally grows best out of a process coordinated by a team because:

- Effective response to an emergency requires coordination of many agencies, organizations, and individuals;
- Broad participation helps ensure that advantage is taken of all relevant and available local and State expertise and resources;
- Organizations and individuals that would respond to a local supply disruption can help to ensure that the plan effectively meshes the operating procedures and needs of each; and
- Involvement in the planning process also helps to give participants a sense of "ownership" in the plan, increasing the chances that the plan will be used when water supplies are threatened.

Although it is unlikely the States will have sufficient resources to actively participate in a large number of local planning efforts, local planners should take the initiative and seek active State involvement. Even if it cannot appoint a participant to the local planning team, the State might be able to offer a variety of resources to assist the local effort (e.g., outreach information, technical assistance documents, partial participation in planning efforts).

STRONG LOCAL LEADERSHIP IS ESSENTIAL

In **Tucson, Arizona**, the various water providers were very reluctant to spend time and resources to develop a contingency plan. The smaller water companies couldn't see any potential benefit for themselves, and the major company felt a plan was unnecessary because it had always been able to handle supply interruptions with relatively little disruption or outside assistance. Pima Association of Governments was able to illustrate the potential benefits of a contingency plan for all water providers; pool the resources, knowledge, and expertise of all the companies; and facilitate the development of the area's first water supply contingency plan.

Lessons learned: Without strong local leadership, the development of a contingency plan is difficult.

Exhibit 1-4 provides a list of the types of local agencies and community interests that might be represented on a contingency planning team. It may also be helpful to think in terms of the specific planning roles or types of expertise that will be needed. Some examples of important roles include: elected official, water systems expert, hydrologist, water quality planner, city manager or planner, emergency response planner, emergency responder, response equipment supplier, response contractor, public safety and law enforcement expert, public health expert, industry liaison, consumer/citizen liaison, and legal adviser.

When selecting team members, organizers of a local contingency planning effort should keep three considerations in mind:

- The members of the group must have the ability, commitment, authority, and resources to get the job done;
- The group must possess, or have ready access to, a wide range of expertise concerning the community, its water system and water users, and the mechanics of response to supply disruptions; and
- The members of the group must agree on their purpose and be able to work cooperatively with one another.

The membership of such a team naturally will vary depending on the size and characteristics of each community. In smaller communities, relatively few individuals may play different planning roles. In very large communities, a planning team representative of all affected interests might be so large as to be unwieldy. It may be appropriate in such cases to divide the team into subcommittees, each responsible for specific parts of the plan, and/or to designate an "executive committee" responsible for making key decisions efficiently based on team input. In communities with relatively sophisticated water supply agencies, the planning team may actually serve as an advisory body reviewing and commenting on a plan developed by the agency and/or its consultants. Regardless of the specific situation in a particular community, the basic goal should be to provide for broad community participation in the planning process in the way that best meets community circumstances and needs.

1.2 IDENTIFYING THE TEAM LEADER

Forming an appropriate planning team is not enough to ensure success in contingency planning. The selection of an effective team leader can be critical in keeping the process on track, making sure that all legitimate community interests have a voice in the process, and ensuring that the planning effort is brought to completion.

Exhibit 1-4

POTENTIAL MEMBERS OF A LOCAL WHP CONTINGENCY PLANNING TEAM

- Mayor/city manager (or representative)
- County executive (or representative)
- City/county council members
- City/county legal counsel
- Municipal water authority or department
- Public works department
- Water quality management agency
- Planning department
- Environmental agency
- Health department
- Fire department
- Police or public safety department
- "Hazmat" or civil defense units
- Hospitals and medical community
- Local Emergency Planning Committee (LEPC) member(s)
- Water supplier(s)
- Red Cross and other volunteer response groups
- Industry representatives (chamber of commerce, large water users)
- Community groups (environmental groups, League of Women Voters)
- Technical experts (hydrologists, engineers)
- Water quality laboratories
- Equipment and response contractors
- Media representatives
- Representatives of neighboring communities
- State agency representatives (e.g., water and health departments)
- Regional agency representatives (e.g., council of governments, regional planning agency)
- Federal agencies (e.g., EPA, FEMA, National Guard), including land management agencies who have WHPA's located on their lands (e.g., DOD, USDA, DOT)
- Emergency response team member(s)
- A neutral meeting facilitator

COORDINATING MUNICIPAL RESPONSIBILITIES

When faced with the State's requirement that all public water suppliers develop emergency operating plans, the Jackson Utilities District (JUD) in **Jackson, Tennessee**, found that there was no central information source on the water distribution system and its components. Nor was there a map illustrating specific features of the system or its extensiveness. Although the city maintained extensive hydrogeologic data on existing wellfields, there was no focal point for coordinating existing municipal emergency response plans to deal with large-scale water service interruptions. The contingency plan the JUD developed in response to the State requirement is organized to provide detailed resource information for those responsible for responding to water supply emergencies. The JUD assumed the responsibility for managing the development of the plan and, with strong leadership and adequate staff support, produced the entire plan in a few month's time.

Lessons learned: Access to extensive technical data alone is not enough to ensure adequate response to water-service emergencies. Existing municipal emergency response plans must be coordinated to ensure that individual responsibilities are met during emergencies.

The choice of team leader in some cases may be obvious. A strong and well-respected water department manager, for example, may be the logical candidate. The city manager or an elected official, or a representative of another local agency -- public works, public safety, or public health, for example --may be the instinctive choice. When the answer is not so clear, however, the selection process can be made easier by using systematic criteria. Several key characteristics might be kept in mind in evaluating candidates:

- The respect of the groups represented on the planning team;
- Planning experience and knowledge of the local water system;
- Authority to access personnel, funding, and other resources necessary to the planning effort;
- Commitment to the objectives of the planning process;
- Availability of time;
- Strong management and communications capabilities; and
- Willingness to listen to the opinions of others and work to find consensus among diverse interests.

In some cases, the "logical" choice for leader, based upon that person's official role, may not be the best choice. The key point is that personal as well as institutional considerations should be weighed in selecting the team leader. For example, a particular agency may appear to have all the necessary resources for a successful contingency planning project. But if the person in charge of that organization does not interact well with other local officials and community interests, it might be advisable to look elsewhere for a leader. In any case, the team leader should be granted the authority necessary to perform his or

her duties, whether that authority must be delegated by the mayor/city manager, granted by the town council or board of supervisors, or established as a mutual agreement by participating agencies.

INSTITUTIONALIZING THE PLANNING PROCESS

The process of developing a contingency plan for **Oakley, Kansas,** currently is on hold because the lead role in the process is being transferred from the mayor to the new City Administrator. The planning process will not be resumed until the new City Administrator has become familiar with the essential facts of the plan and new members of the town council have been briefed on the plan's long-term benefits. Once contingency planning becomes accepted as an important component of the city's governmental role, the planning process itself will become part of the government's routine activities.

Lessons learned: Institutionalizing the contingency planning process in a local government's operations assures continuation of the process and smooth transitions during staff changes.

1.3 IDENTIFYING PLANNING PRIORITIES

Contingency planning can be a very time-consuming and expensive undertaking unless it is carefully managed. The objective, particularly for those communities with thinly-stretched municipal budgets, is to develop a "lean and mean" plan that meets local needs as efficiently as possible.

A useful first step toward this goal is for the planning team, from their very first meeting, to begin identifying local planning priorities and targeting their efforts directly at those priorities. The planning team needs at all times to remember that the objective is to develop a workable plan for responding to water supply disruptions. All available information necessary to meet that objective should be obtained; additional information, while perhaps relevant and useful in refining and expanding the plan, should receive a much lower priority or be deferred to the later plan review and update phase.

The planning team can make it easier to keep this "big picture" in view by making a preliminary list of key planning considerations at one of their earliest meetings. Key considerations might include:

- Principal water system features;
- Principal disruption threats (including both contamination and service interruptions);
- Most obvious water supply alternatives;
- Most readily accessible financial resources; and
- Leading response agencies and resources.

This list can help target the subsequent information gathering process and can, as suggested by that information, be revised and expanded throughout the planning process.

- -- Assessing potential water supply replacement options
- -- Identifying logistical and other support resources to be employed in response actions

- Water Quality/Environmental Official
  - -- Identifying potential contamination and other disruption threats

- Local (City/County) Official
  - -- Identifying financial resources to pay for response actions

- Planning/Emergency Response Official
  - -- Determining key response procedures
  - -- Identifying steps that can be taken to prevent and mitigate the severity of water supply disruptions
  - -- Developing a program for educating the public about the water system and the contingency plan
  - -- Organizing a process for reviewing and updating the plan

The first step in assigning these tasks to members of the planning team is to match as closely as possible member's expertise with the subject matter of each task. Once planning tasks have been assigned, it becomes the team leader's responsibility to manage the work of team members so that it is completed on time, is of acceptable quality, and meshes effectively with the work of other members. Ultimately, monitoring and managing the work of the planning team needs to be done by the team as a whole, operating on a consensus basis. This is particularly important for ensuring coherency and consistency among the various pieces of the plan. In the early stages of the planning process, however, it generally falls to the team leader to monitor members' progress and keep the project on track.

Planning meetings can be an effective tool if they are used properly. They are particularly useful as a periodic means of making sure that the various components of the plan are developing in a consistent direction. Often, however, meetings do not make the best use of available time. It is easy for members of a planning team drawn from many agencies and interests to address tangential issues or to use team meetings as a forum for expressing differences and grievances fueled by longstanding interagency rivalries. Planning meetings, therefore, should be kept to a minimum and should be highly focused. It is the leader's job to know when it is necessary for the group to meet, to develop a focused meeting agenda, and to make sure that meeting discussions stick to the agenda and are productive.

CHAPTER 2: DEVELOPING THE LOCAL PLAN

Once a community's contingency planning team is in place, the real challenge of contingency planning begins. This chapter aims to make the job of writing a water supply disruption contingency plan easier by providing specific suggestions that local planners can follow. The chapter starts with a discussion of key general planning themes in Section 2.1. The next several sections are organized according to how a local contingency plan might be organized:

- Section 2.2 describes what the introduction to a local plan might look like;
- Section 2.3 reviews the types of background information and analysis associated with plan development;
- Section 2.4 describes how emergency response procedures might be developed and used; and
- Section 2.5 describes how a plan might incorporate identification of future steps that a community might take to reduce the chances for a water supply disruption and to improve their readiness for those disruptions that do occur.

Finally, Section 2.6 describes the process of building a broad consensus in support of the plan.

Note that although the identification of appropriate emergency response procedures comes mid-way through the contingency planning process, the emergency response procedures represent the relevant part of the plan during a supply disruption event. In order to facilitate the use of these procedures during an event, therefore, planners might want to highlight their placement in the plan (i.e., with colored paper or the use of indexed tabs) or bind the entire response section separately from the rest of the plan.

Exhibit 2-1 provides an example table of contents for a local community's water supply contingency plan. Although local planners clearly need to tailor this "prototypical" plan to their own community's needs and circumstances, it provides a framework that may make the planning process easier and more focused on the end product. Chapter 2 in general follows this framework.

2.1 FOCUSING ON KEY THEMES

In developing the contingency plan, the planning committee should keep several key themes in mind:

- Simple structure and clear language are essential because the primary purpose of the plan is to provide vital information and guidance to response personnel during or immediately following a water supply disruption.
- Tailoring a plan's structure to meet local threats and conditions is also important. Planners should not waste a lot of time or fill the plan with extensive material addressing threats or problems that do not realistically face their community.

Exhibit 2-1

ILLUSTRATIVE TABLE OF CONTENTS FOR A LOCAL CONTINGENCY PLAN

- The more "user friendly" a plan is, the more likely it will actually be used during an emergency. For example, the plan might provide removable pages that can be pasted on a wall for quick access, make extensive use of exhibits, place detailed information in a separate volume so that it is not in the way during an emergency, and use a loose-leaf format to facilitate the use and updating of the plan.

- In the plan development process, planning team members should take maximum use of all available technical expertise.

By starting out with these key themes in mind, planners should be able to develop effective and useful contingency plans. The remainder of this chapter presents the various components of a typical water supply contingency plan and offers some guidance on how to develop and use such a plan.

2.2 PLACING THE PLAN IN CONTEXT WITH AN "INTRODUCTION"

The first section of a contingency plan typically will be an introduction designed to serve two purposes. First, the introduction should place the plan in context by providing a brief review of the origins and objectives of the plan, as well as explaining the relationship of the plan to other State and local planning efforts. Second, the introduction should provide guidance on how the plan itself should be used during a water supply emergency. In order to serve both of these purposes, the introduction to a plan might consist of a number of subsections, which are described below.

Directory of Information

A useful piece of information to place at the very beginning of the plan is a "Directory of Information." Similar to an annotated table of contents, the purpose of a directory is to identify both the various plan sections relevant for undertaking a particular response action and the locations of those sections in the plan. Such a directory can be particularly useful if it notes the different techniques used to highlight important sections (for example, "all response procedures are printed on colored paper and subdivided with tabs"). This subsection also might facilitate plan use if it includes an exhibit providing definitions of any abbreviations, acronyms, and key terms used in the plan. Finally, this subsection might conclude with a succinct statement (i.e. about one paragraph) of when and how the plan should be used.

Legal Authority for the Plan

This subsection would summarize State requirements, local actions, agency-specific responsibilities relevant to the plan, and the division of funding responsibilities for plan development (for example, from general funds or by agency). This discussion will be particularly useful to parties reviewing and updating the plan in the future by helping to explain why particular approaches or response procedures were adopted for the plan. It might be helpful also to include an appendix containing the full legal documentation (for example, city council resolutions or State legislation or regulations) referenced in this section of the plan.

Objectives of the Plan

The introduction should contain a clear statement of the objective(s) the plan is designed to meet, such as specific contingencies that are addressed and the types of response procedures that are set out. In addition to improving response capabilities, plan

objectives might include educating the public and providing orientation for training new water system personnel.

CREATING A VERSATILE DOCUMENT

Jackson, Tennessee, sees its contingency plan as both a manual for responding to water supply emergencies and an educational/training resource for new employees. Using the newly developed plan, new employees can learn about Jackson's entire water supply system, including the location and specifications of its components, alternative supply response procedures, and the roles of individual municipal sectors (e.g., fire, rescue, civil defense, etc.) in coping with a water service emergency. The plan also distinguishes between internal resources (e.g., personnel, equipment, storage facilities, communications, etc.) and external resources (e.g., contractors, government agencies, other water utilities, parts and repair services, media contacts, etc.). For the first time, Jackson has a complete sourcebook on its system, resources, and potential problem areas.

Lessons learned: Contingency planning documents are versatile and dynamic -- frequently having uses very different from their original intent.

Overview of the Local Wellhead Protection Program

This subsection would explain how the water supply contingency plan fits into the community's larger wellhead protection effort. Other local wellhead protection efforts might include, for example, the acquisition of key ground-water recharge areas or more stringent controls on potentially contaminating land uses in wellhead areas. This discussion is especially useful for illustrating to the general public the comprehensive effort being taken to protect the public water supply.

Summary of Local Planning Needs

This subsection, also designed to place the plan in a general context for the reader, can be taken from the background information section of the plan and used to summarize community conditions, resources, and threats bearing on the plan. It might be useful also to present and summarize the supply disruption scenarios developed in the planning process and used for identifying appropriate response procedures (see Section 2.3 below).

How the Plan was Developed

This subsection should include a summary of the planning process, with an exhibit showing the State and local organizational roles and responsibilities assumed in the planning effort, and the review and approval process used.

Relationship to Other Planning Efforts

This subsection should show how other planning efforts (for example, water supply master plan, Title III local plan, local land use plans, State contingency plans, State and local Civil Defense and HAZMAT Programs) interrelate with this plan. This discussion also might describe what implications this plan holds for the other plans (for example, the need for better land use plans to protect local wellhead areas).

Plan Distribution

The process by which official copies of the plan have been distributed is typically shown by providing a "distribution list" exhibit. Copies of the plan should be provided to all key response personnel and other public officials, and should be made accessible to the general public (for example, at a public library).

Procedures for Review and Update

A brief summary of the procedures for reviewing and updating the plan should be provided in the introduction. The summary should identify the parties responsible for maintaining the plan, note the frequency with which the plan will be routinely updated, and briefly describe how the plan testing and review process will work. This section of the introduction should highlight the importance of keeping the plan current and up-to-date.

Amendments and Changes (with Dates)

In addition to providing a list of all parties holding an official copy of the plan, the introduction might provide a sheet for recording any amendments or other changes to the plan, along with the date of those changes. This is particularly important for changes in response procedures and notification telephone numbers. Plan changes should be distributed to all holders of official copies (those on the distribution list mentioned above) in order to ensure that everyone has the same understanding of appropriate response procedures.

2.3 DESCRIBING EXISTING CONDITIONS -- BACKGROUND INFORMATION

The planning team should review the physical attributes of their water supply system and identify the local resources (personnel, equipment, logistics, and finances) that will be necessary to make the plan work. By taking the time to familiarize themselves with the vulnerabilities of their system and local response capabilities, water supply planners can take steps to prevent a water supply disruption from becoming a water supply emergency.

A background review and analysis of the local water supply situation also will help planners evaluate their contingency planning status and determine what needs to go into their plan. Although the level of appropriate detail will vary, specific planning factors that should be considered by all planners include:

- Water system characteristics;
- Potential sources of water supply disruption;
- Water supply replacement alternatives;
- Logistical support resources; and
- Financial resources.

It is especially important that the information used in the background section be as complete and current as possible. The use of outdated information, especially inaccurate maps, can seriously limit the value and utility of the plan.

Water System Characteristics

The most important component of any water supply plan is the physical process of getting water from a source to the customer. Water supply planners need to familiarize themselves with both the mechanics of the system and the needs of their customers in order to determine appropriate methods to ensure that the flow of water is not interrupted. Much of the analysis of the system will go on "behind the scenes" and need not be incorporated into the contingency plan itself, although the fact that the analysis was done should be documented in the plan. Much of this information will be available in the community master plan or from the water department. The planning process can be a convenient means of gathering the relevant information in one place, or updating records if a central agency has not already undertaken these steps.

The plan should include basic water supply information such as:

- Location and capacity of individual wells and storage tanks;
- Location and capacity of water treatment facilities;
- Location and capacity of major distribution lines; and
- Key points for isolating sections of the system.

The water use characteristics of the communities that are being served also should be determined because such information can be critical in determining whose needs must be met first in the event of a supply disruption. Both capacity and water use information should be recorded using common measures such as maximum and average gallons per day.

The water system can be characterized in a single schematic of the water supply system (see Exhibit 2-2 for an example), as well as with tables or charts which illustrate the major uses and users of water in the community. If this information is readily available through other sources (for example, the water supply master plan or utility files), the contingency plan can simply reference the specific location where the records are located. All such information should be conspicuously dated. Exhibit 2-3 indicates some of the factors that should be analyzed when reviewing these components of a ground-water supply system. Operators of water supply systems that rely on one or more surface water sources (e.g., reservoirs, lakes, rivers) in addition to wells should note the use of those sources, along with water quantity and quality information.

Potential Sources of Water Supply Disruption

Tailoring a plan to community conditions and needs is one of the most important challenges facing the planning team. Accurately identifying the most likely disruption threats to the water supply is the best place to start this process.

Short-Term Versus Long-Term Disruption Events

As a general rule, water supply contingency plans are designed to meet immediate or near-term contingencies. A power outage, vandalism, a hazardous substance spill, and sabotage are all examples of such contingencies. While longer-term problems, such as a prolonged drought or a plume of contamination not expected to reach a wellfield for many years, are very important, they are more relevant to long-term water supply planning than contingency planning. To the extent that contingency plans address long-term problems, they should be given less emphasis than more immediate threats.

Exhibit 2-2

EXAMPLE OF A SCHEMATIC DIAGRAM

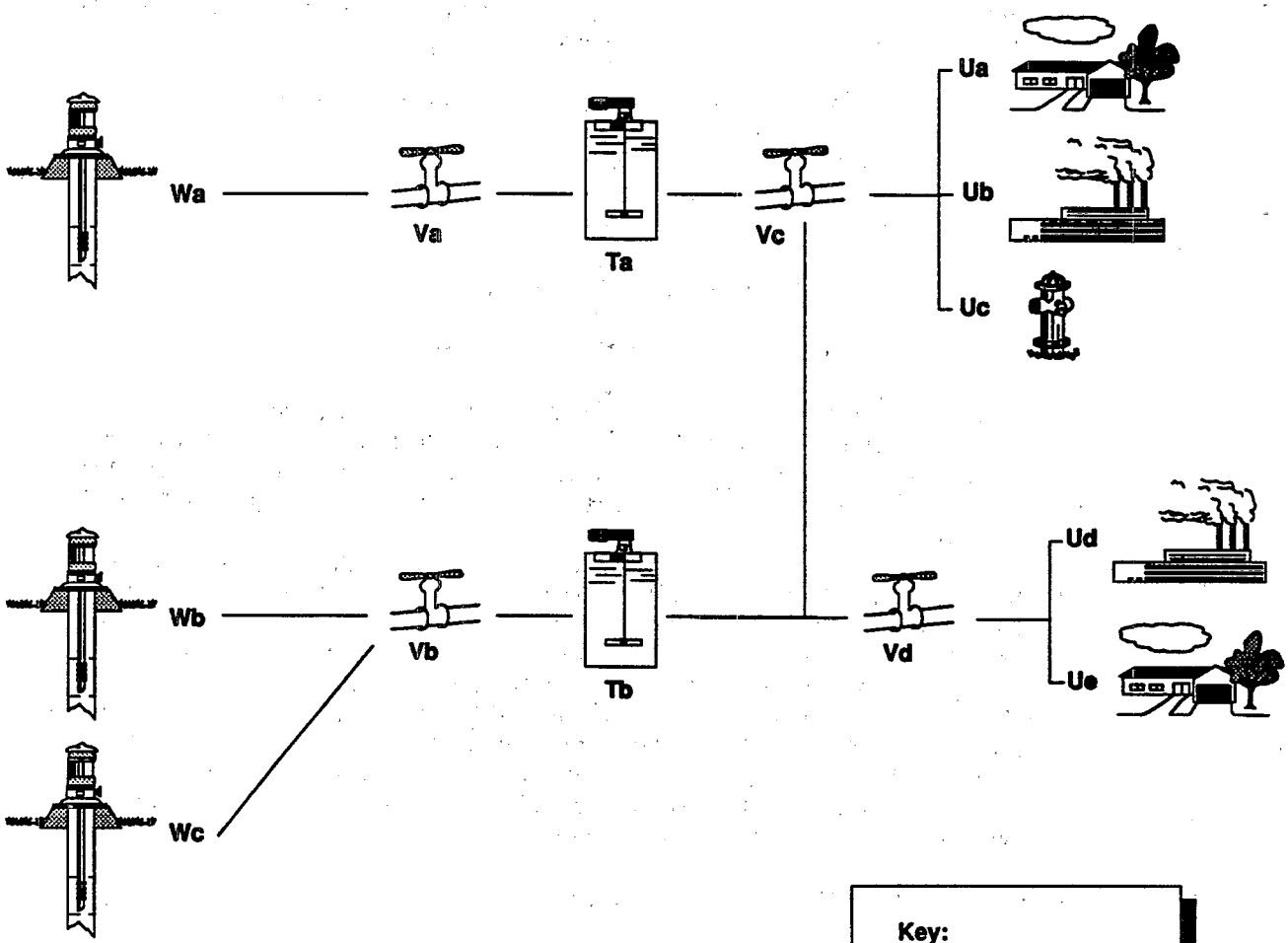


Exhibit 2-3

REVIEWING WATER SYSTEM COMPONENTS -- KEY FACTORS

Supply Components

The supply component of the water supply system consists of the supply wells and the facilities for delivering the water to the treatment plant (if any). Each well should be analyzed for three major factors:

1) production capacity;
2) connection to supply; and
3) monitoring wells.*

For each of these factors, consider the following questions:

1) Production Capacity (supply wells)
   - What is the maximum yield?
   - What is the pump capacity?
   - What is the current flow?
   - Are there seasonal variations?
   - Is there excess capacity?

2) Connection to Supply (pumps, valves)
   - Can the well be isolated or cut-off?
   - Where is the pump cut-off?
   - If the well is cut-off, what are the impacts on supply?
   - How can supplies be obtained from another system?

3) Monitoring Wells
   - What are the potential sources of contamination in the wellhead area?
   - Are monitoring wells located to detect contamination from identified potential sources?
   - Are well samples and monitoring well samples analyzed for contaminants from potential sources?

---

* Note that while monitoring wells are a part of the supply system, they usually do not have production capacity and are not physically connected to the water-supply system. Monitoring wells should be evaluated to assess their suitability for detecting contamination.

Exhibit 2-3 (continued)

REVIEWING WATER SYSTEM COMPONENTS -- KEY FACTORS

Treatment Components

The second component of the water supply system consists of the treatment facilities and processes, which should be analyzed to determine:

1) treatment process capacity;
2) types of contaminants treated; and
3) impact of contamination on treatment capability.

For each of these elements, consider the following questions:

1) Treatment Process Capacity
   - What is the maximum volume of water that can be treated?
   - What is the current flow?
   - Is there excess treatment capacity?
   - Can the existing treatment process be expanded or modified?

2) Types of Contaminants Treated
   - What contaminants can be treated?
   - How are they identified?
   - How does treatment capacity vary by type of contamination?

3) Impact on Treatment Capability
   - What levels of contamination will exceed the existing treatment system's capacity?
   - What type of contamination would impair the system's capability or otherwise pass through?

Exhibit 2-3 (continued)

REVIEWING WATER SYSTEM COMPONENTS -- KEY FACTORS

Distribution Components

The third component of the water supply system is the distribution network, which has three primary parts: 1) the distribution pipes and connections, 2) system operating procedures, and 3) storage capacity. Careful analysis of the distribution system is essential because it may be vulnerable to contamination and will also influence the selection of appropriate supply replacement options. The analysis will be easier if current maps or system schematics can be used. The analysis should answer the following questions:

1) Distribution Pipes and Valves
   - What is the maximum flow capacity?
   - What is the current flow?
   - Is there excess capacity?
   - How does water pressure affect distribution?
   - What portions of the pipe system are vulnerable to contamination?
   - Are there alternative distribution routes?

2) Operating Procedures
   - What portions of the system can be isolated or shut-off in the event of contamination?
   - If portions of the system are shut-off, what are the impacts?
   - What adjustments would have to be made to utilize an alternative supply source?

3) Storage Capacity
   - What is the system storage capacity? Are there seasonal fluctuations?
   - Is stored water vulnerable to contamination?
   - Is there an alternative supply source available that could be stored?
   - How can stored water be treated and distributed?

Exhibit 2-3 (continued)

REVIEWING WATER SYSTEM COMPONENTS -- KEY FACTORS

Analysis of Water Use and Demand

A detailed knowledge of water use and demand is necessary in order to plan for water supply replacement. In order to choose the best alternative, planners must know the existing levels of use and the demand of different sectors of the community. The analysis of water use and demand should:

1) establish maximum daily consumption levels;
2) establish minimum daily consumption levels; and
3) identify priority uses.

The following steps might be followed to determine demands on the system for drinking water and other purposes:

1. Estimate present and projected water use (particularly for major, if not all, users):
   a. Record average daily consumption, minimum daily consumption, and maximum daily consumption levels by use category. If appropriate, major users for each category might be identified. Use categories include:
      - residential;
      - commercial;
      - industrial;
      - institutional;
      - fire safety; and
      - agricultural.
   b. Project daily use over, for example, 1, 2, and 5 years. Note seasonal fluctuations, if any. Projections allow the contingency plan to reflect future conditions, especially regarding the siting and planning for new wells.
   c. Revise projections to take into account population increases and changes in commercial and industrial development.

2. Determine priority uses:
   a. High priority uses for public health protection may include:
      - household and other public drinking water supplies;
      - hospital supplies; and
      - fire fighting systems.
   b. Lower priority uses may include:
      - landscaping;
      - certain industrial processes; and
      - non-essential household uses.

3. Determine the supply requirements for priority uses including:
      - minimum quantity;
      - minimum pressure levels;
      - time of supply; and
      - quality of the supply.

If the water supply system is large enough, this information might be more useful if organized by geographic area.

Specific contingencies will vary from community to community depending on many factors, such as hydrologic conditions, local land uses and sources of potential contamination, and characteristics of the water supply and distribution network. Examining the historical record provides one useful source of information about likely disruption threats. Problems that have occurred in the past, such as droughts and floods, may occur again. The longer the period of time for which such information is available, the more reliable it is for projecting conditions.

Disruption Events Resulting from Contamination

Planners should pay special attention to potential sources of chemical contamination arising from chemical transportation, storage, and use patterns. A contamination event of particular concern for emergency planning purposes might entail the contamination of a specific wellfield or the wide-spread contamination of an aquifer that poses a near-term threat to a wellfield. Localities with ground-water supplies that are hydrogeologically vulnerable, especially those formations characterized as karst terrains, should pay special attention to the potential for contamination. Karst terrains, defined as limestone and dolomite formations subject to rock dissolution, are particularly vulnerable to contamination because of the rapid flow of ground water and, hence, contaminants.

Under the SDWA, State Wellhead Protection Programs must identify anthropogenic sources of contamination within Wellhead Protection Areas. The information collected in conjunction with the State's source identification efforts could be useful to localities in their contingency planning efforts. Moreover, studies done by public water suppliers to meet the SDWA volatile organic chemical (VOC) monitoring and vulnerability assessment requirements will yield information on potential contaminant sources. Appendix E, a hazardous spill vulnerability checklist, reviews potential sources of hazardous materials contamination. Appendix F provides an overview of different types of hazardous materials regulated under Federal environmental programs.

Exhibit 2-4[2] presents a list of potential sources of contamination. Although all of these will not be of concern to every community, the list presents a starting point for planners in reviewing threats to their ground water. The list provided in Exhibit 2-4 can be a very useful tool in conducting what is often called a "windshield survey." Using the list and an appropriately-scaled map, several planning team members can drive around the area surrounding public wellfields and known ground-water recharge areas identifying businesses that may pose a contamination threat. Examples might include gasoline stations (and other businesses with underground storage tanks), autobody and metal working shops, and dry cleaning plants.

---

[2] Sources used to compile Exhibit 2-4 include:

Hrezo, Margaret and Nickinson, Pat, "Protecting Virginia's Groundwater: A Handbook for Local Government Officials," Virginia Water Resources Research Center and Virginia Polytechnic Institute and State University, November 1986;

Jaffe, Martin and DiNovo, Frank, Local Groundwater Protection, the American Planning Association, Chicago, Illinois, 1987;

Page, William E., ed., Planning for Groundwater Protection, Academic Press, Inc., Boston, MA, 1987; and

U.S. Environmental Protection Agency, "Wellhead Protection Programs: Tools for Local Governments," EPA 440/6-89-002, April 1989, Office of Water, Washington, D.C.

Exhibit 2-4

COMMON SOURCES OF GROUND-WATER CONTAMINATION

AGRICULTURAL

Animal burial areas
Animal feedlots
Chemical application
(e.g., pesticides, fungicides, and fertilizers)
Chemical storage areas
Irrigation
Manure spreading and pits

COMMERCIAL

Airports
Auto Repair Shops
Boat Yards
Construction Areas
Car Washes
Cemeteries
Dry Cleaning Establishments
Educational Institutions
(e.g., labs, lawns, and chemical storage areas)
Gas Stations
Golf courses (chemical application)
Jewelry and Metal Plating
Laundromats
Medical Institutions
Paint Shops
Photography Establishments/Printers
Railroad Tracks and Yards/Maintenance
Research Laboratories
Road Deicing Operations
(e.g., road salt)
Road Maintenance Depots
Scrap and Junkyards
Storage Tanks
(i.e., Above-Ground, Below-Ground, and Underground)

INDUSTRIAL

Asphalt Plants
Chemical Manufacture, Warehousing, and Distribution Activities
Electrical and Electronic Products Manufacturing
Electroplaters and Metal Fabricators
Foundries
Machine and Metalworking Shops
Manufacturing and Distribution Sites for Cleaning Supplies
Mining (surface and underground) and Mine Drainage
Petroleum Products Production, Storage, and Distribution Centers
Pipelines
(e.g., oil, gas, coal slurry)
Septage Lagoons and Sludge
Storage Tanks
(i.e., Above-Ground, Below-Ground and Underground)
Toxic and Hazardous Spills
Wells -- Operating and Abandoned
(e.g., oil, gas, water supply, injection, monitoring and exploration)
Wood Preserving Facilities

RESIDENTIAL

Furniture and Wood Strippers and Refinishers
Household Hazardous Products
Household lawns (chemical application)
Septic Systems, Cesspools, and Water Softeners
Sewer Lines
Swimming Pools
(e.g., chlorine)

WASTE MANAGEMENT

Hazardous Waste Management Units (e.g., landfills, land treatment areas, surface impoundments, waste piles, incinerators)
Municipal Incinerators
Municipal Landfills
Municipal Wastewater and Sewer Lines
Open Burning Sites
Recycling and Reduction Facilities
Stormwater Drains, Retention Basins
Transfer Stations

Other sources of assistance might include local land use planners and planning students from local universities who can play a part in identifying potentially contaminating land uses, and the community's local emergency planning committee (LEPC). LEPCs, potentially very rich sources of information, are among the custodians of key emergency planning and community right-to-know information that industries, transporters, and farmers must report under Title III of SARA. Title III's reporting requirements include:

- Section 302, which requires facilities that have present any of over 360 extremely hazardous chemicals above a certain threshold quantity to report that fact to their LEPC for the latter's use in developing a hazardous materials emergency response plan. These facilities include farmers who use many common pesticides. The plans developed by LEPCs must also identify transportation routes carrying hazardous chemicals.

- Section 304, which requires facilities to notify LEPCs whenever there is a spill of any of several hundreds extremely hazardous and hazardous chemicals above a threshold quantity. This is a very useful source of both real-time notification of spills that may threaten ground water and information concerning chronic or large-scale spillers.

- Sections 311-2, the so-called "community right-to-know" provisions of Title III, which require facilities to provide very detailed information concerning the quantity and location of hazardous chemicals on-site, as well as health effects associated with those chemicals and emergency response guidelines.

In addition, Section 313 of Title III requires industry to report to States and the U.S. EPA their total annual emissions of many hazardous chemicals to all environmental media, including ground water. This information provides a useful starting point for pinpointing sources of existing or future aquifer contamination. While Title III does not apply to all local facilities, or to all hazardous chemicals handled at such facilities, it does provide a very good source of information on potential ground-water contaminants. Local water supply contingency planners would be well-served to contact their community's LEPC and include an LEPC representative on the planning team.

Planners in localities with concentrated activities that might pose a threat of contamination to ground water supplies (such as agriculture or mining) also might want to compile a list of chemicals or other hazardous materials used for those activities and include that list in a separate appendix for ease of reference. Such a list, along with relevant characteristic and handling information, could be especially useful during a response effort.

Prioritizing Potential Disruption Events

Each community must decide for itself what it will consider a threat or contingency that needs to be addressed in its plan. Regardless of how a community sets its priorities, it may be useful to think of selecting the appropriate contingencies as a screening process. The planning team first identifies a variety of possible contingencies and then screens these contingencies to assess their importance. Exhibit 2-5 presents one format that can be used for evaluating potential threats by assigning estimates for both probability and severity. Those threats with a high probability are more likely to occur, while those with high severity will have more of an effect on the water system. As an alternative, a third column

Exhibit 2-5

EXAMPLE OF EMERGENCY PROBABILITY AND SEVERITY CHART

TYPE OF EMERGENCY	Probability 10-High 1-Low	Severity 10-High 1-Low	REMARKS
Natural:			
Drought	10	10	
Flood	7	5	Seasonal only
Ice/Snow Storm	1	1	
Wind	5	5	
Earthquake	1	1	
Hurricane	1	1	
Forest Fires	1	1	
Man-Made:			
Fire	6	4	
Explosion	6	5	
Chemical Contamination	5	5	
Vandalism	10	10	Currently a problem
Riots	2	1	
Strikes	1	1	
Sabotage	10	5	Increasingly a concern
Power Outage	8	7	
Poor Operation/Maintenance	2	2	

Source: The format for this chart was adapted from "Emergency Planning and Response - A Water Supply Guide for the Suppliers of Water," New York State Department of Health, January 1984); the data reflect emergency probabilities for the City of Tucson, Arizona.

could be added to the chart in Exhibit 2-5 that would include an overall "weighting" factor, combining probability and severity.

Whatever method or format is used, the screening of a large set of potential contingencies should yield a smaller set of "primary" contingencies. These threats would then receive the most urgent attention in the planning process; other threats would either receive less detailed consideration or be deferred entirely to a later plan review and update process.

Once the planning team has selected an initial or priority set of supply disruption contingencies, these threats must be summarized in a way that is useful in designing appropriate response actions. One of the most effective ways of capturing threats for planning purposes is to write likely water supply disruption scenarios that summarize situations in brief, narrative form. The best way to illustrate this technique is by example:

> Scenario 1 -- Underground Pipeline Break: In April 1987, **Sioux Falls, South Dakota** experienced a break in an underground gasoline transmission pipeline which occurred within a half mile of the City's major public water supply. Although the break was discovered by chance early on and the pipeline company worked swiftly with the South Dakota Department of Natural Resources and the City of Sioux Falls to correct the problem, the incident demonstrated the potential for extensive ground-water contamination.
>
> Scenario 2 -- Agricultural Activities: With agriculture the primary activity in and around **Oakley, Kansas**, several potential pathways of ground-water pollution are possible. Agricultural chemicals (pesticides and fertilizers) are used heavily throughout the area and contribute a well-defined subset of potential contaminants to ground-water reserves in the area. Above-ground and underground storage tanks containing petroleum products are numerous in the area and have maintenance histories of varying reliability. Grain elevators in the immediate area are a potential source of VOC contamination from fumigation activities connected with cereal grain storage.

The key elements of planning scenarios can be seen in these examples -- a brief description of the event triggering a supply disruption, perhaps a few facts or other events that complicate matters, and a summary of the immediate water supply implications.

It is most important to develop scenarios for those disruption threats considered as priorities for planning purposes. If there are numerous priority threats, however, it may not be necessary to capture all of them in scenario form. Many emergencies will involve similar response procedures. Within the set of priority threats planners should develop a variety of scenarios that will require use of different response equipment, personnel, and procedures (for example, contamination in the wellhead area, well collapse, line break, or power loss) to allow development of different response approaches.

The plan should contain a list of potential threats, possibly identified in a schematic that overlays the supply system. This list can be updated, as needed, to help maintain discussion of prevention and mitigation steps in a current list of priorities for preventive measures and response needs (see discussion of prevention and mitigation steps in Section 2.6 below). The plan should also provide several of the disruption scenarios to help members of the response team identify appropriate responses.

Water Supply Replacement Alternatives

The primary concern of any water supplier when faced with a disruption is providing an uncontaminated supply of water to the customer. Depending on the nature of the problem, an alternative source may be required for a number of hours, days, weeks, or, in a worst-case situation, permanently.

As a matter of planning priority, it is important to identify appropriate emergency and short-term options first; these include, respectively, the steps required for immediate provision of water for a period of hours or days, and those which provide an interim supply for periods of weeks or months. Neither of these types of actions are intended to provide a permanent, or long-term solution. The response team can then decide upon the best alternative, based on the situation they face.

In general, there are five categories of alternative water supplies:

- Supply from within the system;
- Supply from outside the system;
- Modification or reduction of water use;
- Water supply treatment; and
- Aquifer remediation.

One or more of these supply sources may be employed depending on the specific characteristics of the water supply system and the cause of the disruption. Clearly, not all of the options are viable alternatives in every situation. For example, remediation of contaminated supplies is not possible in an emergency response because of the time required to put remediation technology, such as carbon filtration, in place. Long-term reduction of demand is probably not politically acceptable in most communities. Exhibit 2-6 lists several specific actions within emergency, short-term, and long-term time frames. Each of these actions may relate to more than one of the five categories of supplies listed above. Tank trucks, for instance, may be available within the system or from outside. A new wellfield may be possible within the system or contamination may require payment to another system to help them construct a new wellfield. Exhibit 2-6 also briefly summarizes several criteria that can be used to judge the viability of a particular supply replacement option. A detailed evaluation of the listed options can be found in Appendix G.

In evaluating alternative water supply replacement sources, the planning team should rely on the water system's managers and staff because they have the best practical familiarity with water use patterns and are in the best position to judge the overall adequacy of potential sources. The plan itself should contain an identification of those options that represent the most realistic and practical responses to the planning scenarios. If the community has the resources, planners may wish to develop a matrix that ties specific supply replacement alternatives to specific water-loss emergencies.

Logistical Support Resources

One of the key objectives of the contingency planning process is ensuring that the proper personnel, equipment, and technical resources are available in case of a water supply disruption. The contingency plan itself should enable local officials and water system managers to rapidly identify and coordinate these resources in actual emergency situations. The basic components of logistical planning include:

Exhibit 2-6

EMERGENCY, SHORT-TERM, AND LONG-TERM WATER SUPPLY REPLACEMENT OPTIONS

Emergency and Short-Term Options

- Bottled Water
- Tank Trucks
- Excess Capacity
- Conservation
- Treatment
  - Point of Use
  - System
- Additional Treatment

Long-Term Options

- Drill New Wells/Wellfields
- Additional Treatment In-System (without cleaning up contaminant source)
- Point-of-Use Treatment
- Clean up contamination source
- Well Field Management
  - Blending
  - Select Pumping
- Interconnection
- Bottled Water
- Surface Water Supplies
- Water Conservation
- Waste-Water Reuse Reinjection
- Desalinization
- Dual-Systems
  (Separate potable/non-potable supplies)
- Artificial Aquifer/Excess Capacity
  (Seasonal storage)

Criteria for Evaluating Options

Technical and Logistical Feasibility
- What procedures are required to implement?
- Are technologies available and well developed?
- How much water can it provide?
- Can it meet the system's priority water uses?
- Can it meet the system's total water needs?
- How quickly can it be made operational?
- What equipment and supplies are needed?

Reliability
- How reliable is it?
- Does it require operation and maintenance skills?

Political Considerations
- What administrative procedures are required?
- Is property ownership a problem?
- Will it gain public confidence?

Cost Considerations
- What is the initial investment?
- What are the operating costs?
- Who bears the costs?

- Identifying key personnel; and
- Identifying essential services, equipment, and supplies.

Clearly identifying logistical needs lays a necessary foundation for the notification and logistical coordination procedures that will govern responses to supply disruptions.

A critical issue to keep in mind when structuring this part of the plan is that resource inventories must reflect only those resources that are currently on hand or readily available in an emergency. At the same time, however, the planning process may identify logistical shortcomings. "Wish lists" of personnel or equipment needs should be placed in the future steps section and then incorporated into the background information and response procedures sections only when they are in fact on hand.

Personnel Needs

The key question in emergency response situations is "who's in charge?" It is essential to have a designated response coordinator in a response situation whose role is clearly understood by all. This coordinator, who should be identified in the plan, must have the expertise and authority required to coordinate all of the activities that make up a response action.

The response coordinator will draw upon a variety of supporting personnel to assist in the implementation of specific response procedures. The plan should identify individuals with expertise in public health, water supply operations, financing, and public relations. The people chosen to fill these roles must also have the authority to carry out the duties delineated in the contingency plan. It may be necessary for the local government (e.g. city council, board of selectmen) to delegate officially certain emergency authorities to specific individuals or, more generically, to representatives of specific local agencies. A list of all involved individuals, including names, phone numbers, addresses, and response assignments should be prepared, with alternative individuals designated. Also, the chain-of-command within and between personnel units should be defined in the plan, with scheduled updates of the personnel list. Finally, personal ties among the key players in the response team parties should be established prior to a supply disruption; this will make coordination in the event of an emergency much smoother.

If there are deficiencies in the number of people or types of expertise available within the community, those needs may be met through hiring, training, arrangements with private contractors, or cooperation with other State or local entities through "mutual-aid" agreements or memoranda of understanding. These arrangements should be made at the planning stage and documented in the contingency plan (copies of mutual-aid agreements might be placed in a plan appendix, for example).

Services, Equipment, and Supplies

In addition to personnel, materials and contractor services must be identified to enable the implementation of response measures. For example, a broken water line may require replacement pipes and fittings; chemical spills may demand the use of absorbent materials, containment booms, excavation equipment, and water quality laboratory analysis; and a collapsed well may require rapid response from a well drilling company, which may be located some distance away. The planning team should evaluate priority supply disruption threats with an eye towards the physical resources and expertise necessary to provide an adequate response. Once those resources are identified, the contingency planners must determine where they can be found.

Exhibit 2-7 illustrates an example from a typical equipment list. The capacity of the individual pieces of equipment, although not provided in the example, would be useful information to include in a plan because equipment needs then could be tied more directly to specific equipment, thus reducing response time. A complete list of equipment and services would be more exhaustive and include such items as:

- Chemical supplies;
- Treatment equipment;
- Spare parts (i.e., pipes and fittings);
- Alternative distribution equipment (tank trucks);
- Vehicles and equipment for emergency excavation and transportation;
- Water sampling and analysis equipment and services;
- Portable pumps and generators;
- Portable treatment equipment;
- Personnel protection equipment and supplies;
- Repair facilities; and
- Heavy equipment contractors.

Depending on the size of the water supply system and whether the system is a private company or a public utility, these resources may be found in-house or may be available from another branch of the municipality -- for example, the public works department. Once resource needs have been identified, water planners should consider the following types of questions:

- If the resource cannot be located within the municipality, is it available from an adjoining city or town, from the State emergency response office, or the National Guard?
- Are there local contractors who would be willing to enter into an agreement to provide emergency services?
- Where is the nearest well drilling firm and what sort of response time can they guarantee?

Response equipment and services that are identified as essential but cannot be secured at the present time must be highlighted. Addressing this deficiency should be included in the "Future Steps" section of the plan (see Section 2.5 below) as a priority agenda item for improving local response capabilities.

Exhibit 2-7

EXAMPLE OF LIST OF AVAILABLE WATER TREATMENT EQUIPMENT

The following is an illustrative list of water department equipment and its location.

Quantity	Type	Age and Manufacturer	Location	Capacity	Name and Phone Number of Qualified Operator(s)
1	Fork Lift	1980 Caterpillar	WW Plant		
4	Air Compressor	Ingersoll-Rand	Equip. Yard		
1	Trencher	Davis	Equip. Yard		
1	Tapping Machine	1963 Smith	Dist. Shop		
1	Earth-boring Machine	NA	Dist. Shop		
1	(2040) Tractor	John Deere	Equip. Yard		
2	Sewer Bucket Machine	NA	Equip. Yard		
1	Concrete Mixer	Stone	Equip. Yard		
1	Welder	Hobart	Dist. Shop		
1	Jet Clean Truck	1978 Chevrolet	Dist. Shop		
1	TV Sewer Van	1980 GMC	Dist. Shop		
1	Ag-Gator	NA	Storeroom		
1	Fork Lift	1980 Clark	WW Plant		
2	580 C Backhoe	1978 Case	Equip. Yard		
2	580 SE Backhoe	1986 Case	Equip. Yard		
1	Trailer (dual)	Hy-Power	Equip. Yard		
1	Trailer (material)	NA	Equip. Yard		
1	Trailer (utility)	1972 Snoco	Equip. Yard		
1	Trailer (tandem)	Hudson	Equip. Yard		
1	Sewer Rodding Machine	NA	Equip. Yard		
1	Drill & Angur Assembly	1970 Mighty Mole	Dist. Shop		
1	Drill & Augur Assembly	1988 Mighty Mole	Dist. Shop		
1	Hydraulic Jack	1963	Dist. Shop		
1	Hot Roll Machine	1963	Dist. Shop		
1	Dump Trailer	NA	Equip. Yard		
1	Pressure Water	1983	Dist. Shop		
1	Jack Hammer	1980	Dist. Shop		
1	Power Drive	1975 Wach	Dist. Shop		
1	Power Drive	1964	Dist. Shop		
1	Hydraulic Valve Operator	1982	Dist. Shop		
1	Test Pump	1984 Hydro	Dist. Shop		
1	Gas Air Compressor	NA	Equip. Yard		
3	Trash Pump (2 ft.)	NA	Dist. Shop		
1	Multipurpose Saw	NA	Dist. Shop		
3	Sewer Wagon	NA	Equip. Yard		
1	Tapping Machine	1987	Dist. Shop		
3	Multi-Purpose Saw	NA	Dist. Shop		
1	Generator (gas)	NA	Dist. Shop		

NA - Not available

Financial Resources

Provision of alternate water supplies, particularly on an emergency basis, can be a costly proposition for many communities. In determining the level of funding necessary to meet these needs, the community must look not only at the costs associated with responding to specific incidents, but also the costs associated with developing and updating the contingency plan.

In planning for water supply needs, communities must first evaluate their own financial sources. In this process, they should consider both traditional and innovative funding approaches, including property tax assessments, specialty taxes, user charges, and short-term and long-term borrowing. Funds that are, or could be, available through the community's normal operating, capital, and emergency budgets should be identified. Localities may need to create new contingency funds, bonding authority, or lines of credit for emergency water supply needs.

The lack of adequate local financial resources is often cited as a major obstacle both to developing a formal water supply contingency plan and to responding effectively to ground-water contamination and other types of supply disruptions. Localities might be able to take advantage of emergency Federal or State authorities during supply disruption in order to secure funding for some response activities. For example, Section 1431 of the Safe Drinking Water Act grants EPA the authority to respond to contamination events that present an "imminent and substantial endangerment to the health of persons" and that have not been addressed by appropriate State and local authorities. In undertaking this response, EPA may order the provision of alternate water supplies to affected parties by the "persons who caused or contributed to the endangerment." Similar State emergency powers might be applied in some response actions to help defray the costs of those actions. Nonetheless, local officials should strive to make these contingency plans self-sufficient and not dependent on such Federal emergency assistance.

In addition to such emergency funding options, some Federal and State sources may be available to supplement local resources for plan development and implementation. Exhibit 2-8 presents several of these potential funding sources, along with a brief description of how funds from each might be used. Additional information regarding Federal and State sources of funds can be found in Appendix H. The contingency plan should identify specific Federal and State programs that are currently available and (in the response procedures section) the specific means of accessing the funds these programs might provide.

2.4 DEFINING WHO DOES WHAT -- EMERGENCY RESPONSE PROCEDURES

Once the planning team has defined the components of the water supply system, identified the potential threats to the supply, and defined the resources necessary to ensure that water supply can be maintained, it is time to establish the procedures governing and coordinating response activities. Certain general procedures that should be developed and agreed upon beforehand include:

- Emergency identification;
- Notification of key response personnel;
- Incident direction and control;
- Internal communications;

Exhibit 2-8

STATE AND FEDERAL FUNDING SOURCES AND THEIR POTENTIAL USES FOR CONTINGENCY PLANNING

Funding Source	Potential Use of Funds
• State "Superfund" Programs	Uses vary by state; typically used for remediation of contaminated water or establishment of alternate supplies.
• State Hazardous Material Spill Funds	Some states have revolving funds that can be used to cover remedial tasks and both direct and indirect damages. Some legislation requires states to use such funds to provide water supplies until responsible parties do so.
• State Grant Programs	Traditional grant programs for public facilities construction, low-income housing, and community or urban development can sometimes be used for construction of alternative water supplies or rehabilitation of contaminated supplies.
• Federal "Superfund" Program	Funds may be provided for emergency response and clean-up of hazardous substances through short-term removal actions or long-term remedial actions, both of which may include the provision of alternative water supplies.
• Federal Leaking Underground Storage Tank Trust Fund	Trust funds are used for clean-up of leaking underground tanks and for provision of alternative water supplies. Priority situations for funding are those where prompt action is essential or the owner/operator of the tank(s) or facility cannot be identified.
• Farmers Home Administration Grants	Grant-loan combinations are made to rural municipalities to construct or rehabilitate public water systems.
• Army Corps of Engineers Programs	The Corps may supply temporary, emergency water supplies after a contamination incident. However, funds cannot cover contingency plan development, decontamination, or system repair and are meant to be supplemental to community efforts.
• Federal Emergency Management Agency Funds	Funds can be used to defray necessary and essential civil defense expenditures associated with planning and implementation.
• Housing and Urban Development Funds	Grant funds are available for state and local planning and implementation activities concerning the provision of public services, including water supply systems.

- Public communications/community relations;
- Ongoing incident assessment;
- Contamination assessment;
- Special procedures for non-contamination events;
- Obtaining alternative/supplementary water supplies; and
- Water use restrictions.

As already noted, these response procedures constitute the most relevant part of the contingency plan during an actual supply disruption event. In order to highlight these procedures for easy reference during an event, therefore, planners might want to distinguish them with the use of colored paper or indexed tabs, or bind the entire response procedures section separately from the rest of the plan.

This section discusses the purposes for and potential uses of these various response procedures in more detail. Planners should recognize that although this list of procedures is not exhaustive, it is fairly comprehensive and may entail more effort than some localities may require. In developing a local plan, therefore, planners should consider both the practicality and feasibility of these recommended options in order to identify which procedures are most appropriate.

Emergency Identification

In the initial stages of any emergency it is critical to gather as much information as possible about the disruption incident as well as circumstances contributing to the situation. Because quick response minimizes the potential effects of an incident, utilities should take steps to encourage and facilitate the prompt reporting of possible problems by their employees, police and fire personnel, and the public. This can be accomplished through education and through the use of simplified notification procedures. Exhibit 2-9 provides an example of a consumer call-in notice.

Appendix I presents a sample emergency notification report which includes a section for recording the specifics related to an emergency. Communities that consider chemical contamination of their aquifer to be a priority threat may want to prepare an additional sheet, similar to that shown in Exhibit 2-10, for reporting of chemical incidents.

Copies of the emergency response notification form could be provided to potential dischargers to familiarize them with information needed at the time of an incident. A copy of the form should be located at the front of the plan to enable ready access whenever an incident is reported.

Utility personnel should use the U.S. Department of Transportation's (DOT) Emergency Response Guidebook (available from DOT's Washington and Regional offices) to help identify hazardous materials. Additional information about the identity and characteristics of chemicals is available by calling CHEMTREC (800-424-9300), a service provided by the chemical industry. Another potential source of information about potential supply disruption problems are the emergency notification reports provided by spillers of hazardous chemicals under Section 304 of SARA Title III (discussed above). These reports go to a community's LEPC.

Exhibit 2-9

EXAMPLE OF CONSUMER CALL-IN NOTICE

The following notice may be printed on the back of water bills to advise consumers on how and where to report potential or actual water supply system emergencies.

_____ WATER SUPPLY SYSTEM

The following may constitute an emergency:

1. Vandalism of Water Supply Facilities
2. Loss of Water Pressure
3. Leaking Water
4. Sudden Changes in Water Quality
5. Spills of Chemicals or Petroleum Products

If you observe any of these conditions, please telephone the _____ water supply system immediately.

Business Office _____

Water Treatment Plant _____

After Normal Business Hours _____

If there is no answer at any of the above numbers, please contact the Police/Sheriff's Department at

_____.

Exhibit 2-10

EXAMPLE OF REPORTING FORM FOR CHEMICAL INCIDENTS

- Identity of contaminant material: _____
  - Manifest/shipping invoice/billing label _____
  - Shipper/manufacturer identification _____
  - Container type _____
  - Placard/label information _____
  - Railcar/truck 4-digit identification number _____
  - Nearest railroad track intersection/line intersection _____
- Characteristics of material, if readily detectable (for example, odor, flammable, volatile, corrosive) _____
- Present physical state of material (gas, liquid, solid) _____
- Amount already released _____
- Amount that may be released _____
- Other hazardous materials in proximity _____
- Whether significant amounts of the material appear to be entering the atmosphere, nearby surface water, storm drains, or soil _____
- Direction, height, color, odor of any vapor clouds or plumes _____
- Weather conditions (including wind direction and speed) _____
- Local terrain conditions _____
- Personnel at the scene _____

In short, initial information is critical. Answers to some of the key notification questions may be unknown by the caller, but it is important to gather as much information as quickly as possible to facilitate decisions on public notification. Once the emergency has been identified with some specificity, the individual who receives a notice must contact the response team. This process is facilitated through use of a formal notification roster (as described in the following section).

Notification Roster

Immediately following the incident report form, the contingency plan should contain an emergency notification roster. The roster will list the names and telephone numbers of all of the personnel who might be involved in responding to an incident. Exhibit 2-11 provides an example of such an emergency notification roster, illustrating the wide range of parties that should be made aware of a disruption incident.

In addition to the notification roster, the specific procedures for notifying responders must be presented in the plan. Some communities may prefer to identify one or two individuals responsible for contacting all key personnel. This approach has the advantages of simplicity. Another system is the "cascade" or "pyramid" system, in which each person calls two people on the next level of the pyramid. If someone cannot be reached, the caller is responsible for notifying the next two people in the pyramid. No matter what notification procedure is adopted, it must be described clearly in the plan. One procedure for normal work hours and an alternate for off-hours may be necessary.

Overview of Incident Direction and Control

Because speed of response is by definition essential in water supply emergencies, the response chain-of-command must be determined prior to an emergency, thus averting confusion which could aggravate the emergency and prevent a coordinated response effort.

The designated response coordinator should work with the planning team to determine:

- What will be the chain-of-command?
- Who has overall responsibility for incident command?
- Who is in charge of important support functions?
- Who will have advisory roles (and what will their precise roles be)?
- Who will make the technical recommendations on response actions to the lead agency?
- Who (if anyone) will have veto power over response decisions?
- Who is responsible for requesting assistance from outside the community?
- Who will make decisions on water-use restrictions?

Exhibit 2-11

EXAMPLES OF EMERGENCY NOTIFICATION ROSTER

Emergency Plan for Water Supply Should Include Names and Phone Numbers for:

- Key Water Supply System Personnel (office and home, with hours) _____
- Key Community Leaders (office and home, with hours) _____
- Local Public Health Engineer (office and home, with hours) _____
- Fire Department _____
- Police, Schools _____
- Hospital and Ambulance Service _____
- Nursing Homes _____
- Dialysis Users _____
- Neighboring Water Supply System Managers _____
- Power Company Emergency _____
- Highway Department _____
- All Key Suppliers/Vendors/Technical Representatives of Water Supply Related Equipment, Chemicals, and Supplies _____
- Key Personnel of Major Industrial/Commercial Water Users _____
- State and Local Emergency Agency _____
- State and Local Civil Defense Offices _____

Internal Communications

When responding to a supply disruption incident, especially in an emergency situation, it is essential that all those involved are kept informed as the situation unfolds. Persons with authority need to be kept up-to-date on response actions and results in order to make appropriate decisions. Reliable channels of communication should be established at the planning stage so that information and instructions reach people quickly and accurately in an emergency. In addition, the format to be used for recording and transmitting essential information should be defined (for example, telephone or two-way radio frequencies).

Certain types of emergencies, such as fires or floods, may disrupt normal power or communication lines. Local police, fire, or civil defense personnel (who may be members of the planning team) can indicate what arrangements have been made for power and communications systems in the community in the event of such emergencies. If these systems are not adequate to meet the water system's needs, other arrangements for back-up power and communications, such as independent generators and two-way radios, must be made.

Public Communications/Community Relations

Effective communication with the public both before and after a water supply disruption incident is important for a number of reasons. Health considerations may require prompt public notification, as in incidents where boil-water notices are necessary. Public notification may also be a legal requirement for many situations under both the Safe Drinking Water Act and State statutes. In addition, effective communication can minimize public confusion and frustration and can help to secure the public's cooperation in implementing such response measures as water conservation.

To be effective, public communication must be prompt, frequent, accurate, and credible. Moreover, the credibility of water supply system personnel must be established at the outset of any problem. Appendix J identifies public communication procedures that should be taken before and after a disruption, along with ways the planning process can lay the groundwork for implementing these communication steps. Appendix J also provides sample notices for media release and direct public communications, which can be used to ensure the credibility of emergency responders by facilitating the provision of accurate and timely information to the public. A final and principal component of a public communication program should be the education of consumers before a problem arises so that they can be on the look-out for potential problems and will understand the basis for any water use restrictions.

Form is often as important as content when communicating potentially volatile material to the public. The following are suggestions concerning the manner of presenting information about a water disruption event:

- Notify the public as quickly as possible following the discovery of a problem. It is crucial to credibility that initial notification be through water supply personnel -- not State or Federal personnel or press leaks.

- Choose a spokesperson likely to communicate clearly with the public and to inspire confidence. The public generally has a preexisting reservoir of trust in the public water supply system and the person selected to speak on its behalf should be careful not to

deplete it. Keep local politics in mind and select a respected, neutral individual.

- Public anger and frustration are more likely to arise than panic. Avoid defensive postures and speculative responses in the face of negative reactions. It is better to admit ignorance than to speculate.

- Do not raise false hopes concerning the remedial time-frame or attempt to trivalize problems involved in responding to a serious water supply disruption.

- If the incident is substantial, failure to convey adequate information to the public could be particularly polarizing. Including the involvement of a person from the "public," therefore, would provide a gesture of openness and respect. Such a person need not necessarily be involved in the decisions, but should be allowed to observe them impartially and in their entirety.

Ongoing Incident Assessment

After response procedures have been initiated, the water supplier must take steps periodically to evaluate the situation and determine the short-term and long-term impacts on water supply. The major questions to be answered in most cases will include:

- What is the current status of the water supply system?

- What is the current status of the response effort?

- How long and what will it take to return the system to normal operations?

- Should any of the response activities be changed or should new activities be initiated?

The answer to these questions may change as the response effort progresses. Therefore, it is important to ask these questions on a periodic basis. As the answers change, the response team may wish to develop alternative response strategies:

- Is there a need to implement water restrictions? To advance to the next stage of restrictions?

- Does the situation require customers to boil water before drinking? Can an existing boil water requirement be lifted?

- Should steps be taken to obtain water from alternative sources? How much? From where?

Contamination Assessment

If the supply disruption is the result of a contamination event, responders may want to undertake a contamination assessment. Contamination may occur through naturally occurring constituents leaching into the water supply, through the migration of contaminants introduced into the aquifer from agricultural or waste disposal practices, or from the accidental release of contaminants (e.g., truck spill or poor materials handling

practices). Whatever the source of contamination, a water supplier must maintain an ongoing sampling and monitoring program to ensure that its treatment system is capable of handling the types and levels of contamination present in its water sources. Certain steps in response to evidence of contamination must also be taken:

- Notify the public.
- Identify and isolate the source of contamination, if known. If not known, identify and isolate contaminated water supplies.
- Map the extent of contamination.
- Determine appropriate responses.

The appropriate responses for each contamination event will be dependent on the nature of the specific occurrence. The first priority for most spill scenarios, for instance, will be containment of the material followed by removal of the contaminant and any contaminated soils, and/or pumping and treatment of contaminated waters. For water supplies that are threatened by plumes of contamination already in the aquifer, the alternatives may include:

- Connection to alternative supplies;
- Development of new wells;
- Remediation of the aquifer;
- Treatment at the well or point-of-use; and
- Blending of water supplies to achieve acceptable levels.

The response to any contamination incident should involve an ongoing program of monitoring and sampling to follow the extent of contamination. The contingency plan should identify the necessary procedures for establishing an adequate monitoring program, including such considerations as:

- Identification of the contaminated area;
- Installation of monitoring wells;
- In-house laboratory capabilities; and
- Location and turn-around time for water analyses by contractors.

Special Procedures for Non-Contamination Events

Water supply disruptions will often be caused by natural phenomena, such as storms, lightning, floods, or earthquakes, which can result in power outages or physical consequences to the supply and distribution systems (for example, well collapse or line breakage). The contingency planners in their prioritization process (discussed in Section 2.3) should identify the most likely candidates for such occurrences and include response scenarios for the most likely events.

Obtaining Alternative/Supplementary Water Supplies

In developing the background information described in Section 2.3, water supply contingency planners will have identified potential sources of alternate water supplies. The response procedures section should contain a listing of the sources of alternate supplies to be used for various contingencies and should identify specifically the procedures necessary to access those supplies. Planners may wish to list the sources according to quantity available, ease of access, cost associated with supply, or some other hierarchy. Exhibit 2-12 represents an example of a call-up list for alternate water supplies.

Water-Use Restrictions

If the water lost due to a supply disruption cannot be readily replaced, the response team may choose to impose water use restrictions. Planners should consider whether to employ categories of water-use restrictions based on the severity of the disruption. Appendix K contains one example of water-use restrictions based upon classifications of use. If such restrictions are adopted, planners should establish a hierarchy of uses, as well as objective "trigger points" or thresholds for imposing increasingly stringent restrictions on those uses, that best reflect their community's needs. For example, the system might call for voluntary cutbacks when supplies fall below 80 percent of system capacity, mandatory cutbacks at 70 percent, and bans on certain uses at 60 percent. The program of restrictions, as well as the procedures (typically through notification of water users in the mail and through the media) for implementing those restrictions, should be documented in the plan.

2.5 ADDRESSING PROBLEMS -- FUTURE STEPS TO BE TAKEN

The core of a water supply disruption contingency plan is the response procedures section, followed in importance by the background description of system conditions and potential disruption threats. A plan which stops there, however, is not being utilized fully.

The process of developing a contingency plan typically helps a community identify a variety of tangible actions that should be taken to either reduce the vulnerability of the system to disruptions or improve the community's response capabilities. These steps generally fall into four broad categories:

- Preventing or mitigating emergencies;
- Training local responders;
- Educating the public; and
- Reviewing and updating the plan.

Preventing or Mitigating Emergencies

While certain water supply disruption emergencies are unforeseeable, the planning process often identifies problems or potential contingencies that, if addressed promptly, can be prevented or mitigated. Examples might include unregulated land uses that threaten chemical contamination of an aquifer, shortages of critical response equipment, or the lack of a mutual aid response agreement with a neighboring community. The development of background information (see Section 2.3 above) is typically where these situations will come to light. The plan itself can also incorporate such prevention and mitigation measures. This incorporation will be easier if the plan contains a specific agenda of what

Exhibit 2-12

EXAMPLE OF SUPPORT CALL-UP LIST*

The following agencies/organizations have standing agreements and/or interconnections whereby they will provide water supplies upon request in an emergency.

ORGANIZATION	ADDRESS	NAME	TELEPHONE	QUANTITY AND METHOD TO BE PROVIDED	REQUIRED AUTHORIZATION

APPROVED _____ DATE _____

* To be completed and used by water supply system personnel.

Source: Adapted from Emergency Planning and Response - A Water Supply Guide for the Supplier of Water, NYSDOH, January 1984.

measures are necessary, who is responsible for them, and when they will be done. As new measures are adopted, they should be incorporated into the contingency plan.

Training Local Responders

In order for a plan to be implemented effectively in actual disruption incidents, local response personnel may need training in their specific tasks. Making sure this training occurs is easier if the plan specifies what the responders need to know and how and when they will be trained by providing, in effect, a training agenda and a set of training procedures.

Training can be accomplished in several ways. One way is to educate responders using training courses in which each person's role and responsibilities are clearly identified and explained. Another method is to provide on-the-job training through the types of emergency simulation exercises described in Chapter 5. Such exercises include full-scale field exercises, functional exercises, and tabletop exercises. There are a number of agencies and organizations that provide training assistance including:

- State agencies and training institutes;
- Federal emergency and hazardous materials training;[3]
- Universities or community colleges;
- Industry associations; and
- Private consultants.

Communities should be aware that training is an ongoing need. New responders will need to be trained and veteran responders will need refresher courses at periodic intervals.

Educating the Public

Public knowledge and confidence in system management can be essential in undertaking a successful response. A severe water disruption crisis, for example, may require that stringent water conservation measure be implemented. By educating the public ahead of time about their role in conservation (for example, by using brochures, water-bill mailouts, public forums, or press articles based on plan information relevant to the public), their understanding and cooperation will greatly improve during an emergency. Again, building and maintaining public confidence is an ongoing process.

Reviewing and Updating the Plan

Keeping a contingency plan up-to-date is essential to its continued usefulness. The easiest way to ensure that a plan is kept current is to build the procedures for review and update directly into the plan itself. Chapter 5 discuses these procedures in some depth. The point here is that these procedures should be included as an integral component of the plan.

---

[3] Including the U.S. Environmental Protection Agency, Federal Emergency Management Agency, Occupational Safety and Health Administration, Department of Transportation, and United States Coast Guard.

UPDATING AND REVISING THE PLAN

Jackson, Tennessee, has completed its emergency response plan and currently is in the process of updating names, addresses, and telephone numbers. Jackson's plan is designed to provide detailed resource information to those who respond to water supply emergencies. For ease of use, the plan uses different paper colors for each section and distinguishes between internal and external resources.

Lessons learned: The use of visual aids such as different paper colors in a contingency planning document can enhance the document's usefulness.

2.6 BUILDING CONSENSUS FOR THE PLAN

Once a draft plan is complete, but before the plan is officially approved or adopted, it should be reviewed carefully. The success of a plan may be dependent on its acceptance by the local community. Involving as many interested parties as possible at the review stage of the plan will improve the quality of the plan and build community support for the plan.

The review process begins with review of the draft plan by the planning team itself. This review consists of evaluating the plan for adequacy, clarity, coherence, and completeness. Even though team members may have worked only on specific parts of the plan, it is still helpful for the team as a whole to review the entire document to make sure that no gaps or inconsistencies exist.

Once the internal review process is complete, an external review can help legitimize the plan's authority and build community support for it. Several distinct types of external review might be considered, including:

- Expert review: Typical candidates for expert review include: industry officials, college professors, and other officials from nearby jurisdictions. It is important that the individuals selected for the expert review be able to provide objective reviews of the plan.

- Local official review: Here an individual or group with oversight authority reviews the plan. This stage of review should come after the comments of the expert reviewers have been addressed and appropriately incorporated.

- Community input: Local community interests should be invited to participate in the review. There are several ways to involve the local community, including community workshops, public notice of comment periods, public meetings, invited reviews of special interest groups, and advisory councils.

- State/Federal review: Communities may request that appropriate State or Federal officials review a plan. There may be a requirement in the State WHP program that the plan must comply with in order to be approved or before funding can be provided.

State agencies can also help coordinate the plan with other contingency plans.

* * * * *

This chapter has described the development of a local contingency plan. While several specific planning activities have been described, it is important that the general themes of this process be reflected throughout the plan: keep the plan simple in structure and clear in language; tailor the plan and the response procedures to local circumstances and needs; make the plan as "user-friendly" as possible; and make use of all available expertise in the planning process itself. Keeping these themes in mind should help make the planning process less imposing and the resulting plans more effective.

SECTION II

CONTINGENCY PLANNING AT THE STATE LEVEL

The first section of this TAD focused on contingency planning at the local level. This emphasis reflects the primary role that local governments typically play in both providing public water supplies and responding to supply disruptions. The focus in this second section shifts to the State level. The Safe Drinking Water Act Amendments of 1986 (SDWA) established six key elements, of which contingency planning is one, that States are required to incorporate in their State Wellhead Protection Programs (WHPP). The contingency planning element specifies that each State program shall include contingency plans for the location and provision of alternative drinking water supplies for each public water system in the event of well or wellfield contamination (see Appendix A, page A-2). The reason States have been delegated such an extensive role in contingency planning is that State government is the most appropriate level of authority to organize the planning process and to encourage consistent and comprehensive contingency planning and implementation at the local level. Many States also play a critical back-up role to local responders, making available equipment and expertise when water supply disruptions overwhelm local capabilities or require specialized response expertise.

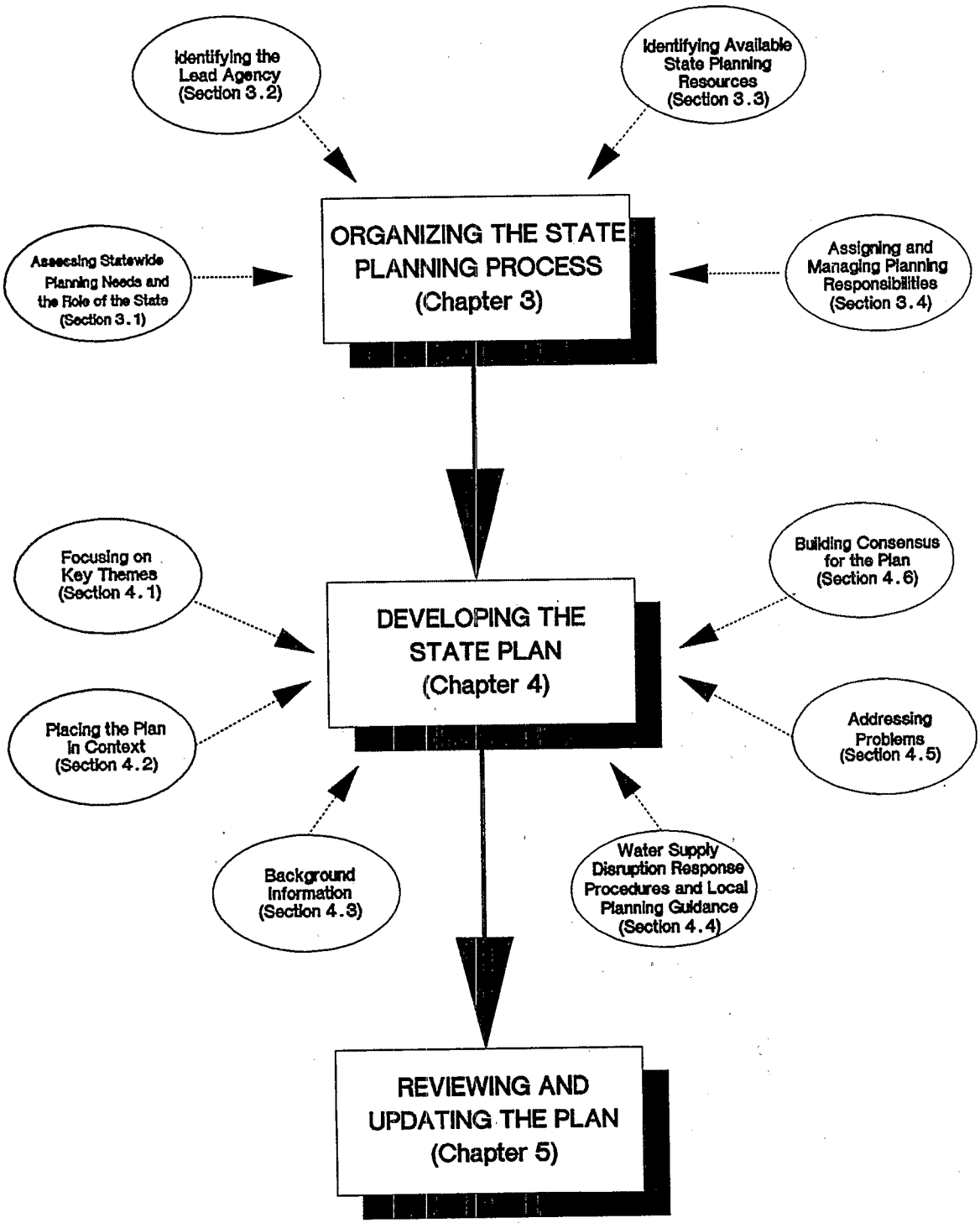
Although the SDWA requires States to develop Wellhead Protection Programs that provide for the development of local contingency plans, States are not required to prepare separate State contingency plans per se. In fact, most States will likely delegate much of these planning responsibilities to local governments because of the site-specific nature of contingency planning. Nonetheless, a formal State contingency planning effort, if not a separate State plan, can help the State discharge its responsibilities by establishing standards for local planning, providing guidance to assist local planners, and identifying resources more appropriately provided at the State level. This section on the State planning process, therefore, is designed to help States undertake formal contingency planning efforts.

Exhibit 3-1 provides both a flow chart of the planning process at the State level and a "road map" of Section II. Parallelling Section I, the discussion here is divided into two chapters. Chapter 3 focuses on organizing the State planning process and Chapter 4 provides concrete suggestions on developing a State plan itself.

The discussions of key themes and plan development in Section I -- although explicitly geared to local planners -- are important for State planners as well. Recognizing this fact, the discussion in Section II is generally shorter than in Section I, with the reader referred back to corresponding discussions in Section I as appropriate. Beyond these specific references, however, State planners will want to read Section I to glean as much guidance as possible that may be relevant to their own State planning effort. Moreover, the local planning guidance provided in this TAD may be useful as a model for States developing their own local planning guidance, either as part of the State plan or as a separate document.

Exhibit 3-1

CONTINGENCY PLANNING AT THE STATE LEVEL



CHAPTER 3: ORGANIZING THE STATE PLANNING PROCESS

Organizing the water supply contingency planning process is as important to the ultimate effectiveness of a plan at the State level as it is in the development of local plans. This chapter provides specific suggestions on organizing the planning process at the State level, including assessing statewide planning needs and the appropriate role of the State, forming the planning team, choosing the lead agency, identifying available planning resources, and assigning and managing planning responsibilities.

3.1 ASSESSING STATEWIDE PLANNING NEEDS AND THE ROLE OF THE STATE

The role of the State is primarily to respond to the wellhead protection requirements established by the SDWA. In doing so, a State needs to concentrate its contingency plan on its own particular needs if that plan is to be effective. Focusing planning efforts in this way increases the usefulness of the State plan in emergency response situations; it also increases the efficiency of the planning process, making the most productive use of limited planning resources and the limited time of busy planning team members. The State role also will influence the contents of the State plan and the level of detail in particular sections of the plan.

The role of local authorities, the front-line in responding to supply disruption incidents, is relatively straight-forward. There is greater diversity, however, in the roles assumed by States. State roles generally divide into two broad categories:

- Delegating contingency planning responsibility to local governments within a framework established by the State; and
- Providing back-up support for local responders in supply disruption incidents.

Probably the most effective way for the State to fulfill these roles will be to establish a formal State contingency plan. In developing this important plan, the State planning team needs to keep the "big picture" in mind, linking its information gathering efforts to the purposes and objectives of the plan. Activities particularly useful in this process might include:

- Undertaking "broad-brush," statewide assessments of local water system characteristics, ground-water supply vulnerability, and water supply replacement options;
- Evaluating available State technical, logistical, and financial resources available to support local planning and response capabilities;
- Focusing team decision-making on developing appropriate State response procedures, including criteria for determining the appropriate level of State response to different types of local supply disruptions;
- Deciding on the most appropriate framework for local planning efforts, if the State plan is intended to serve a guidance function; and
- Linking the WHP contingency planning process with other State planning efforts, such as SARA Title III plans, civil defense plans, and so on.

3.2 IDENTIFYING THE LEAD AGENCY AND FORMING THE STATE PLANNING TEAM

The State planning process will most likely begin with the passage of State legislation, or perhaps as a Governor's executive order, implementing the State's Wellhead Protection Program (WHPP) as required by the Safe Drinking Water Act Amendments of 1986. The State WHPP should in turn assign responsibility for contingency planning to one or more agencies or individuals. The States should establish the lead agency for its contingency planning efforts so that the designation is consistent with Wellhead Protection Program roles and responsibilities as required by the 1986 SDWA amendments (see Appendix A).

Once the lead agency is identified, the next step is the formation of a contingency planning team including representatives of all agencies (as well as select private interests) that have a role to play in responding to water supply disruptions or have expertise to lend to the preparation of the plan. Exhibit 3-2 provides an illustrative list of the types of agencies and private sector interests that might be represented on a State contingency planning team. Section 1.1, which offered advice on forming a local planning team, provides many suggestions that are equally relevant to the State planning process. Readers may wish to refer back to Section 1.1 for more information.

3.3 IDENTIFYING AVAILABLE STATE PLANNING RESOURCES

Tight budgets are as much a reality for most State governments as they are for local jurisdictions. The emphasis placed in Chapter 1 on making the most productive use of existing planning resources -- including both available expertise and planning-related documents -- applies equally to State contingency planning teams. Resources necessary for a State effort, thus, might be sought from a number of sources:

- State agency staffs are a particularly good place for planning team members to look for both expert advice and for assistance in writing and reviewing key parts of the plan. States typically have a larger pool of personnel than local governments to access for technical and planning expertise.

- Members of the State Emergency Response Commission (SERC), the body created under the Federal SARA Title III to coordinate the local Title III planning efforts of Local Emergency Planning Committees, may be especially valuable contributors to the planning effort.

- State planners may also turn to water system managers and local planners from the larger, more sophisticated communities in their State. Because they are likely to feel they have a large stake in the viability of the State plan, such local personnel may be willing to invest time in developing that plan.

- Local government representatives, technical experts, and others bringing specialized perspectives to the State planning effort may either be included on the planning team itself or enlisted in an "advisory board" or other adjunct body.

EXHIBIT 3-2

POTENTIAL MEMBERS OF A STATE WHP CONTINGENCY PLANNING TEAM

- Water supply department
- Water quality department
- Emergency management agency
- Health department
- Environmental protection department
- Governor's Office representative
- Attorney General's office representative
- State police or public safety department
- State Civil Defense Agency
- State Engineer
- Local government representatives
- Statewide industry association representatives
- Statewide citizen group representatives
- Technical experts (hydrologists, engineers)
- Water quality laboratories
- Equipment and response contractors
- Federal agency representatives (FEMA, DOD, USDA, DOT, EPA)

- Local plans, at least for the largest communities in the State, may also be worth examining. Well-crafted, pre-existing local plans can help State planners get a sense for how water supply disruption response actions are actually managed at the local level. Local plans will also give State team members a feel for local hydrologic conditions, disruption threats, and response capabilities.

State contingency planners, however, must be careful to evaluate the adequacy and relevance of existing planning documents. While much useful information, response procedures, and other materials may be gleaned from existing plans, it is important not to simply borrow material without asking questions about how appropriate the materials are in a water supply contingency planning context and about how useful existing procedures have been in guiding previous response actions.

3.4 ASSIGNING AND MANAGING PLANNING RESPONSIBILITIES

Once the planning process begins, the most important job of the leader of the planning team is to keep that process on track towards completion of an effective plan. This requires close monitoring of team members' work and facilitating consensus among team members on key procedures and local planning guidance. This task can be even more challenging at the State level than at the local level simply because a statewide planning team is more likely to include people who do not know each other or have experience working with each other (local planners and water system managers, for example).

The first management task is to make appropriate assignments of specific tasks to planning team members. These tasks (discussed below in Chapter 4) include:

- Assessing the characteristics of water systems statewide;
- Assessing the vulnerability of ground-water supplies statewide, including a review of State emergency response plans developed under Section 1413 of the SDWA;
- Assessing water supply replacement options statewide;
- Evaluating the State's technical, logistical, and financial resources to support local response activities;
- Developing effective action-level systems to determine when the State's support resources should be provided;
- Developing guidance and standards to direct local plan development;
- Identifying future steps that should be taken to prevent/mitigate future disruptions and improve the State's ability to respond to major supply disruptions; and
- Organizing a process for reviewing and updating the plan.

By their nature, many of these tasks will require involvement by more than one team member. When assigning planning responsibilities, the planning team or team leader should be sure to clarify the process by which one agency will take charge when two or more agencies have similar or concurrent plan development and/or implementation roles.

CHAPTER 4: DEVELOPING THE STATE PLAN

Developing a State contingency plan involves a complex set of tasks that need to be coordinated with other wellhead protection efforts and focused in order to ensure that the resulting plan is useful under response conditions. It is also important to develop the plan in an efficient manner.

The purpose of this chapter is to facilitate the development of State plans, which in turn will guide local public water supply system managers in developing their plans, by providing specific suggestions that State planners can follow. The chapter begins with a discussion of key general planning themes in Section 4.1, which is then followed by several sections organized according to how a State plan might be structured:

- Section 4.2 describes a typical plan introduction;
- Section 4.3 reviews the types of background information and analysis associated with plan development;
- Section 4.4 describes how response procedures might be developed and used; and
- Section 4.5 describes how a plan might incorporate identification of specific future steps that a State might take to help local communities prevent or mitigate the impacts from supply disruption.

Finally, Section 4.6 describes the process for building consensus in support of the plan.

Exhibit 4-1 provides an example table of contents for a State water supply contingency plan. Although State plans will vary in structure and detail more so than local plans, because of the wide variety of State governmental structures, priorities, and available resources, this exhibit offers a starting point for State plan development. The remainder of this chapter discusses in more detail how a State planning team might go about developing a water supply contingency plan based in general on the outline presented in Exhibit 4-1.

4.1 FOCUSING ON KEY THEMES

Planning team members developing a State contingency plan should keep a number of key themes in mind. The key themes presented in Section I, such as keeping the plan simple and making sure it is clearly written and "user-friendly," are as applicable to the State planning process as they are at the local level. In addition to these themes, State planners should bear in mind several themes unique to the State planning process:

- Because contingency planning is only one element in the Wellhead Protection Program requirements set out in the SDWA, State planners first need to ensure that the State water supply contingency plan is fully integrated with the State's Wellhead Protection Program. Consistency with the more comprehensive WHPP, which governs local wellhead protection efforts, will also help local communities understand how their plans will mesh with the State plan.

Exhibit 4-1

ILLUSTRATIVE TABLE OF CONTENTS FOR A STATE WHP CONTINGENCY PLAN

- State planners should strive to make the plan as accessible and useful to local communities as possible. It is vital that local communities have a clear understanding of how to access State resources during an emergency and know exactly what backup support they can expect from the State.

- State planners should focus the plan on those disruption threats that are most likely to require State response actions. These are likely to be disruptions large enough to affect more than one community or events posing threats requiring specialized expertise that may not be available at the local level (analytic laboratory services for contamination events, for example).

- State planners should take a more "broad-brush" perspective than their local counterparts, basing their response procedures and planning guidance on a larger-scale, less detailed assessment of statewide ground-water supply conditions and supply disruption capabilities.

- State planners should think of the State WHP contingency plan as a dynamic document that must be kept up-to-date to reflect changing conditions and statewide response needs. Changes in local conditions and response capabilities may affect the specific assistance the State, in its role as a back-up to local responders, may be called upon to provide.

By starting out with these key themes in mind, planners should be able to develop State plans that meet both the needs of the State in terms of comprehensive ground-water protection and the needs of localities in terms of safeguarding community water supplies.

4.2 PLACING THE PLAN IN CONTEXT WITH AN "INTRODUCTION"

State plans should begin with an introduction designed to serve two purposes. First, the introduction should place the plan in context by providing a brief overview of the plan's origins and objectives and by explaining how the plan relates to other State planning efforts. The form and objectives of the plan must be based on the State's Wellhead Protection Program goals and activities. Second, the introduction should indicate how State responders should use the procedures in the plan, as well as how, for the benefit of local officials, local plans should be integrated with the State plan. Direction for local planners is of utmost importance because these planners will be making the "front-line" decisions on how to best protect community water supplies and may need to access State response assistance quickly.

The content of a State plan's introductory section can follow essentially the same format as that presented for local plans in Section 2.2 of this TAD. State planners should review Section 2.2 as a starting point for developing an introduction to their plan, keeping in mind the State's objectives as indicated in its Wellhead Protection Program and necessary differences in perspective between the State and local levels.

4.3 BACKGROUND INFORMATION

State water planners should begin their efforts by evaluating the current status of water supplies in the State and existing capabilities for responding to threats to those supplies. For planning purposes, this section of the document should rely on existing information. Few, if any, States can afford to develop detailed analyses for every ground-water system within the State. These assessments, therefore, should not be overly detailed and should be based on information that can be found in existing water data bases, reports

generated by previous water supply emergencies, and other State and local contingency plans. Most States should have on file an emergency plan for water supply that was prepared in support of their State primacy program under Section 1413 of the Safe Drinking Water Act. Four key components of this background evaluation include:

- Statewide water system assessment;
- Statewide ground-water supply vulnerability assessment;
- Statewide water supply replacement assessment; and
- Review of State support resources.

In undertaking statewide water system and vulnerability assessments, State planners should consider the level of resources available for planning purposes. It may be more efficient for the State to collect and aggregate local water system and vulnerability assessment data gathered during local planning efforts, as opposed to collecting such information separately and duplicating local efforts. Under this approach, the State could focus its efforts on responding to general local needs as defined by the localities themselves, rather than directing the development of local plans. Activities that a State might undertake in order to perform statewide water system, vulnerability, and replacement assessments, and to develop a support strategy for localities based on those assessments, are presented in more detail below.

Statewide Water System Assessment

In order to develop an effective statewide contingency strategy, State planners must determine both the physical status of local water supply systems and the available local response capabilities. The first task will involve answering some basic questions relating to ground-water supplies in the State, including:

- How many systems in the State are dependent on ground water?
- Where are they located?
- How large a population do these systems serve?
- Do any of these systems have excess capacity?
- Are any of these systems at full capacity?
- Are any of these systems interdependent either through use of the same aquifer or through interconnections of their distribution systems?
- What systems have locally available sources of alternative supply?

The contingency plan should incorporate the results of this analysis through such means as charts or tables that enumerate the various systems along with data indicating capacity, number of wells, population served, or other information. Planners may want to establish categories of systems within the State, grouping systems by criteria such as common aquifer, population served, or relative dependence on ground water.

Once they have identified those systems most dependent on ground water, State planners should undertake an evaluation of these systems to determine whether they

possess the necessary administrative, technical, and financial resources to respond to a water supply emergency.

- Some communities will already have adopted a local contingency plan. These plans can be a wealth of information for State contingency planners.

- Other communities will possess the abilities and resources, but require guidance from the State to develop a useful plan of their own.

- A third category of communities will require extensive assistance from the State in the event of any problem with their water supply system.

Planners may wish to create a hierarchy of systems, based upon local response capabilities. This evaluation will help the planners to quickly determine what type and level of support the State will need to provide should an emergency arise. If resources are limited, the State may decide to focus planning efforts on areas that have the least capacity to respond to emergencies, areas of heavy population, or those areas where problems are most likely to occur.

Statewide Ground-Water Supply Vulnerability Assessment

Under the SDWA, State Wellhead Protection Programs must identify anthropogenic sources of contaminants within each wellhead protection area. The information collected in conjunction with a State's source identification efforts can therefore form the basis of the vulnerability assessment in the State contingency plan. State emergency response plans developed under Section 1413 of the SDWA may also prove useful. If available, data generated by previous water supply emergencies and existing data bases of land use and water resources can be incorporated in the assessment. Finally, the monitoring and vulnerability assessments required of public water suppliers in order to address contamination by volatile organic compounds (VOCs), as codified in the Federal Regulations at 40 CFR 141.24(g), might provide useful information concerning the frequency and location of VOC contaminant sources. This wide variety of potential information sources should allow planners to conduct a fairly comprehensive evaluation of threats. Exhibit 4-2 lists some of these information sources. Much of this information may already be collected in one place.

Once the existing contamination threats have been reviewed, the potential for future problems in wellhead areas should be examined. This step requires planners to develop a map of wellhead areas supplying public water systems within the State (see Appendix A, page A-3; Section (e)). This map and other supporting data should be used to:

- Identify wellhead areas where problems have occurred;

- Identify activities taking place in or near wellhead areas with the potential to disrupt water systems; and

- Estimate the number of people served by these water supply systems.

All of the categories of emergencies identified in Chapter 2 may be relevant to a State contingency plan. State planners, however, are specifically required to consider chemical contamination under provisions of the Safe Drinking Water Act and SARA Title III. Exhibit 4-3 illustrates the types of factors that should go into a statewide evaluation

Exhibit 4-2

SOURCES OF INFORMATION ON POTENTIAL THREATS TO GROUND WATER

- State emergency response plans developed under Section 1413 of the SDWA
- Source identification efforts required under the SDWA Wellhead Protection Program
- Local public works departments
- City, regional, or State departments of environmental protection
- Environmental quality engineering department
- State and local health departments
- State and local water, public water supply, or drinking water departments
- State ground-water office
- U.S. EPA Office of Drinking Water
- U.S. EPA Office of Ground-Water Protection
- U.S. or State Geological Survey
- Material Safety Data Sheets (MSDSs) developed under Title III of the Superfund Amendments and Reauthorization Act (SARA) or the Occupational Safety and Health Administration's Hazard Communications Standard
- RCRA contingency plans prepared by owners and operators of hazardous waste treatment, storage, and disposal facilities
- University personnel with expertise in hydrology, pollution control, planning, or related fields
- Site visits or questionnaires addressed to water suppliers
- Old aerial photographs (may be used to help identify abandoned waste sites)

Exhibit 4-3

EVALUATION OF CONTAMINATION THREATS

State water planners should consider the following factors when evaluating potential contamination of water supplies:

1) Contamination incidents that may occur, including:

   a) Acute events - emergencies and accidents resulting in ground-water contamination, and

   b) Chronic events - the leaching of contaminants into ground water from a variety of sources over time.

2) Possible sources of contaminants, including:

   a) Industrial sources related to transportation, use, production, storage, and disposal of hazardous and toxic materials, including:

      - railroads, highways, pipelines;
      - active hazardous materials storage and disposal facilities;
      - abandoned storage and disposal facilities; and
      - fires and explosions, other air pollution that impacts ground-water.

   b) Non-industrial sources, including:

      - septic tanks;
      - non-hazardous waste disposal; and
      - agricultural fertilizers and pesticides.

3) Types of contaminants that may be detected, including:

   - organic contaminants, including petroleum products;
   - inorganic contaminants;
   - conventional viral and bacteriological contaminants; and
   - radioactive materials.

4) Public health impact of contamination incidents, including:

   - immediate, acute health impacts;
   - long-term chronic health impacts;
   - the contaminant's persistence; and
   - the extent of the problem.

5) Proximity of contaminant threats to public water supply wells:

   - in immediate vicinity of threat, or
   - in Wellhead Protection Area.

of the contamination threat. Similar evaluations can be made for other types of emergencies, depending on local priorities and available resources.

Again, the degree to which the State becomes involved in analyzing specific ground-water threats in multiple, local communities depends very much on the State's resources and priorities as well as the structure of its WHP program.

Statewide Water Supply Replacement Assessment

The statewide water supply assessment described above may have identified water systems within the State that have excess supply capacity. It is important to include in the plan a summary of where these systems are located, the quantities of water that are available from each system, and the means of distributing that water to other systems (for example, by interconnections or water tanker trucks).

In addition, State water resource planners may be aware of potential additional sources of water, as yet untapped, that could be developed in the event of an emergency, including:

- Surface water sources;
- Undeveloped ground-water sources;
- Large industrial supplies;
- Private bottled water suppliers; and
- Civil Defense agencies.

These sources should be evaluated in terms of their requirements for treatment, time for development, availability of equipment to deliver the water (tank trucks, for example), or other constraints.

State Support Resources

In the event of water supply disruptions that exceed local response capabilities or require specialized expertise, State resources may be called upon to supplement local capabilities. State planners must assess the adequacy of State resources prior to an emergency. Four factors that should be examined include:

- Determining which support functions the State will provide;
- Determining the conditions under which the State will provide support;
- Identifying areas of sufficiency and deficiency in State support capabilities; and
- Correcting deficiencies in State support capabilities.

In determining what support will be provided and the conditions under which it will be supplied, the State may need to strike a balance between its goal of meeting all the local public water system needs and the limitations imposed by its budget, personnel expertise, equipment, laboratory, and treatment facilities available. It may be useful to survey water supply managers and local officials in order to evaluate the State's current

performance in providing such support functions. Appendix L provides an example of a support functions assessment, based on specific categories of support. On the basis of the State's support functions assessment, the State may need to upgrade specific support capabilities so that they adequately complement local response capabilities. Specific steps may involve inspection and certification of laboratory facilities, contamination response training for purveyors and local officials, or the creation of laboratory and equipment back-up plans.

4.4 WATER SUPPLY DISRUPTION RESPONSE PROCEDURES AND LOCAL PLANNING GUIDANCE

The response procedures of a State plan should consist of two primary types of information, including:

- State response procedures; and
- Guidance for local planning and response.

State Response Procedures

Initial response procedures in most water supply emergencies will of necessity take place at the local level. Some situations, however, will require that State resources be activated to support local efforts. Examples include local emergencies that require the use of State equipment, contamination events that require water quality certification by State health department personnel, and widespread emergencies that require the State to assume a coordination role over assorted local response efforts. The plan should clearly identify the roles to be played by the State and local response personnel. This section of the plan will be unique to each State, determined to a large extent by the analysis of local supply threats and local response capabilities. Critical components of every State plan, however, include:

- Personnel Roster;
- Action Level Response System; and
- Inventory of Resources.

The State response sections should include a roster of both State and Federal personnel who are to be contacted in the event of a water supply emergency. The same information should be available for use by local planners. Exhibit 4-4 illustrates a sample roster derived from a State water-supply emergency plan. In addition, the plan should illustrate interagency relationships among the various response personnel at the State level.

One of the most important functions of a State plan is to clearly identify when and how the State will become involved in supporting local responses to water supply disruptions. This function can be performed by developing an action-level system. This decision-making tool defines appropriate types of State response actions for various contamination threats to the public water supplies, including:

- What action will be taken - treatment or replacement;

Exhibit 4-4

EMERGENCY RESPONSE CONTACTS*

The following information indicates the type of information to be included on a roster; the name and phone number of each contact should be provided.

A. STATE AGENCIES

1. STATE DEPARTMENT OF HEALTH SERVICES

   a. BUREAU OF WATER QUALITY CONTROL

      - PRIMARY CONTACTS:
        - Emergency Response Coordinator:
        - Northern Regional Office:
        - Central Regional Office:
      - SECONDARY CONTACTS:

   b. BUREAU OF EPIDEMIOLOGY AND LABORATORY SERVICES

      - PRIMARY CONTACTS:
        - Chemical Contamination:
        - Microbiological Contamination:
      - SECONDARY CONTACTS:

2. STATE DEPARTMENT OF EMERGENCY AND MILITARY AFFAIR
   (Division of Emergency Services)

   - PRIMARY CONTACT:
   - SECONDARY CONTACT:

3. STATE DEPARTMENT OF PUBLIC SAFETY:

4. STATE ATOMIC ENERGY COMMISSION

   - PRIMARY CONTACT:
   - SECONDARY CONTACT:

---

* Derived from the Arizona State Water Supply Emergency Plan.

Exhibit 4-4 (continued)

EMERGENCY RESPONSE CONTACTS*

B. U.S. ENVIRONMENTAL PROTECTION AGENCY - Regional Office

- PRIMARY CONTACT:
- SECONDARY CONTACT:
- EMERGENCY RESPONSE COORDINATOR:
- EPA 24-HOUR EMERGENCY NUMBER:

C. OTHER LABORATORIES

- MICROBIOLOGICAL:
- CHEMICAL:

- When — the action is needed -
  replacement or treatment immediately,
  within a week, or
  within a year;

- Who — (what agency, division, or personnel position) is responsible -
  for replacement or treatment, and
  for subsequent monitoring;

- Why — the action is being taken.

Defining a formal action-level system as part of the State contingency plan has several benefits. Once established, an action-level system can reduce the number of decisions to be made by State authorities when a contamination incident occurs; reduce implementation time and cost; replace subjective judgments with objective answers; reduce uncertainty for State water managers; reduce risks to public health; help inform the public about relative risk; and increase public credibility.

The basic structure of an action-level system consists of a series of response tiers, each associated with a specific type of contamination incident, a level of contamination (if any), and a range of responses. The specifics of the action-level system including the number of response tiers, levels of contamination which trigger a set of responses, or the types of recommended response may vary from State to State. Appendix M outlines the types of factors that a State should consider in developing an action-level system.

The State plan can supplement the action level system by including specific response procedures tailored to individual types of events. Appendix N includes an example of specific procedures for chemical contamination, drawn from New York State's guidance.

The State plan should also include an inventory of resources available at the State level that can be mobilized to assist a local response effort. Exhibit 2-7 and the accompanying text illustrates the type of information that should be included in this inventory. This information may be obtainable from the State Office of Emergency Management or Civil Defense. In many instances, such an inventory can be pulled from an existing State or local plan.

Guidance for Local Planning and Response

A State contingency plan for water supply should incorporate information that will facilitate the development and implementation of local response activities as well as State response activities, if it is to be an effective document for overall strategy guidance. The State plan should include sections that address the most critical aspects of the relationship between State and local response activities:

- State delegation of planning and response authorities to local planners;

- Guidance for use by local contingency planners; and

- State oversight of the local planning process.

Delegation of contingency planning responsibility to local planners will be specified in a State's Wellhead Protection Program. Two methods that may be effective for stimulating the planning process include:

- Incorporating a contingency planning requirement as a condition of a water system operator's permit; and

- Conditioning approval of State grant funds to localities for water supply, water quality, or public health-related purposes on the existence of an adequate contingency plan.

Regardless of the approach used, the State should offer as much information and technical assistance as possible to localities to expedite planning and ease the demand on limited resources. The State also might conduct a public information campaign on contingency planning to foster public support for the preparation of contingency plans in their community.

A key function of the State plan is to encourage reliability and consistency in local plan development and implementation. Through the development of standardized local response procedures, State planners can accomplish the following two beneficial goals:

- Provision of guidance for communities with limited resources for local plan development; and

- Creation of a uniform response protocol that will facilitate coordination of State activities in support of local procedures.

State guidance should fulfill a local assistance role not so much as a model for wholesale adoption by local planners, but rather by establishing criteria for the necessary components of a local plan. These criteria will help to guarantee that local planners have evaluated the most critical components of their water system and their response capabilities and will also ensure that local response activities are tied to the State's response plan; thereby facilitating communications and the activation of State resources in an emergency. These local components are described more fully in Chapter 2.

Delegation and guidance is not enough to ensure that local plans are completed and will effectively provide for emergency water supplies. The State will also need to coordinate and oversee the local planning process. The task of coordination may involve the following activities:

- Establishing a minimum set of criteria that local governments should follow in developing their contingency plans (e.g., essential plan sections);

- Establishing a minimum set of criteria that local governments should follow in implementing their plans (e.g., periodic plan exercises, plan review following a supply disruption);

- Establishing the process by which the State will evaluate local plan development and implementation, provisions for partial or conditional plan approval (if appropriate), and the consequences of incomplete or inadequate plans (e.g., reduction in State assistance).

As a final note, a State should work to ensure that the level of oversight undertaken corresponds to the degree to which that State has delegated its SDWA contingency planning responsibilities to local governments. States that have delegated most of the responsibility to local governments, thus, will likely need more comprehensive oversight

provisions than States that play a more active role in local plan development and implementation.

4.5 ADDRESSING PROBLEMS -- FUTURE STEPS TO BE TAKEN

During preparation of the State plan, specific response deficiencies may be identified. These deficiencies can form the basis for a specific agenda to guide future State water supply. Critical components of this agenda include measures that will address the State role in ensuring the long-term effectiveness of its contingency plan, including:

- Preventing or mitigating emergencies;
- Training local responders; and
- Reviewing and updating the plan.

Preventing or Mitigating Emergencies

In preparing their contingency plan, State planners may identify patterns of problems (contamination problems, shortages of treatment capacity, shortages of response equipment, or highly constrained local budgets, to cite a few examples) in various locations throughout the State. Where they are common and/or significant enough, these problems provide the basis for preparing a specific agenda of tasks that State authorities, perhaps in conjunction with local officials, can undertake to prevent or mitigate future emergencies. Such tasks might include providing guidance on how to deal with specific contaminants, providing new State funding for local acquisition of response equipment or to support local planning, or accumulating stockpiles of critical equipment and supplies in regional locations around the State.

Training Local Responders

The discussion in Chapter 2 emphasized the importance of appropriate training for local responders in the specific tasks they will be responsible for in the event of a water supply disruption. An evaluation of the statewide adequacy of response training for water system employees and others is one potential outcome of State planners' background information gathering. A logical follow-up role for States to play might be to provide funding for local response training or to provide such training directly through community colleges or specialized training institutes. A direct State training role may be particularly helpful to smaller jurisdictions that cannot afford to provide or contract for such training on their own. Even for larger communities, State training in specialized areas such as toxicology may be appropriate.

Reviewing and Updating the Plan

Just as a local plan should incorporate procedures for reviewing and updating planning assumptions and response procedures, so should State plans. Many of the conditions underlying a State plan when it is first prepared may change, perhaps frequently or fundamentally. The statewide pattern of local ground-water supply conditions and threats or the level of local preparedness for disruption incidents are only two examples of factors, which underlie or provide the basis for the State's plan, that are subject to significant change. Moreover, because the State plan covers a much larger and more diverse territory than any single local plan, there is great potential for conditions to change unbeknownst to State officials. Chapter 5 provides more information on the plan review and update process.

4.6 BUILDING CONSENSUS FOR THE PLAN

State planners can benefit from reviewing the suggestions provided in Section 2.6 concerning procedures for building consensus in support of local plans. While the basic process is the same at both levels, two additional suggestions should be considered at the State planning level. These suggestions are based on the necessary interactions between State and local authorities in the event of an actual emergency.

- In testing or exercising draft State plans, the scenario(s) chosen as the basis for the exercise(s) should require State response. The incidents should, for example, involve large-scale, perhaps regionalized supply disruptions or contamination from hazardous chemicals that require specialized State expertise. Such scenarios provide the opportunity to test one or more local plans, the State plan, and their interaction.

- In structuring a process for review of the State plan, opportunities should be provided for local governments to comment on the plan's workability. Local planners and responders must be familiar and comfortable with the State plan if the latter is to be successful.

State planners should, of course, incorporate any other considerations that reflect their own needs into the review process.

* * * * *

Development of an effective State response plan requires the evaluation of a broad range of threats and a varied assortment of water supply systems. Although State planners do not need to be as specific in tailoring responses to an individual community's needs, they must be prepared for a wider diversity of threats than any one community will ever face. The most important points to keep in mind in the process are to tailor the plan to State needs and abilities; use all of the resources that are available both for plan development and implementation; keep the plan simple and "user friendly;" and think out procedures through their foreseeable consequences.

SECTION III

CHAPTER 5: REVIEWING AND UPDATING LOCAL AND STATE PLANS

Approval and completion of a ground-water supply disruption contingency plan marks a key milestone in improving local and State response capabilities. It is not, however, the end of the planning process. This section of the TAD, which consists solely of Chapter 5, emphasizes the need to maintain up-to-date local and State plans and suggests specific techniques to accomplish this task effectively. Most of these techniques apply to both local and State planning efforts.

5.1 PLANNING IS A CONTINUOUS PROCESS

Contingency planning is a continuous process. As community needs, response capabilities, and resources change, the local contingency plan needs to keep pace. Likewise, widespread changes in community efforts and State resource capabilities should prompt revision to the State plan. An outdated plan, be it the local or State plan, may hamper response to a contamination incident.

A wide variety of factors may affect a plan's timeliness, including changes in response agency telephone numbers and procedures, fluctuations in water demand, the quality and quantity of available response supplies, and shifts in land use. Likely supply disruption scenarios, supply replacement options, and financial resources may also change over time. Turnover of local agency personnel might necessitate the revision of a local plan's logistical elements, as would shifts in the lead agency's organizational structure. Availability of services and equipment also may fluctuate as prices change, suppliers enter or leave the local market, or State and Federal technical and financial support services evolve.

Sections 2.5 and 4.5 introduced the idea of incorporating specific procedures for reviewing and updating a local or State plan in the plan itself. The focus of this chapter is on more detailed suggestions concerning these procedures.

5.2 SUGGESTED PLAN REVIEW TECHNIQUES

Contingency planning teams often disband when a plan has been approved and is officially "on the books." However, the planning team can play a key role in maintaining an up-to-date, usable plan. This job can be made easier by using a few well-tested steps to maintain the plan.

- Establish a regular plan review period, preferably either every six months or annually. Some critical components of the plan -- emergency notification telephone numbers, for example -- should perhaps be reviewed even more frequently.

- Test the plan through regularly scheduled "table-top" and field emergency exercises (see Section 5.3). Exercises should be followed by debriefing sessions where key planners and responders have a chance to review how well the plan worked and identify deficiencies or gaps in planning or response capabilities that need to be addressed.

- Review the plan after every significant water supply disruption incident (see Section 5.4) so that response problems, unanticipated difficulties, and other "lessons learned" can be incorporated into the plan.

- For a local plan, review the plan after making significant modifications to the water supply system. This will ensure that the plan correctly describes the system and the implications of disruption events on system components.

- For a local plan, review the adequacy of the plan to cope with the effects of proposed new developments, such as shopping centers, industrial parks, and subdivisions. (Note, this review of the plan might be integrated with a review of the development itself.)

- For a local plan, review the plan after significant developments are completed.

- For a State plan, review the plan in response to significant trends in community response capabilities and procedures.

- Publish a notice and announce a comment period for plan review and revisions, allowing the public to air their concerns.

- Maintain a list of individuals, agencies, and organizations that will be interested in participating in the review process.

- Assign the lead responsibility for managing the plan review and update process and, more generally, for stewardship of the plan to one agency.

- The lead agency can take steps to facilitate the review and update process, including scheduling periodic planning team meetings specifically for plan review; maintaining a list of plan holders to be sent any changed materials; requesting other agencies to closely review those sections of the plan that particularly affect them; numbering changes consecutively, for ease of tracking; using electronic word processing to make the process of incorporating changes easier; and working with other agencies to ensure that contingency plan changes are integrated with other plans.

- Include both a "Record of Amendments" sheet and a "When and Where to Report Changes" notice in the plan to facilitate both the reporting and sharing of changes. Exhibit 5-1 illustrates how such items might be incorporated into a single form.

- Clearly identify sections of the plan that are likely to be changed frequently. This can be done through the use of colored paper, tabs, or other graphics techniques.

Exhibit 5-1

SAMPLE "RECORD OF AMENDMENTS" FORM

Notice: Both scheduled and unscheduled official revisions to this plan should be described and dated in the space provided below. Reviews of the plan not resulting in amendments should be noted as well. Notices of review and copies of any amended sections should then be sent to official document holders, listed in Section ( ) of this plan, and noted below.

Amendment(s)	Date	Copies Sent to:

5.3 EXERCISING THE PLAN

Short of an actual supply disruption, the best way to test the usefulness of the plan is to exercise it using the disruption scenarios developed in the planning process. There are several basic forms of plan exercises.

- Full-scale field exercises, also known as "simulations," are mock emergencies in which the response organizations that would be involved in an actual emergency perform the actions they would take in a real event. The emphasis of such an exercise is on realism and time pressure as local and/or State personnel interact in response to the simulated disruption scenario. These drills generally involve all response agencies and functions.

- Functional exercises are similar to full-scale field exercises, except that they usually involve testing the capabilities of only one agency or response functions. Functional exercises might, for example, test the response capabilities of the local water department, the State agency responsible for supplying equipment to local communities during a supply disruption, or of those agencies involved in communicating with the public.

- Table-top exercises provide a flexible, low-cost alternative to these other field-oriented exercises. Table-top exercises require gathering key decision-makers from all response agencies in a room where they are presented with the disruption scenario by an exercise facilitator. These exercise "players" then "walk" through their decision-making process as realistically as possible.

Exercises are most beneficial when followed by a meeting of all participants to review and critique their performance in the exercise and identify strengths and weaknesses in the operation of the contingency plan. Outside reviewers may also provide helpful feedback. The agency given the lead in plan maintenance should follow-up to make sure that planning and response deficiencies are adequately addressed by the appropriate response agencies.

Holding a successful exercise requires planning and careful execution. Communities can find more detailed guidance on the use of exercises in various documents prepared by the Federal Emergency Management Agency (FEMA). These guidance materials should be readily available through either the local or State emergency management or preparedness agencies. Alternatively, FEMA's Washington or regional offices can provide the materials upon telephone request.

5.4 REVIEWING SUPPLY DISRUPTION INCIDENTS

When a supply disruption incident does occur, a formal review of the incident helps the planning team to evaluate the effectiveness of a contingency plan. Specific suggestions in reviewing incidents include:

- Assign lead review for incident assessment to the same agency with responsibility for overseeing plan review and maintenance.

- Conduct the review only after the emergency phase of a disruption is over and sufficient time has passed to permit responders to be objective about the incident.

- Use questionnaires, telephone interviews, and other relatively formal mechanisms to obtain input from as many responders as possible.

- Convene the planning team to carefully review all comments, identify plan and response deficiencies, and make appropriate changes in the plan.

- Response problems rooted not in the plan itself but in a lack of equipment, supplies, or financial capabilities should be documented and brought to the attention of the appropriate public body with authority for appropriating funds and acquiring response hardware.

State plans should be reviewed following a local incident where State resources were used or if there appears to be a trend toward a certain type of local incident. Watching for trends in local incidents is especially important because such trends might be addressed more effectively at the State level than at the local level.

Reviewing the plan following disruption incidents, building in an automatic periodic review cycle, and the other suggestions provided in this chapter should help simplify the plan maintenance process. This in turn will help ensure an up-to-date plan that will meet both local and State needs in an emergency.

GUIDE TO GROUND-WATER SUPPLY CONTINGENCY PLANNING FOR LOCAL AND STATE GOVERNMENTS

APPENDICES

APPENDICES

Appendix A

FEDERAL CONTINGENCY PLANNING REQUIREMENTS

Section 1413 of the Safe Drinking
Water Act of 1974

STATE PRIMARY ENFORCEMENT RESPONSIBILITY

Sec. 1413.(a) For purposes of this title, a State has primary enforcement responsibility for public water systems during any period for which the Administrator determines (pursuant to regulations prescribed under subsection (b)) that such State --

(1) has adopted drinking water regulations which are no less stringent than the national primary drinking water regulations in effect under section 1412(a) and 1412(b);

(2) has adopted and is implementing adequate procedures for the enforcement of such State regulations, including conducting such monitoring and making such inspections as the Administrator may require by regulation;

(3) will keep such records and make such reports with respect to its activities under paragraphs (1) and (2) as the Administrator may require by regulation;

(4) if it permits variances or exemptions, or both, from the requirements of its drinking water regulations which meet the requirements of paragraph (1), permits such variances and exemptions under conditions and in a manner which is not less stringent than the conditions under, and the manner in, which variances and exemptions may be granted under sections 1415 and 1416; and

(5) has adopted and can implement an adequate plan for the provision of safe drinking water under emergency circumstances.

(b)(1) The Administrator shall, by regulation (proposed within 180 days of the date of the enactment of this title), prescribe the manner in which a State may apply to the Administrator for a determination that the requirements of paragraphs (1), (2), (3), and (4) of subsection (a) are satisfied with respect to the State, the manner in which the determination is made, the period for which the determination will be effective, and the manner in which the Administrator may determine that such requirements are no longer met. Such regulations shall require that before a determination of the Administrator that such requirements are met, or are no longer met with respect to a State may become effective, the Administrator shall notify such State of the determination and the reasons therefore and shall provide an opportunity for public hearing on the determination. Such regulations shall be promulgated (with such modifications as the Administrator deems appropriate) within 90 days of the publication of the proposed regulations in the Federal Register. The Administrator shall promptly notify in writing the chief executive officer of each State of the promulgation of regulations under this paragraph. Such notice shall contain a copy of the regulations and shall specify a State's authority under this title when it is determined to have primary enforcement responsibility for public water systems.

(2) When an application is submitted in accordance with the Administrator's regulations under paragraph (1), the Administrator shall within 90 days of the date on which such application is submitted (A) make the determination applied for, or (B) deny the application and notify the applicant in writing of the reasons for his denial.

Appendix A (continued)

FEDERAL CONTINGENCY PLANNING REQUIREMENTS

Section 205 of the Safe Drinking Water
Act Amendments of 1986

STATE PROGRAMS TO ESTABLISH WELLHEAD PROTECTION AREAS

The Safe Drinking Water Act is amended by adding the new section 1428, as follows:

SEC. 1428. STATE PROGRAMS TO ESTABLISH WELLHEAD PROTECTION AREAS

(a) State Programs. -- The Governor or Governor's designee of each State shall, within 3 years of the date of enactment of the Safe Drinking Water Act Amendments of 1986, adopt and submit to the Administrator a State program to protect wellhead areas within their jurisdiction from contaminants which may have any adverse affect on the health of persons. Each State program under this section shall, at a minimum --

(1) specify the duties of State agencies, local governmental entities, and public water supply systems with respect to the development and implementation of programs required by this section;

(2) for each wellhead, determine the wellhead protection area as defined in subsection (e) based on all reasonably available hydrogeologic information on ground water flow, recharge and discharge and other information the State deems necessary to adequately determine the wellhead protection area;

(3) identify within each wellhead protection area all potential anthropogenic sources of contaminants which may have any adverse effect on the health of persons;

(4) describe a program that contains, as appropriate, technical assistance, financial assistance, implementation of control measures, education, training, and demonstration projects to protect the water supply within wellhead protection areas from such contaminants;

(5) include contingency plans for the location and provision of alternate drinking water supplies for each public water system in the event of well or wellfield contamination by such contaminants; and

(6) include a requirement that consideration be given to all potential sources of such contaminants within the expected wellhead area of a new water well which serves a public water supply system.

(b) Public Participation. -- To the maximum extent possible, each State shall establish procedures, including but not limited to the establishment of technical and citizens' advisory committees, to encourage the public to participate in developing the protection program for wellhead areas. Such procedures shall include notice and opportunity for public hearing on the State program before it is submitted to the Administrator.

(c) Disapproval. --

(1) In General. -- If, in the judgment of the Administrator, a State program (or portion thereof, including the definition of a wellhead protection area), is not adequate to protect public water systems as required by this section, the Administrator shall disapprove such program (or portion thereof). A State program developed pursuant to subsection (a) shall be deemed to be adequate unless the Administrator determines, within 9 months of the receipt of a State program, that such program (or portion thereof) is inadequate for the purpose of protecting public water systems as required by this section from contaminants

Appendix A (continued)

FEDERAL CONTINGENCY PLANNING REQUIREMENTS

Section 205 of the Safe Drinking Water
Act Amendments of 1986
(continued)

that may have any adverse effect on the health of persons. If the Administrator determines that a proposed State program (or any portion thereof) is inadequate, the Administrator shall submit a written statement of the reasons for such determination to the Governor of the State.

(2) Modification and Resubmission. -- Within 6 months after receipt of the Administrator's written notice under paragraph (1) that any proposed State program (or portion thereof) is inadequate, the Governor or Governor's designee, shall modify the program based upon the recommendations of the Administrator and resubmit the modified program to the Administrator.

(d) Federal Assistance. -- After the date 3 years after the enactment of this section, no State shall receive funds authorized to be appropriated under this section except for the purpose of implementing the program and requirements of paragraphs (4) and (6) of subsection (a).

(e) Definition of Wellhead Protection Area. -- As used in this section, the term 'wellhead protection area' means the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield. The extent of a wellhead protection area, within a State, necessary to provide protection from contaminants which may have any adverse effect on the health of persons is to be determined by the State in the program submitted under subsection (a). Not later than one year after the enactment of the Safe Drinking Water Act Amendments of 1986, the Administrator shall issue technical guidance which States may use in making such determinations. Such guidance may reflect such factors as the radius of influence around a well or wellfield, the depth of drawdown of the water table by such well or wellfield at any given point, the time or rate of travel of various contaminants in various hydrologic conditions, distance from the well or wellfield, or other factors affecting the likelihood of contaminants reaching the well or wellfield, taking into account available engineering pump tests or comparable data, field reconnaissance, topographic information, and the geology of the formation in which the well or wellfield is located.

(f) Prohibitions. --

(1) Activities Under Other Laws. -- No funds authorized to be appropriated under this section may be used to support activities authorized by the Federal Water Pollution Control Act, the Solid Waste Disposal Act, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, or other sections of this Act.

(2) Individual Sources. -- No funds authorized to be appropriated under this section may be used to bring individual sources of contamination into compliance.

(g) Implementation. -- Each State shall make every reasonable effort to implement the State wellhead area protection program under this section within 2 years of submitting the program to the Administrator. Each State shall submit to the Administrator a biennial status report describing the State's progress in implementing the program. Such report shall include amendments to the State program for water wells sited during the biennial period.

Appendix A (continued)

FEDERAL CONTINGENCY PLANNING REQUIREMENTS

Section 205 of the Safe Drinking Water
Act Amendments of 1986
(continued)

(h) Federal Agencies. -- Each department, agency, and instrumentality of the executive, legislative, and judicial branches of the Federal Government having jurisdiction over any potential source of contaminants identified by a State program pursuant to the provisions of subsection (a)(3) shall be subject to and comply with all requirements of the State program developed according to subsection (g)(4) applicable to such potential source of contaminants, both substantive and procedural, in the same manner, and to the same extent, as any other person is subject to such requirements, including payment of reasonable charges and fees. The President may exempt any potential source under the jurisdiction of any department, agency, or instrumentality in the executive branch if the President determines it to be in the paramount interest of the United States to do so. No such exemption shall be granted due to the lack of an appropriation unless the President shall have specifically requested such appropriation as part of the budgetary process and the Congress shall have failed to make available such requested appropriations.

(i) Additional Requirement. --

(1) In General. -- In addition to the provisions of subsection (a) of this section, States in which there are more than 2,500 active wells at which annular injection is used as of January 1, 1986, shall include in their State program a certification that a State program exists and is being adequately enforced that provides protection from contaminants which may have any adverse effect on the health of persons and which are associated with the annular injection or surface disposal of brines associated with oil and gas production.

(2) Definition. -- For purposes of this subsection, the term 'annular injection' means the reinjection of brines associated with the production of oil or gas between the production and surface casings of a conventional oil or gas producing well.

(3) Review. -- The Administrator shall conduct a review of each program certified under this subsection.

(4) Disapproval. -- If a State fails to include the certification required by this subsection or if in the judgment of the Administrator the State program certified under this subjection is not being adequately enforced, the Administrator shall disapprove the State program submitted under subsection (a) of this section.

(j) Coordination With Other Laws. -- Nothing in this section shall authorize or require any department, agency, or other instrumentality of the Federal Government or State or local government to apportion, allocate or otherwise regulate the withdrawal or beneficial use of ground or surface waters, so as to abrogate or modify any existing rights to water established pursuant to State or Federal law, including interstate compacts.

Appendix A (continued)

FEDERAL CONTINGENCY PLANNING REQUIREMENTS

Section 301 of the Emergency Preparedness
and Community Right-to-Know Act of 1986
(EPCRA, also known as Title III of
the Superfund Amendments and
Reauthorization Act of 1986)

SUBTITLE A: EMERGENCY PLANNING AND NOTIFICATION

Section 301 -- Establishment of State Commissions,
Planning Districts, and Local Committees

(a) ESTABLISHMENT OF STATE EMERGENCY RESPONSE COMMISSIONS. -- Not later than six months after the date of the enactment of this title, the Governor of each State shall appoint a State emergency response commission. The Governor may designate as the State emergency response commission one or more existing emergency response organizations that are State-sponsored or appointed. The Governor shall, to the extent practicable, appoint persons to the State emergency response commission who have technical expertise in the emergency response field. The State emergency response commission shall appoint local emergency planning committees under subsection (c) and shall supervise and coordinate the activities of such committees. The State emergency response commission shall establish procedures for receiving and processing requests from the public for information under section 324, including tier II information under section 312. Such procedures shall include the designation of an official to serve as coordinator for information. If the Governor of any State does not designate a State emergency response commission within such period, the Governor shall operate as the State emergency response commission until the Governor makes such designation.

(b) ESTABLISHMENT OF EMERGENCY PLANNING DISTRICTS. -- Not later than nine months after the date of the enactment of this title, the State emergency response commission shall designate emergency planning districts in order to facilitate preparation and implementation of emergency plans. Where appropriate, the State emergency response commission may designate existing political subdivisions or multijurisdictional planning organizations as such districts. In emergency planning areas that involve more than one State, the State emergency response commissions of all potentially affected States may designate emergency planning districts and local emergency planning committees by agreement. In making such designation, the State emergency response commission shall indicate which facilities subject to the requirements of this subtitle are within such emergency planning district.

(c) ESTABLISHMENT OF LOCAL EMERGENCY PLANNING COMMITTEES. -- Not later than 30 days after designation of emergency planning districts or 10 months after the date of the enactment of this title, whichever is earlier, the State emergency response commission shall appoint members of a local emergency planning committee for such emergency planning district. Each committee shall include, at a minimum, representatives from each of the following groups or organizations: elected State and local officials; law enforcement, civil defense, firefighting, first aid, health, local environmental, hospital, and transportation personnel; broadcast and print media; community groups; and owners and operators of facilities subject to the requirements of this subtitle. Such committee shall appoint a chairperson and shall establish rules by which the committee shall function. Such rules shall include provisions for public notification of committee activities, public meetings to discuss the emergency plan, public comments, response to such comments by the committee, and distribution of the emergency plan. The local emergency

Appendix A (continued)

FEDERAL CONTINGENCY PLANNING REQUIREMENTS

Section 301 of the Emergency Preparedness
and Community Right-to-Know Act of 1986
(continued)

planning committee shall establish procedures for receiving and processing requests from the public for information under section 324, including tier II information under section 312. Such procedures shall include the designation of an official to serve as coordinator for information.

(d) REVISIONS. -- A State emergency response commission may revise its designations and appointments under subsections (b) and (c) as it deems appropriate. Interested persons may petition the State emergency response commission to modify the membership of a local emergency planning committee.

Appendix B

LIST OF WORKSHOP PARTICIPANTS

The following Federal, State, and local water supply and emergency response experts participated in a contingency planning workshop held in Washington, D.C. on January 27 and 28, 1988. These officials might be able to offer valuable insight to State and local governments undertaking contingency planning efforts of their own.

Jon Beekman, Manager
Division of Environmental Management
Whitman & Howard, Inc.
45 William Street
Wellesley, Massachusetts 02181
(617) 237-5000

Scott Cunningham, Washington Representative
Federal Relations Department
Union Carbide Corporation
1100 Fifteenth Street, N.W.
Washington, D.C. 20005
(202) 872-8555

Rodney DeHan, Assistant Bureau Chief
Bureau of Groundwater Protection
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301
(904) 488-3601

Russell Ellison, Senior Geologist
Virginia Water Control Board
P.O. Box 11143
Richmond, Virginia 23230
(804) 367-6350

James Feuss, Public Health Director
Cortland County Health Department
60 Central Avenue
P.O. Box 5590
Cortland, New York 13045
(607) 753-5036

Charles Glore, Associate Engineer
Mobil Research and Development Corporation
Paulsboro Research Lab
Bellingsport Road
Paulsboro, New Jersey 08066
(609) 423-1040

Larry Graham, Training Specialist
States Program Division
Office of Drinking Water
U.S. EPA
401 M Street, S.W.
Washington, D.C. 20460
(202) 382-7593

Paul Guthrie, Director
State and EPA Relations
Office of Community and Intergovernmental Relations
U.S. EPA
401 M Street, S.W.
Washington, D.C. 20460
(202) 382-4461

Doug (Dusty) Hall, Environmental Protection Manager
Dayton Department of Water
101 West Third Street
Dayton, Ohio 44502
(513) 443-3734

Sam Harper, Field Supervisor
Operation Section
Bureau of Water Quality Management
Pennsylvania Department of Environment Resources
121 South Highland Avenue
Pittsburgh, Pennsylvania 15206
(412) 645-7166

John Hroncich, Sanitary Engineer
Hackensack Water Company
200 Old Hook Road
Harrington Park, New Jersey 07640
(201) 767-9300

Appendix B (continued)

LIST OF WORKSHOP PARTICIPANTS

Donald A. Kuntz, Director
Environmental Engineering Division
West Virginia Office of Environmental Health Services
1800 Washington Street
West Charleston, West Virginia 25305
(304) 348-2981

Robert Mendoza, Chief
Ground-Water Management Section
U.S. EPA - Region I
JFK Federal Building, Room 2203
Boston, Massachusetts 02203
(617) 565-3600

Richard Mitzelfelt, Chief
Groundwater Bureau
New Mexico Environmental Improvement Division
P.O. Box 968
Sante Fe, New Mexico 87504
(505) 827-2919

George Moein, Chief
Emergency Response and Control Section
U.S. EPA - Region IV
345 Cortland Street, N.E.
Atlanta, Georgia 30365
(404) 347-3931

Glenn Moon, Director
Valley Park Water Department
320 Benton Street
Valley Park, Missouri 63088
(314) 225-5171

Jennifer Orme, Toxicologist
Health Effects Branch
Office of Drinking Water
U.S. EPA
401 M Street, S.W.
Washington, D.C. 20460
(202) 382-7586

Rick Otis, Policy Analyst
Office of Assistant Administrator for Solid Waste and Emergency Response
U.S. EPA
401 M Street, S.W.
Washington, D.C. 20460
(202) 382-2203

Bill Price, Section Chief
Public Drinking Water Program
Missouri Department of Natural Resources
P.O. Box 1368
Jefferson City, Missouri 65102
(314) 751-5331

Velma Smith, Director
Groundwater Project
Environmental Policy Institute
218 D Street, S.E.
Washington, D.C. 20003
(202) 544-2600

Edith Tanenbaum, Bi-County Planning Coordinator
Long Island Regional Planning Board
H. Lee Dennison Building, 12th Floor
Veterans Memorial Highway
Hauppauge, New York 11788
(516) 360-5195

Dr. Raymond Thron, Director
Division of Environmental Health
Minnesota Department of Health
717 Delaware Street, S.E.
P.O. Box 9441
Minneapolis, Minnesota 55440
(612) 623-5320

David Venekamp, City Administrator
City Hall
239 Central Avenue
Long Prairie, Minnesota 56347
(612) 732-2167

Appendix B (continued)

LIST OF WORKSHOP PARTICIPANTS

Sam Wade, Director of Professional Services
National Rural Water Association
P.O. Box 1428
2915 South 13th Street
Duncan, Oklahoma 73534
(405) 252-0629

Doug Yoder, Assistant Director
Dade County Environmental Resources
Management Department
111 Northwest 1st Street, Suite 1310
Miami, Florida 33128
(305) 375-3376

Appendix C

EPA PILOT PROJECTS

This appendix briefly describes the results of five pilot projects that EPA initiated in order to learn more about the practical realities of contingency planning.

Tucson, Arizona

Tucson is a large, well-known city of the desert Southwest and like Phoenix, its neighbor to the north, is a popular place to live for young and old alike. Lying within the Sonoran Desert, Tucson has a climate characteristic of the lower elevations of the southwestern United States, controlled largely by the presence of extensive mountain ranges surrounding the city, and long distances from major bodies of water. The area enjoys a mild, dry winter and has a long, hot season lasting from April through October. Precipitation averages less than 12 inches per year, and almost half of this occurs during the summer months. This period provides isolated but violent thunderstorms, which generate flash flooding of considerable proportions.

Tucson's 1985 population was recorded at approximately 634,000 persons, and is projected to reach just over 1 million by the turn of the century. With this projected increase, the demand for water and related services is on the rise. Tucson is currently aiming for "safe yield" status in ground-water management, which means reducing the amount of water withdrawn so as not to exceed the natural and artificial recharge capacity of the aquifer to replenish itself. These withdrawals or "overdrafts" are currently the result of an increased amount of land dedicated to agriculture and copper mining activity.

Most ground water in the Tucson area is of excellent quality, but highly variable in type. Some areas do exist where ground-water quality is poor, but these areas are not used for public drinking water supplies. Tucson's ground-water reserves are relatively deep, with average depth-to-ground water of about 200 feet. In some parts of the area, water levels have dropped more than 100 feet since 1940, primarily due to increased ground-water demand. In order to reduce this continuing dependency on ground-water reserves, Tucson plans to receive water from the massive Central Arizona Project (CAP), which will bring water by surface canal from the Colorado River, by way of Phoenix. This additional water supply, slated for delivery in the early 1990's, will allow reduced dependence on ground water as the only source of drinking water, and will allow the surrounding aquifers to recharge naturally over the first 2 to 3 years after CAP water is made available to Tucson.

The extensive depth-to-ground water and the very long time of travel combine to de-emphasize the importance of contaminant spills or releases in comparison to the threat of physical disruption of public water supplies and services. Tucson has experienced damage and disruption of public water supplies in the past as a result of flash flooding within their wellfields, and intentional thefts and vandalism of pumping and distribution equipment. For these reasons, Tucson became very interested in developing a pilot contingency plan as part of EPA's Wellhead Protection Program.

The Pima Association of Governments (PAG), headquartered in Tucson, was instrumental in orchestrating cooperative efforts among Pima County, the City of Tucson, and individual private water providers within the Tucson metropolitan area. Before PAG took the lead, ambiguity and confusion existed between the State, county, local, and private interests in terms of the benefits and responsibilities in developing a contingency plan. Through skillful networking and cooperative effort, PAG was able to bring most of the major water providers in the Tucson area to agreement and participation in the Water

Appendix C (continued)

EPA PILOT PROJECTS

Tucson, Arizona (continued)

Supply Interruption Contingency Planning Committee, the formal workgroup developing the plan. This workgroup participated in meetings with State, county, local, and EPA Regional and Headquarters personnel to help draft the contingency plan, which was specifically designated to meet the unique needs of Tucson's water service areas.

Without strong local leadership, the development of a contingency plan for Tucson, Arizona would not have taken place. The number of smaller water providers were very reluctant to devote time and resources to developing the plan, because they did not foresee any significant benefit to them as smaller companies. The major water provider in Tucson was likewise reluctant from the historical point of view, because it had always been able to handle any interruptions in supply or service with relatively little outside assistance or disruption in routine. By illustrating the potential benefit to all water providers, regardless of size or service area, PAG was able to pool the resources, knowledge and expertise of the largest as well as the smallest of Tucson's water providers, thus facilitating the development of the area's first water supply contingency plan.

Oakley, Kansas

Oakley is a small community located in western Kansas, about 70 miles from the Colorado border. The current population is approximately 800 people and has remained fairly constant over the last decade. The community is served by rail and interstate highway systems and is primarily an agricultural community with sustained production of cereal grains (wheat). Some oil wells are located in the Oakley area, with 21 active oil wells currently pumping within Oakley's defined Wellhead Protection Areas. Population changes as a result of commercial or industrial development are not expected in the near future.

Oakley is totally dependent on ground water as its only source of drinking water. Oakley's water supply system consists of 6 on-line wells, with one approved well to be completed. Each of the wells can be independently operated in the system and turned on or off at will. The operation of the system is overseen by the city superintendent who has historically maintained a more or less even pumping regime, allowing adequate opportunities for well and pump maintenance when necessary. July is typically the highest use month, with February the lowest.

With agriculture the primary activity in and around Oakley, and with the existence of actively pumping oil wells, several potential pathways of ground-water pollution are possible. Underground disposal wells, brine tank batteries, underground transmission lines and storage tanks all pose potential threats to Oakley's drinking water supplies drawn from ground-water reserves. A landfill which has existed for years without monitoring, lining, or attempts at leachate control also creates potential threats. Agricultural chemicals (pesticides and fertilizers) are heavily used throughout the area and contribute a well-defined subset of potential contaminants to ground-water reserves in the area. Above-ground and underground storage tanks containing petroleum products are numerous in the area and have maintenance histories of varying reliability. Grain elevators in the immediate area are a potential source of VOC contamination from fumigation activities connected with cereal grain storage.

Appendix C (continued)

EPA PILOT PROJECTS

Oakley, Kansas (continued)

Impetus for the development of a contingency plan for Oakley originated at the State level, with Kansas' Northwest Ground Water Management District No. 4 directly involved. The variety of potential ground-water contaminants, the small number of wells providing public water, and the total dependence of the city on ground water for its drinking water supplies all factored into the selection of Oakley as a candidate for a Contingency Pilot Project location. Coordination at the local level took place within the town council, with the mayor as lead. The Office of City Administrator, which had existed but had not previously been occupied, has now been designated as the local lead, and the incumbent serving in this position must now assume the lead role.

The process of developing a contingency plan for Oakley, Kansas is currently inactive because of a transfer of the lead role from the mayor to the City Administrator. Only after the new City Administrator has become familiar with the essentials of the plan and the new members of the town council briefed as to the plan's long-term benefits can the planning process begin again.

Sioux Falls, South Dakota

Sioux Falls, South Dakota is located in the southeastern corner of the state, and is approximately 230 miles southwest of Minneapolis/St. Paul, Minnesota. The city has a population of roughly 96,000 people, and relies almost totally on ground water for public drinking water supplies, mostly drawn from the Big Sioux Aquifer. This aquifer is the most accessible, the most used, and the most susceptible to contamination. Other aquifers are located near the city, but are much less accessible and unsuitable for development as primary drinking water supplies. Depth to ground water in the Sioux Falls area is generally less than 20 feet and high-capacity wells may yield over 1,000 gallons per minute. The relatively shallow depth to ground water and potentially high capacity well yields make this aquifer a naturally attractive and logical choice for ground-water withdrawal to satisfy public water supply needs.

Municipal growth within the Sioux Falls area is increasing and with it the demand for water supplies and services. The city currently uses about 16.3 million gallons of water a day on an average basis. Along with this growth, the potential for ground-water contamination resulting from man's activities is likewise increasing. Sioux Falls is a central warehousing and distribution point for materials routinely used by the agribusiness complex, and is served by rail and highway routes which deliver pesticides, fertilizer, petroleum products, organic solvents and commercial industrial metals to the area for consumption and distribution. Agricultural waste impoundments, meatpacking plants, road salt storage piles, and urban runoff also compound the potential ground-water contamination problem in this area.

In April 1987, Sioux Falls experienced a break in a gasoline transmission pipeline which occurred within a half mile of one of the city's major public water supply wells. Although the pipeline company worked swiftly with the South Dakota Department of Water and Natural Resources and the City of Sioux Falls to correct the problem, the incident demonstrated the potential for extensive ground-water contamination and significant damage to the municipal well field. Following this incident, the City of Sioux Falls accelerated

Appendix C (continued)

EPA PILOT PROJECTS

Sioux Falls, South Dakota (continued)

plans for the development of a contingency plan to respond to similar threats to their public water supplies. An active representation at the local level, including introduction of a bill containing provisions for a comprehensive Wellhead Protection Program, including contingency planning, helped to facilitate the development of Sioux Falls contingency plan.

The "real life" experience of having to respond to an imminent threat to public drinking water supplies from a contamination incident goes a long way towards accelerating the development of a local contingency plan. However, without significant support at the local level from municipal program offices (Health Department, Fire and Rescue, Civil Defense, etc.), the process is slow and often difficult to orchestrate. The added support and exposure to the legislative process at the state level provided by a local elected representative was instrumental in focusing the importance of developing contingency plans at the local level for the City of Sioux Falls, South Dakota. Once the desire to establish a contingency plan for Sioux Falls was firmly entrenched and the process begun, the neighboring community of Brookings, South Dakota, some 60 miles north of Sioux Falls and dependent on the same aquifer for its public water supplies, began investigating the process of developing its own contingency plan.

Corning, New York

The City of Corning is located in south-central New York on the Chemung River, a major branch of the Susquehanna River. The City relies completely on ground-water supplies because surface water filtration and treatment is thought to be prohibitively expensive. Up to one-third of the municipal water supply is used by Corning Glass Works; the remainder meets the domestic needs of the city's 13,000 residents (1980 census).

The major water supply and protection problems which the contingency plan must consider are a vulnerable aquifer system, a limited storage and excess pumping capacity, and the confinement of storage capacity to one side of the river. Additionally, Corning is developing its contingency plan in the context of pre-existing State requirements and local emergency planning efforts. New York State's Water Supply Emergency Plan statutes which require all community systems with gross revenues in excess of $125,000 to prepare and submit a plan to the State Department of Health by December 31st, 1990. The city would also like to integrate the plan into the broader context of regional watershed planning efforts. The City's Public Works Department, responsible for water supply protection, is a small department with limited resources.

The regional aquifer system consists of a near-surface sand and gravel aquifer in hydraulic connection with the surface waters and a deeper semi-confined aquifer. Heavy pumping in the region has led to water-table declines and pumping-induced infiltration from surface waters now is an important source of aquifer recharge. Up to 70% of the discharge from municipal wells may be from induced surface water recharge in the well vicinity. Although municipal and industrial wells are generally screened in the deeper aquifer, this aquifer is recharged through "windows" in the confining layer as well as leakage. Thus, both aquifers are vulnerable to pollution from surface and subsurface contamination sources, as well as contaminated surface waters, and two of the city's nine municipal wells have already been closed due to TCE contamination. The contamination

Appendix C (continued)

EPA PILOT PROJECTS

Corning, New York (continued)

sources have not been conclusively identified and there is a clear and urgent need for source identification and management in the wellhead areas.

The total pumping capacity of Corning's municipal wells is roughly twice that of the 3.5 million gallon per day (gpd) demand. Storage capacity is about 5.3 mgd -- about one-and-a-half days supply. Corning is considering increasing its storage capacity as part of its long-range contingency planning efforts. In addition to the limited storage capacity, long-range emergency planning must consider how to alleviate the problem of storage confined to one side of the river.

One lesson learned in the process of undertaking a contingency plan for Corning, New York, has been that increased coordination is needed between Steuben County's Emergency Planning efforts and the Corning Fire Department's Emergency Response Plan. In terms of current preparedness for immediate response to short-term emergencies, Corning benefits from the existing New York State Emergency Planning and Response Program which has well-defined guidelines and includes regionally distributed stockpiles of materials and equipment. On the other hand, Corning's efforts in developing a contingency plan have been hampered by the difficulties of interagency coordination, and by the limited fiscal and manpower resources of a relatively small municipal agency.

Jackson, Tennessee

The City of Jackson, Tennessee receives its public water supply from the Jackson Utility Division, a combined public utility, providing water and sewer service, power and light to the City.

The Water Department is totally served by ground-water wells and supplies 22,000 service connections and a population of 60,000 persons. The system is comprised of nineteen deep wells which feed through two water treatment plants. The treatment plants provide aeration, disinfection, stabilization, fluoridation, and filtration.

Jackson has completed it's emergency response plan and is currently in the process of a routine revision to update names, addresses, and telephone numbers. Jackson chose to structure their plan differently from local emergency response plans. Their plan is organized to provide detailed resource information to those responding to emergency conditions. For example, the report reproduced with different colored pages for each section to allow for quick reference during an emergency. The plan differentiates between internal resources (i.e., personnel, equipment, materials, storage facilities and communications) from external resources. The section on external resources identifies contractors, government agencies, other water utilities, parts and repair services, private water suppliers and media contacts.

Jackson Utility District (JUD) views their contingency plan as not only a document to turn to in the event of an emergency, but also as an educational/training document for new employees. For the first time the District has a complete compendium of their systems, resources, and potential problem areas.

Appendix C (continued)

EPA PILOT PROJECTS

Jackson, Tennessee (continued)

Jackson's efforts to prepare an emergency response plan were prompted mainly by the State of Tennessee's requirement that all public water suppliers prepare an emergency operation plan. The Rules of the Tennessee Department of Health and Environment state that "... all community water systems shall prepare an emergency operations plan in order to safeguard the water supply and to alert the public of unsafe drinking water in the event of natural or man-made disasters."

The plan that is currently prepared for Jackson provides an excellent system reference document and in the event of an emergency, can be a valuable aid in determining the appropriate response.

JUD assumed responsibility and managed the entire process of producing an emergency response plan. Strong leadership and a sense of need directed the efforts and assured success. Staff support was available to direct to this effort and in a few months time the entire document was completed.

Appendix D

SOURCES OF INFORMATION ON CONTINGENCY PLANNING

FEDERAL PUBLICATIONS

Title	Available From
Protection of Public Water Supplies from Ground-Water Contamination (Basic Information on hydrogeology and water treatment options)	U.S. EPA, 401 M Street, S.W. Washington, D.C. 20460 (September 1985)
Hazardous Materials Emergency Planning Guide NRT-1 (General Planning Model)	National Response Team GWER/12, 2100 Second Street, S.W. Washington, D.C. 20593 (March 1987)
Emergency Response Guidebook	Materials Transportation Bureau U.S. Department of Transportation Washington, D.C. 20590 (1984)

STATE PLANS AND OTHER PUBLICATIONS

Title	Produced by
Memorandum: Groundwater Contamination Remediation Strategy	New York State Department of Environmental Conservation 50 Wolf Road, Albany, New York 12233-3505 (April 1987)
Emergency Planning and Response: A Water Supply Guide for the Supplier of Water	New York State Department of Health Bureau of Public Water Supply Protection Corning Tower, Rockefeller Empire State Plaza, Albany, New York 12237 (January 1984)
Drinking Water Supply Emergency Plan	State of Ohio, Office of Public Water Supply Environmental Protection Agency, Box 1049 Columbus, Ohio 43216, (614) 466-8307 (September 1977)
Standard Procedures for Drinking Water Emergencies	Office of Emergency Services State of West Virginia (October 1981)
Memo on Guidelines for Use of Tank Trucks	Department of Natural Resources State of Wisconsin, Box 7921 Madison, Wisconsin 53707 (undated)

Appendix D (continued)

SOURCES OF INFORMATION ON CONTINGENCY PLANNING

NON-GOVERNMENTAL PUBLICATIONS

Title	Produced by
Emergency Procedures Handbook	American Water Works System (1979) 1010 Vermont Avenue, N.W. Suite 810 Washington, D.C. 20005-4994
Video Teleconference on Emergency Planning for Potable Water Supplies	U.S. EPA, Federal Emergency Management Agency, U.S. Army Corps of Engineers, and American Water Works Association (June, 1987)
Handbook for Public Notification During Drinking Water Contamination Events	Virginia Water Project, Inc. P.O. Box 2868 Roanoke, Virginia 24001 (703) 345-6781

Appendix E

EXAMPLE OF HAZARDOUS MATERIAL SPILL VULNERABILITY SURVEY CHECKLIST[1]

The following checklist, adapted from the American Water Well Association Handbook: Hazardous Materials Spills Emergency Handbook, has been provided to assist the supplier of water in identifying problem areas and corrective actions that can be taken to mitigate emergencies associated with hazardous material spills. Maps showing exact locations of railroad crossings, highways, pipelines and/or hazardous substance facilities should be developed. Planners can adopt the relevant items listed below and then fill in the adjacent blank columns with relevant information.

MATERIALS TRANSPORTED BY RAILROADS

ITEM		IMPACTS/REMARKS/CORRECTIVE ACTION
A.	Name and location of railroads crossing watersheds or water supplies	
B.	Title and telephone numbers of company office to contact in event of emergency (24-hour coverage)	
C.	Location of railroad on maps showing water utility's water supplies and tributaries	
D.	Location of railroad's nearest cleanup crew	
E.	Hazardous materials commonly transported	
F.	Nature of hazardous materials transported (petroleum or chemical type, toxic or nontoxic, special hazards)	
G.	Protective features or equipment provided by railroad to protect water utility in event of spill	
H.	Improvements planned by railroad or water company to reduce vulnerability of utility to spills	
I.	Nature of additional investigations required to reduce vulnerability	
J.	Other factors	

[1] Adapted from Emergency Planning and Response - A Water Supply Guide for the Supplier of Water, New York State Department of Health, January 1984.

Appendix E (continued)

EXAMPLE OF HAZARDOUS MATERIAL SPILL VULNERABILITY SURVEY CHECKLIST

MATERIALS TRANSPORTED BY HIGHWAYS

ITEM	IMPACTS/REMARKS/CORRECTIVE ACTION
A. Information on interstate, U.S., and major state highways with respect to watershed or source of water supply is available in files as follows:	
1. Maps showing the routing of major highways within the watershed and near water-utility facilities	
2. Maps showing drainage patterns from major highways with respect to watershed and water utility facilities	
B. For carriers of hazardous materials dispatched locally, title and telephone number of office to be notified in event of an accident (24-hour coverage)	
C. Hazardous materials commonly transported	
D. Nature of hazardous materials transported (petroleum or chemical type, toxic or nontoxic, special hazards)	
E. Highway authorities to contact regarding elimination of local highway conditions that could cause spillage accidents	

MATERIALS TRANSPORTED BY PIPELINES

ITEM	IMPACTS/REMARKS/CORRECTIVE ACTION
A. Name and location of company owning pipelines crossing watersheds or water supplies	
B. Name and telephone number of company office to contact in event of emergency (24-hour coverage)	
C. Materials being transported	
D. Nature of material (petroleum or chemical type, toxic, or nontoxic, special hazards)	

Appendix E. (continued)

EXAMPLE OF HAZARDOUS MATERIAL SPILL VULNERABILITY SURVEY CHECKLIST

MATERIALS TRANSPORTED BY PIPELINES (continued)

ITEM		IMPACTS/REMARKS/CORRECTIVE ACTION
E.	Drawings of pipeline routing showing line valving (may be plotted on base maps for railroads, etc.)	
F.	Line size and installation date	
G.	Frequency of line testing	
H.	Determination that owner has an acceptable shutdown procedure	
I.	Public agency responsible for line safety	
J.	Pipeline leaks in last ten years that have endangered water supply	
K.	Determination that pipelines carrying hazardous materials through watershed are cathodically protected	

FIXED-STORAGE FACILITIES FOR HAZARDOUS MATERIALS

ITEM		IMPACTS/REMARKS/CORRECTIVE ACTION
A.	Name and location of company handling or storing hazardous materials near water supply	
B.	Name and telephone number of company office to contact in an emergency (24-hour coverage)	
C.	Materials being stored	
D.	Nature of materials stored (petroleum or chemical type, toxic or nontoxic, special hazards)	
E.	For tanks storing hazardous materials installed underground such that a leak could pollute the groundwater supply; determination that tanks are cathodically protected and periodically leak tested	

Appendix E (continued)

EXAMPLE OF HAZARDOUS MATERIAL SPILL VULNERABILITY SURVEY CHECKLIST

FIXED-STORAGE FACILITIES FOR HAZARDOUS MATERIALS (continued)

ITEM	IMPACTS/REMARKS/CORRECTIVE ACTION
F. Determination whether drainage from the storage site is safely conveyed off the watershed or treated before disposal	
G. Check for overflow alarms installed on hazardous materials storage tanks	
H. Check of catchment basins for hazardous-material spills for suitable containment dikes	
I. Adequate protection by local ordinances against deficiencies in storage facilities that handle hazardous materials should be verified	
J. Check of local building departments making periodic inspections of storage facilities handling hazardous materials for conformance to applicable regulations	

Appendix F

LIST OF SOURCES OF INFORMATION ON HAZARDOUS MATERIALS

1. List of Extremely Hazardous Substances and Their Threshold Planning Quantities. 40 CFR Part 355, Appendices A and B.

   List chemicals which are "acutely lethal," with threshold quantities at which point the operator or owner of the facility must report to the State emergency response commission, the local emergency planning committee, and the fire department with jurisdiction over the facility. The list is limited to acutely toxic chemicals; it does not list all potential sources of contamination.

2. Hazardous Materials Table. 49 CFR 172.101.

   Lists all materials determined to be hazardous by the Department of Transportation. These materials may be released by incidents on highways, railroads, or navigable waters.

3. Optional Hazardous Materials Table. 49 CFR 172.102.

   Supplements Hazardous Materials Table.

4. List of Hazardous Substances and Reportable Quantities, Table 302.4. 40 CFR 302.4.

   List of hazardous substances reportable under the provisions of CERCLA.

5. Hazardous Constituents. 40 CFR Part 261, Appendix VIII.

   Lists hazardous constituents for which there are reporting requirements under the provisions of RCRA.

6. Hazardous Waste Excluded from Non-Specific Sources. 40 CFR Part 261, Appendix IX.

   Supplements Hazardous Constituents List.

7. Hazardous Waste Excluded From Specific Sources. 40 CFR Part 261, Appendix IX.

   Supplements Hazardous Constituents List.

Appendix G

SHORT-TERM AND LONG-TERM REPLACEMENT OPTIONS

Emergency and Short-Term Replacement Options

Although options that are viable on an emergency or short-term basis may differ depending on the circumstances of the supply disruption incident, they are discussed together here. A summary of the types of emergency and short-term options available are shown in Exhibit G-1. The following discussion of replacement options is organized according to those that are available from within the water system and those that must be obtained from outside of the system.

A. Alternative Supplies Within the System

1) Water System Management

One option available to supply systems with several wells or more than one wellfield is to contain or dilute the contaminated supply while meeting demand from other wells or wellfields. Containment can involve shutting off the well or wellfield or adjusting the rate of withdrawal from neighboring wells. Another option is to continue pumping from the contaminated source while preventing the water from entering the treatment or distribution system. In some cases, such as intrusion by saline water, it may be acceptable to blend contaminated supplies, especially when the existing treatment system can adequately handle the contaminant in dilute concentrations.

The viability of water system management as an emergency or short-term option depends on prior design of the system and a detailed knowledge of the hydrogeology. It will not be feasible for small systems which rely on a single well or several wells drawing from the same area of a contaminated aquifer. In addition, the source of contamination must be precisely located and identified and the contamination plume mapped.

The benefits of this alternative are substantial. Because it requires no additional equipment and relies on existing capacity, it is a low-cost alternative which minimizes interruptions to service.

2) Use of Stored Supplies

In an emergency situation, stored supplies can meet immediate demand if a major supply has to be shut off. However, many systems have only limited storage capacity. This is especially true in areas with limited supplies of water. In some cases, ground-water and riparian rights are tied directly to actual use of available supplies; water storage may be politically or legally infeasible. Another factor to consider with stored supplies is the need to assure quality. Stored supplies must be treated and protected from contamination.

Exhibit G-1

EMERGENCY AND SHORT-TERM WATER SUPPLY REPLACEMENT OPTIONS

OPTION	TECHNICAL AND LOGISTICAL FEASIBILITY	RELIABILITY	POLITICAL CONSIDERATIONS	COST CONSIDERATIONS
Bottled Water	Easily available. Can be obtained from stores and wholesale outlets.	Generally good. Depends on the capacity of the bottling and distribution system.	Very good. Commercially available, perceived as an acceptable supply.	Variable. No capital investment.
Tank Trucks	Should be available through National Guard; private sources may exist, for example bottlers, milk trucks, etc.	Need to ensure that tanks are sterilized.	Requires involvement of State; generally positive because perceived to be responding to local needs.	Varies - low capital investment.
Excess Capacity	Variable - requires multiple sources. Need additional wells, storage capacity.	Varies with the specific system.	Can be difficult to install because perceived as a low priority use of limited resources.	Varies with site.
Conservation	Requires public education. Important to protect priority demand.	Depends on voluntary compliance. Tends to be effective only in short-term.	Generally positive, some sensitivity with priority users. Does not meet existing demand.	Very low.
Treatment	Not always practical in emergency, unless treatment technologies are readily available.	Contaminant-specific.	Public confidence in treated water.	Variable, capital intensive.
Point-of-Use	Technology available/variable quality, installation is contaminant-specific.	Requires operation and maintenance skills.	Conflict possible over ownership, maintenance.	Variable, capital intensive.
System	Can be part of existing treatment. If not, time for installation is contaminant-specific.	Requires operation and maintenance skills.	Public confidence in treated water.	Variable, capital intensive.
Additional Treatment	Limited by system capacity. Effective for traditional biological contaminants.	Generally good but contaminant-specific.	Public confidence in treated water.	Variable, low capital investment.

Appendix G (continued)

SHORT-TERM AND LONG-TERM REPLACEMENT OPTIONS

Emergency and Short-Term Replacement Options (continued)

3) Excess Capacity

Many wellfields have excess capacity which can be tapped in an emergency or short-term situation. The analysis of water supplies should identify wells and wellfields with the potential for expanded yields. The viability of this alternative depends on prior planning; detailed hydrologic information and equipment must be available.

Again, there may be political and legal problems with this alternative, especially in areas with limited supplies. In addition, the cost of maintaining and accessing excess capacity may be prohibitive. Finally, reliance on excess capacity as an emergency replacement option requires a detailed knowledge of the hydrology of the wellfields.

The benefit of this alternative is that it does not require bringing in outside supplies. In certain situations, it may also be cost-effective if there are only limited logistical requirements.

B. Alternative Supplies Outside the System

1) Bottled Water

In an emergency situation which requires the wells or wellfields to be shut off, bottled water may be the best alternative supply of drinking water. Bottled water has certain advantages. In many cases, sufficient supply is immediately available either in stores or at the bottling facility. Using or recommending the use of bottled water has a low cost to the water purveyor. In most situations, the quality of the bottled water is assured, especially in states were bottled water is regulated and sampling for contamination is required on a regular basis.

There are disadvantages to bottled water as well. The supply may not be sufficient to meet a sustained demand for drinking water. In addition, bottled water cannot meet the need for fire safety or industrial use. There is potentially a high cost to the consumer, especially if the supplier takes advantage of the situation. High cost may be a problem in areas where bottled supplies are transported over considerable distances. Finally, the source of bottled water may be contaminated; in some states, sampling of bottled water supplies dose not cover the full range of potential contaminants.

2) Tank Trucks

Alternative supplies can be brought in by tank truck. In many states, the National Guard maintains a supply of "water buffaloes" which are tank trucks intended for transporting water. An alternative source of transportation may be milk trucks or tank trucks used for transporting other materials. Careful attention must be paid to avoid bacterial

Appendix G (continued)

SHORT-TERM AND LONG-TERM REPLACEMENT OPTIONS

Emergency and Short-Term Replacement Options (continued)

contamination and evaporation. In addition, the source of water brought in by tank truck must be sampled and monitored. If this option is selected, a source of sanitary containers should be identified so that homeowners are not required to use their own, possibly contaminated, receptacles.

3) Surface Water

In many cases, ground-water supplies are a preferred alternative to surface water supplies, principally because of problems with bacteriological pollution in surface waters. If an available surface water supply is treatable, it may be a viable alternative. However, treatment technology may be difficult to put in place and require a high level of capital investment; surface water is therefore not a preferred emergency option, although it may be an attractive short- or long-term alternative.

4) Interconnection with Another Supply System

Many communities may link into the water supply system of another community. This alternative requires considerable planning and the availability of the appropriate equipment to connect the alternative supply to the distribution system. It also requires excess capacity in the other system. Finally, it depends on the capacity, quality, and operations of the other system. As a result, it may not be a viable emergency option, although it may be the most cost effective short- and long-term option.

C. Modification or Reduction of Water Use

1) Conservation

In an emergency situation which requires a complete or partial shutoff of the wellfields and wells, non-essential water uses must be restricted, preferably by voluntary conservation measures. Users can reduce consumption by limiting activities such as industrial processes, landscaping, laundry, bathing, washing cars, etc. Purveyors should make an effort to educate consumers about conservation techniques prior to contamination incidents. This option is especially attractive for those cases where contamination is restricted to a portion of the water supply, since it eliminates the need to provide alternative supplies immediately.

2) Modification of Use

Some forms of contamination, especially bacteriological contamination, may require some modification of use, such as boiling drinking water for a prescribed period. In order for this to be a viable alternative, methods of communicating such information to homeowners should be identified in advance. The principal benefit of this alternative

Appendix G (continued)

SHORT-TERM AND LONG-TERM REPLACEMENT OPTIONS

Emergency and Short-Term Replacement Options (continued)

is that it does not interrupt water service. It is only possible, however, when the type of contamination is precisely identified.

D. Treatment of Water Supplies

1) Additional Treatment with Existing Equipment

In some cases, contaminants can be effectively treated by the existing treatment system. This alternative is limited by the treatment system capacity and usually only is viable for bacteriological and mineral contaminants. In cases where there is a dramatic increase in the level of contamination, careful operation of the treatment system will be necessary; as a result, additional treatment is only a viable alternative if there is a full-time operator and monitoring system available.

2) Point-of-Use Treatment

Home treatment systems may be a cost-effective means of securing a safe supply of drinking water in some circumstances. This may be the case when private wells are affected and no municipal interconnection is within close proximity. It is not a viable alternative in an emergency situation because of time and technical expertise required to install the equipment. There are three common designs: 1) faucet mount of line by-pass activated carbon filters; 2) reverse osmosis or ultraviolet combined with activated carbon; and 3) air strippers.

The treatment methods used in these designs have been proven in larger scale equipment. They have been adapted for home use with good results in some cases. However, there are a number of operating and maintenance factors which significantly affect their removal capabilities. Therefore, the use of such devices should only be made after the careful evaluation of manufacturers' testing data, and if there is a provision for scheduled professional maintenance of such devices.

3) Additional Treatment with New Equipment

Treatment technologies can also be applied to the water supply system. Treatment method selection depends upon a number of factors, including the chemical characteristics of the contaminants, the extent and severity of the contamination, the treatment removal objective, and the financial and technical resources available. The method of treatment used to treat the contaminated supply depends primarily on the type of contaminants being removed. Treatment systems may be relatively simple when a single chemical is involved or extremely complex when a number of contaminants are involved. The basic types of treatment technologies for organic chemicals in ground water are air-stripping, activated carbon, and biological treatment. Chemical precipitation is used for the removal of inorganic chemicals.

Appendix G (continued)

SHORT-TERM AND LONG-TERM REPLACEMENT OPTIONS

Emergency and Short-Term Replacement Options (continued)

Additional treatment with new equipment may not be a viable alternative in an emergency situation. The technologies can have a high cost and may require technical expertise. In addition, the amount of time required to put the equipment in place may be significant (1-7 days). In general, treatment of the water supply should be viewed as a short-term and long-term option.

Long-Term Replacement Options

Long-term water replacement options differ from emergency and short-term options in two ways. First, the amount of time available to evaluate the various alternatives is longer, permitting more extensive analysis and the consideration of future needs and other factors prior to a decision being made. Second, the range of alternatives which are viable is larger. Provided that an interim solution has been put in place, officials can use replacement options which require more extensive capital investment and more time to implement. A summary of the long-term replacement options available is provided in Exhibit G-2.

A. Provision of Alternative Supply from Within the System

1) Water System Management

This option is viable in the long-term, although it reduces the ability of the water supply system to respond to increased demand in the future. Combined with a strategy of aquifer remediation, it may be an effective option.

2) Stored Supplies

This is not a viable alternative. Storage capacity in most supply systems does not exceed several weeks consumption.

3) Excess Capacity

While the use of excess capacity alone will reduce the opportunities of the community to expand in the future, it may be one of the most cost-effective alternatives since it requires almost no capital investment.

B. Provision of Alternative Supplies from Outside the System

1) Bottled Water

This is a viable alternative in some circumstances, but not recommended. It fails to satisfy the demand for water uses besides drinking water. In addition, consumers have to bear the burden of higher costs for water over an extended period, which may encourage them to resume using contaminated water supplies.

Exhibit G-2

LONG-TERM WATER SUPPLY REPLACEMENT OPTIONS

OPTION	TECHNICAL AND LOGISTICAL FEASIBILITY	RELIABILITY	POLITICAL CONSIDERATIONS	COST CONSIDERATIONS
Drill New Wells/ Wellfields	Technologies available and well developed. Local site hydrogeological data essential.	Highly reliable if technical and hydrogeological data are accurate.	In Western States, questions of rights to ground water. Property ownership - need to obtain lease, easements, etc.	Highly variable depending on hydrogeology. Major factor is depth to ground-water source. Capital intensive.
Additional Treatment In-System (not remediation)	Technology available for most contaminants. In some cases, technology still in development.	Specific to contaminant. Sensitive to operation and maintenance.	Raises concern about inadequate protection of resource, psychological impacts of drinking "treated" water, "How clean is clean" issues.	Economies of scale. Can have high capital investment costs and high operating costs.
Point-of-Use Treatment	Variety of systems available. Installation may be difficult in individual residences.	Inadequate performance testing. Maintenance is required. Does not deal with problems of dermal and inhalation exposure.	Potential conflicts over who owns and maintains filter systems.	Each unit has a fixed cost; a viable alternative on a small scale only.
Remediation	Technology still developing. Depends on the degree of contamination.	Contaminant-specific.	May require use of Federal or State Superfund.	Very expensive; can require long-term commitment of funds and resources.
Well-Field Management - Blending - Select Pumping	Requires detailed hydrogeologic data and sophisticated understanding and operation of water supply system.	Does work but requires vigilant operation and monitoring of supply.	Does not eliminate contamination. Can cause concern over drinking "treated" water.	Low cost; requires no capital investment.
Interconnection	Requires technology to link systems, which is readily available. Requires excess capacity in other system.	Depends on the capacity, quality, and operation of another supply system.	Loss of autonomy, especially small, isolated communities. Cross-jurisdictional management. Potential for hoarding.	Capital intensive for initial hook-up, may require rate increases.
Bottled Water	(Only a short-term option for small systems.) Supplies available, although unregulated in some States.	Infrequent sampling for a limited number of constituents.	Potential for price gouging.	Low capital investment; long-term operation costs, borne by consumers.

Exhibit G-2 (continued)

LONG-TERM WATER SUPPLY REPLACEMENT OPTIONS

OPTION	TECHNICAL AND LOGISTICAL FEASIBILITY	RELIABILITY	POLITICAL CONSIDERATIONS	COST CONSIDERATIONS
Surface Water Supplies	Well established technologies for pumping treatment.	Source often contaminated, variable flows.	Riparian rights. Consumer fears about water quality.	Capital investment required for pumping and treatment. However, in some cases may only require expansion of existing system.
Water Conservation	Technology available to lower water pressure. Public education required.	Depends on voluntary compliance. Only reduces consumption.	Enforcement difficult. Long-term loss of supply unacceptable.	Low cost (possible drop in revenues).
Waste-Water Reuse/ Reinjection	Technology exists and used. Required treatment.	Unknown.	Consumer fears over use for drinking water but acceptable for irrigation.	High capital cost for treatment/reinjection.
Desalinization	Technology available. May lead to salt-water intrusion.	Well-tested. Used on ocean-going vessels.	Variable and site-specific.	High cost/capital intensive.
Dual-Systems (separate potable/non-potable supplies)	Requires separate distribution systems.	Needs careful management.	Difficult to predict.	Very capital intensive (especially for retrofit).
Artificial Aquifer/Excess Capacity (seasonal storage)	Technology available. Site-specific in terms of storage capacity.	Interim. Depends on source availability.	Requires support of expenditures for emergency conditions.	Variable.

Appendix G (continued)

SHORT-TERM AND LONG-TERM REPLACEMENT OPTIONS

Long-Term Replacement Options (continued)

2) Tank Trucks

Again, this is a viable alternative but is not recommended. As in the case of bottled water, it may be difficult to meet the demand for water uses besides drinking water. The costs of maintaining a fleet of tank trucks would be substantial.

3) Surface Water

This may be a good alternative if supply and adequate treatment technology is available. A major factor, especially in areas with limited water supplies, is riparian rights.

4) Interconnection with Another Water Supply System

Despite the capital investment required to link with a neighboring public water supply, this may be a cost-effective solution. In addition, it reduces the difficulty involved in locating new supplies, drilling wells, and providing adequate treatment facilities. A factor that has to be resolved is the loss of autonomy by the community; a direct consequence is the possibility of higher water rates.

5) Drilling New Wells

If there is an untapped supply of ground water in the form of a separated aquifer or a portion of the contaminated aquifer which is upgradient and uncontaminated, it may be feasible to drill new wells. The relative cost of this alternative depends on the hydrogeology of the site.

6) Desalinization

In a number of areas, desalinization of water or saline ground water may be a viable alternative. Desalinization technologies are available and the supply of saline water is relatively unlimited.

C. Modification or Reduction of Water Use

1) Conservation

While it is possible to use conservation strategies to reduce consumption over the long-term, it may not be politically viable. Conservation is difficult to enforce since it depends on voluntary compliance. This is especially true if there is a substantial industrial or commercial demand or if there is projected growth in the residential sector. Conservation may also have a negative effect on the financial condition of the water supply system if the loss of revenue becomes

Appendix G (continued)

SHORT-TERM AND LONG-TERM REPLACEMENT OPTIONS

Long-Term Replacement Options (continued)

permanent. However, water conservation should probably be encouraged as part of any long-term replacement strategy.

2) Reduction of Water Pressure

Not a viable alternative because of potential damage to equipment and decreased fire safety.

3) Modification of Use

Not an acceptable alternative although it may be necessary for extended period of time.

4) Dual Systems

By separating potable water from non-potable water in the distribution system, it may be possible to reduce the demand for drinking quality water while using the contaminated supply for industrial and commercial purposes. Development of dual systems may be prohibitively expensive. Buildings and distribution systems would have to be retrofitted. Even if carefully planned, dual systems will require investment in additional materials.

D. Treatment of Water Supply

The same treatment technologies previously described are available as permanent solutions for contaminant removal. In this case, treatment technologies would be permanently installed at the treatment facility rather than relying on a mobile treatment unit. Adequate treatment of existing supplies is in many cases preferable since it reduces the demand on other supplies.

E. Aquifer Remediation

Cleansing a contaminated aquifer involves various methods of pumping ground water, treating it, and recharging the aquifer with uncontaminated water. Most aquifer remediation projects have taken place pursuant to Superfund activities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This option will only be considered if water supply treatment is not viable or there are no alternative sources of long-term supply.

The disadvantages of aquifer restoration are considerable. Aquifer restoration is time consuming and costly and the results are uncertain. In addition, the experience has been that the public may not accept a drinking water supply produced from a restored aquifer.

Appendix H

POTENTIAL FUNDING SOURCES

State Funding Sources

Most States operate their own funds or fee systems, similar to the Federal Superfund, for emergency response and cleanup of hazardous waste contamination. Some States simply provide funds to finance the State share of Federal Superfund cleanups; others finance the cleanup of sites that are not priorities for Federal Superfund aid. The 1986 Superfund amendments clarified that the federal law does not preempt State statutes.

State funding mechanisms vary, usually including a combination of "front-end" taxes of industries; "back-end" taxes on waste generation; general fund appropriations; recoveries from liable parties; and penalties and fines. One of the oldest State clean-up statutes is the New Jersey Spill Compensation and Control Act, enacted in 1976. This act created a revolving fund to be used to cover "all clean-up and removal costs and for all direct and indirect damages," including the costs of restoring or replacing ground water. Parties with any responsibility for hazardous substances removed by the fund are strictly liable for all clean-up and removal costs.

Connecticut's water pollution control law addresses water replacement needs directly. In the event of water supply contamination, the State is authorized to issue orders requiring responsible parties or the affected municipality to provide alternative drinking water supplies. The law also requires the State to use its emergency spill response fund to finance short-term drinking water supplies until responsible parties do so. Connecticut also provides grants to municipalities for water supply replacement for the first year. Other States, such as Massachusetts, also have created funds earmarked for water supply cleanup and replacement. Many States are also establishing underground storage tank funds, compatible with the federal program, and oil spill clean-up funds.

Funds for construction or rehabilitation of water supplies may also be available from other traditional State grant programs, such as public facility construction grants, low-incoming housing, and community or urban development programs.

In some instances the facility or the party responsible for the contamination can be held liable for the costs of cleaning up the contamination, including emergency responses, studies, provision of alternative water supply, and the actual cleanup itself. Congress and State legislatures have created new liability mechanisms in recent years, both to finance cleanups and to create economic disincentives to pollute.

Some States' statutes expand the concept of responsible party liability beyond that of federal statutes. States such as Maine, New Hampshire, Rhode Island, and North Carolina permit private parties to recover for clean-up costs and/or damages. Other states, including California, Florida, and South Carolina, authorize private claims directly against the state Superfund. A few States, including New Jersey and Massachusetts, allow for the recovery of punitive damages. Another approach is to require responsible parties to clean up contamination as a condition of State ground-water discharge permits. New Jersey and Connecticut are among the States with this authority.

Beyond the specific liability provisions of these statutes, a community might consider suing potentially responsible parties to recover costs and damages using tort or other liability theories, such as public nuisance, negligence, trespass, or strict liability. Communities should realize, however, that few toxic tort cases concerning ground-water

Appendix H (continued)

POTENTIAL FUNDING SOURCES

State Funding Sources (continued)

contamination have been decided, and it can be difficult to prove the source of contamination, the damage or injury caused by exposure to the contamination, and the appropriate remedy in a court of law.

Federal Superfund Program

The U.S. Environmental Protection Agency manages several funding programs relevant to replacement of contaminated ground-water supplies. The most significant is the Superfund Program, created by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 and expanded by the Superfund Amendments and Reauthorization Act of 1986. The Superfund program provides for emergency response and cleanup of hazardous substances which threaten public health or welfare or the environment. High priority is given to releases that contaminate drinking water supplies.

Under Superfund, hazardous substances are defined as any substances listed as toxic or hazardous under any federal pollution control statute, excluding oil and petroleum products. EPA uses Superfund primarily to address problems caused by abandoned sites. EPA administers the Superfund program directly, with only a limited role for States, localities, or private parties.

EPA can take two types of actions under Superfund; "removal actions" and "remedial actions." "Removal actions" are short-term and limited, intended to prevent or minimize an imminent threat. Superfund will finance removal actions up to $2 million over one year. "Remedial actions" are long-term or permanent responses. Any instance of a release threatening the public health or welfare is eligible for a removal action. On the other hand, only sites placed in the National Priority List are eligible for remedial actions. Remedial action can only be authorized after a lengthy analysis of options. Both removal actions and remedial actions may include the provision of an alternative water supply including both drinking water and household water, if needed.

EPA draws from a revolving trust fund to finance Superfund actions. The Agency is responsible for securing reimbursement to the fund from those who may be responsible for the contamination, defined by the statute as "potentially responsible parties." Such parties may include current or past owners or operators of facilities that handle hazardous substances. A State or locality may also recover damages from the party responsible for the contamination. If States or localities undertake removal action on their own, they may be reimbursed from the fund, with some restrictions. Reimbursable costs include site assessment, training, enforcement, construction, and community relations.

One condition of Superfund aid is that States finance at least 10 percent of the total cleanup costs and 100 percent of long-term operation and maintenance costs. If the source of contamination is a facility owned or operated by a State or political subdivision of a State, then the State or municipality must cover 50 percent of cleanup costs. The law classifies the cost of restoring ground-water quality for the first ten years as a clean-up cost, rather than an operation or maintenance cost.

Appendix H (continued)

POTENTIAL FUNDING SOURCES

Federal Superfund Program (continued)

Under 1986 amendments to the Superfund program, localities may also be reimbursed for up to $25,000 per incident for temporary emergency measures. To be eligible, localities must not use this funding to supplant local emergency funds normally provided and must exhaust all other sources of reimbursement first. Localities with the most significant financial burdens receive priority for emergency reimbursement funds.

Underground Storage Tank Program

The Hazardous and Solid Waste Amendments of 1986 created a Leaking Underground Storage Tank Trust Fund to provide funding for cleanup of leaking underground storage tank leaks, including the provision of alternative water supply. The Fund has $500 million budgeted over a five-year period and is financed through a 0.1 cent-per-gallon tax on motor fuels. States are required to cover 10 percent of the cost. Priority for Trust Fund monies is given to cases in which prompt action is needed to protect public health or the environment and/or the owner or operator cannot be identified.

Farmers Home Administration

The Farmers Home Administration provides grants and loans to rural municipalities to construct or rehabilitate public water systems. Communities must have a population of less than 10,000 and be unable to obtain credit from private sources. Priority is given to communities with lower income levels and greater public health or safety concerns. Grants are also awarded to reduce unreasonably high user charges. Loans are made at different interest rates, depending on the community's income levels. Most assistance takes the form of a grant-loan combination. Farmers Home has over 300 district offices which process applications for this aid.

Corps of Engineers

Following a contamination incident, the Corps of Engineers, pursuant to 33 U.S.C. 701n, may provide temporary emergency supplies of clean drinking water. Such assistance is at the discretion of the Corps, and is supplemental to community efforts. It is only available where the contamination poses a substantial threat to public health and welfare, and does not cover plan development, decontamination, or system repair. The regulations authorize the expenditure of up to $50,000 per incident at the district level without prior approval, and authorization must be obtained before additional expenditures are made. Repayment is not required. Since this funding is meant to be supplemental to community efforts, it is not recommended that it be relied upon as a contingency plan element, although local officials should be aware of its availability in the event the system is temporarily overwhelmed by a contamination incident.

Federal Emergency Management Agency

States can request funding for up to 50% of costs associated with necessary and essential civil defense expenses (planning and implementation) under the State and Local Emergency Management Assistance Program. See 50 U.S.C. App. 2251.

Appendix H (continued)

POTENTIAL FUNDING SOURCES

Housing and Urban Development

Community Development Block Grants are available to State and local governments for planning and implementation activities concerning the provision of public services, including water supply system services. See 42 U.S.C. 5301 et seq.

Appendix I

EXAMPLE OF EMERGENCY NOTIFICATION REPORT*[1]

This notification report represents a typical form that might be adapted for use in a water supply contingency plan.

PART 1 - FACTS RELATED TO EMERGENCY

1. Person or department calling in emergency _____

   Phone No./Radio frequency _____ Date/Time call received _____

2. Location of emergency

   Street and Home/Building number _____

   Other (approximate location, distance from landmark, etc.) _____

3. Nature of the emergency (e.g., broken water main, chemical spill, lost pressure in home, etc.) _____

4. Condition at scene _____

5. Actual/Potential damage (briefly describe the situation) _____

6. Access restrictions, if any _____

7. Assistance already on the scene (who, what are they doing, etc.) _____

PART 2 - EMERGENCY INVESTIGATION

1. Personnel investigating emergency _____

2. Reported results of investigation _____

3. Time Assessed _____

[1] Adapted from Emergency Planning and Response - A Water Supply Guide for the Supplier of Water, New York State Department of Health, January 1984.

Appendix I (continued)

EXAMPLE OF EMERGENCY NOTIFICATION REPORT*

PART 3 - EMERGENCY ACTION TAKEN

1. Immediate action taken _____

2. Is immediate action: Permanent _____ Temporary _____

3. Was an emergency crew dispatched: Yes ___ No ___ Time arrived on scene _____

4. Note all other actions that will be necessary to bring the water supply system back into operation:

PART 4 - PERSONS/DEPARTMENTS NOTIFIED OF EMERGENCY

Positions	Name	Work Phone	Home Phone	Time of Call
___ Chief Operator				
___ General Manager				
___ Local Health Department				
___ Engineer				
___ Operations Supervisor				
___ Plant Manager				
___ Shift Operator				
___ Fire Department				
___ Police Department				
___ Highway Department				
___ Local Elected Official (Mayor, Commissioner, etc.)				
___ Department of Health				
___ Department of Transportation				
___ Department of Environmental Conservation				
___ County Civil Defense				
___ Other (refer to system personnel and support call-up lists)				
___ Priority water users				
___ News Media				

Signature of Person Who Filled Out Form

_____

_____

* To be completed and used by water supply system personnel.

Appendix J

PUBLIC EDUCATION

In general, the public is unaware of basic ground-water concepts, and this lack of knowledge often frustrates communication efforts when a contamination incident occurs. The public should be educated about its water supply system so that basic information is lodged in the public consciousness before any contamination incident occurs. The following fundamentals should be covered in any public education program:

- What ground water is;
- How ground water is distributed;
- How ground water can become contaminated;
- Measures taken to ensure that the water supply is safe; and
- The basis for the water rate structure.

There are a number of ways to educate the public concerning its ground-water supply. Some are more costly than others and some depend upon the extent of the community's communication resources. Listed below are a number of potential methods for reaching the public:

A. Pamphlet to customers -- This could be a separate mailing to customers, or could be included with their rate notice.

B. Newsletters to customers -- Utilities often send brief newsletters to their customers along with their rate notices with different aspects of the water supply system featured. The frequency of distribution can vary, depending upon the system's resources, from monthly to even yearly.

C. Newspaper articles -- Newspaper articles are an inexpensive and efficient way to communicate the basic elements of the water supply system. In larger communities, system staff should approach the science editors of local and regional papers. The contact may be less formal in smaller communities, where local and regional papers may rely upon general reporters and donated features.

D. Television and radio -- Television and radio can also be used to educate the public in an inexpensive and efficient way. Contacts made with television and radio personnel may also be useful during a contamination incident. If funding permits, public service announcements could be prepared.

E. Presentations to civic groups -- Civic groups in residential neighborhoods generally welcome presentations by utility personnel and the groups are an excellent means of establishing contact with local civic leaders, whose support may be valuable following a contamination incident.

F. School programs -- Early education can provide a lifetime awareness of the value of a safe drinking water supply. An effort can be made to include ground water and the water supply system as topics on local school civics or science curricula.

Appendix J (continued)

PUBLIC EDUCATION

After contamination of a public water supply well has been detected, the initial public communication is crucial to maintaining public confidence in the integrity of the water supply system. The duration of the initial communication phase may vary depending upon the severity of the contamination incident, but it encompasses the time from the discovery of the contamination to the provision of interim remedial measures. While the precise information that needs to be transmitted also will depend upon the nature and extent of the contamination, the water replacement contingency plan can contain a list of the types of information most likely to be important to an interested public. This list should include the following:

A. Federal and State Notification Requirements -- Pursuant to Section 1414(c) of the Safe Drinking Water Act (42 U.S.C. 300g-3(c)) public water system owners or operators must notify their customers of any failure to comply with a maximum contaminant level (MCL) established in a national primary drinking water regulation (NPDWR), failure to comply with a prescribed treatment technique established in lieu of an MCL, failure to meet a variance or exemption schedule, failure to comply with monitoring requirements or a testing procedure prescribed by an NPDWR, and operation pursuant to a variance or exemption. Current regulations governing the manner and form of the public notification are found at 40 CFR 141.32. In addition, States are free to adopt public notification requirements that are more stringent than the federal requirements, and any applicable State requirements should also be referenced in the contingency plan.

B. Water Supply System Information -- Basic information on the location of wellfields and the distribution system.

C. Identify the Contaminant -- The name of the contaminant, what it is used for, any chemical or physical properties that are easily explained (such as the ability to degrade), toxicity information, and the concentration that has been detected.

D. Water Use Restrictions -- Impermissible and permissible water uses should be given. Whether the public can drink the water is obviously the most important information to convey at this stage. However, people will also want to know whether they can use it for bathing, washing dishes, or watering the lawn.

E. Boil Orders -- In cases of bacterial contamination, the public may be directed to boil water for drinking uses.

F. Conservation -- In situations where the ability to supply customers is jeopardized, the public may have to employ water conservation measures to ease the demand.

G. Impact on Water Supply -- The impact on the availability of water can be illustrated with a description of the hydrogeologic area and the supply components affected by the contaminant.

Appendix J (continued)

PUBLIC EDUCATION

H. Alternative Supplies -- A list of the source(s) of alternative water supplies should be provided, including information on how this water will be made available to the public.

I. Risk Assessment -- This is very difficult information to convey without creating frustration and confusion. Avoid comparisons to other types of risks, e.g., driving a car versus drinking the contaminated water. In some instances, particularly with relatively low-level contamination and short public exposure, it will be impossible to quantify the risk in a meaningful way. Give figures where available, stress the margin of safety built into drinking water standards, discuss the steps taken to eliminate any risk, and do not trivalize the significance of the contamination.

J. Actions Taken and Planned -- Detail the steps the water supply system has taken and will take to address the incident.

K. Duration of the Incident -- Be realistic in addressing the long-term impact of the incident. There is a temptation to be optimistic in making predictions on the resolution of the incident, but it is important for the sake of credibility to avoid building up unrealistic public expectations.

L. Future Public Communication -- Set forth plans for continued dissemination of information to the public.

M. Contamination Source -- To avoid liability for false statements, do not make any accusations that cannot be substantiated. Where the contamination source is verified, provide a straightforward account of the facts; avoid speculation.

Methods of communicating the above information to the public regarding a contamination incident include:

A. Select a Spokesperson -- To ensure consistency and accuracy, one person should be responsible for the flow of information to the public and the media. The plan should designate this spokesperson, with alternates indicated. The type of person chosen may depend upon the size of the water system -- a large system may have a public relations officer, while a very small system may have only a couple of employees from which to choose. For credibility's sake, the spokesperson should be local, either an employee of the water system or a municipal official. State personnel can be available for referral on some questions, but should not be the primary information source as the public will lose confidence in the water system if it is perceived that outside entities are taking over the remedial action. The spokesperson must be knowledgeable about the supply system and must be in close contact with those responding directly to the contamination incident.

Appendix J (continued)

PUBLIC EDUCATION

B. Have Information Sheets Available -- Some of the information that needs to be disseminated during the initial communication phase can be prepared in advance, such as water system information, boil orders, and conservation measures. It may be appropriate to have a prepared "initial news release," similar to that shown in Exhibit J-1, that notifies the public that there has been a contamination incident, and gives system personnel some time to assess the incident and prepare a more detailed "explanatory news release."

C. Contact Media -- The contingency plan should list by name, organization, and phone number the radio, television, and newspaper personnel to be contacted by the spokesperson. A press conference may be an appropriate venue for disseminating information to the media, depending upon the size of the community and the seriousness of the incident.

D. Contact External Notification Network -- The contingency plan should contain a list of local, regional, State, and federal personnel who are likely to be contacted by the media following a contamination incident, e.g. local politicians, congressmen, civic leaders, the governor. These individuals should be provided with the basic facts surrounding the incident, and can be requested to refer the media to the designated spokesperson.

E. Notify Public Directly -- If there is an acute public health threat associated with the contamination incident, it may be necessary to disseminate information directly through dramatic methods, such as civil defense sirens, sound trucks, and door-to-door notification. The contingency plan should list civil defense contacts and their phone numbers.

It is important to keep the public informed following the initial communication phase. Interest in the problem may wane if providing alternate supplies has caused relatively little public inconvenience and support for costly, long-term solutions may erode. If the public is experiencing long-term inconvenience as a result of the incident, it will want periodic reassurance that efforts are underway to restore the water supply system. The following are progress report items which should be referenced in the contingency plan:

A. Federal and State Notification Requirements -- The initial communication requirements listed above include provisions for notification in the event of ongoing violations.

B. Status of Use Restrictions -- As more information on the nature and extent of the contamination becomes known, the water use restrictions and conservation measures may change.

C. Time Frame for Permanent Remedial Measures -- Avoid excessive optimism so that public expectations remain realistic.

Exhibit J-1

SAMPLE INITIAL NEWS RELEASE
(For distribution to previously identified television, radio, and newspaper personnel.)

The following substance has been detected in the _____ system:

It is vital that all residents in the _____ area observe the following water use restrictions until further notice:

The characteristics and potential public health hazards associated with this contaminant are as follows:

City and water system personnel are taking the following steps to address the problem:

For further information please contact _____ at this phone number: _____. A press conference is scheduled for _____ to be held at _____. News updates will be provided as additional information becomes available.

Attached please find a copy of an information sheet which provides details concerning the physical plans, organization structure, and function of the _____ water system.

Time: _____ Date: _____

Signed: _____

Title: _____

Appendix J (continued)

PUBLIC EDUCATION

D. Options Under Consideration -- Describe permanent supply replacement, treatment, and cleanup options. Public comment may be solicited.

E. Cost and Funding -- Detail response costs to-date and give estimates of both future costs and possible sources of funding.

F. Investigation Results -- Name the source of contamination if it has been confirmed by investigation. Avoid finger-pointing without clear substantiation.

The urgency of the situation is likely to have lessened by the time the progress report phase has been reached and time can be spent in building upon the good relations established during the initial communication phase. The following are recommendations for maintaining positive public relations:

A. Prepare a regular progress report on the situation;

B. Continue to direct all communication through the designated local spokesperson;

C. Refer difficult inquiries to technical personnel (State or local); and

D. Hold regular press conferences if the severity of the situation warrants.

Once permanent remedial measures have been selected, it is important to notify the public in a manner that fosters support for the water supply system's decision. The following should be included in this notification:

A. Memory Refresher -- In some situations, the public may need to be reminded as to why there is a problem that needs correcting.

B. Details of Long-Term Option Selected -- Include as much information on the option selected as the public can easily digest. Explain why it will provide a safe, permanent solution, and why it was selected over alternatives.

C. Costs -- Give an accurate assessment of the costs involved.

D. Funding Strategies -- Detail how the water supply system intends to pay for the option it has selected.

Because the selection of a long-term solution may have financial implications for the water supply system's customers, the method of communication should be straightforward and allow for no hint of impropriety on the part of system personnel. Advance information "leaks" should be guarded against. The following should be considered as means of notifying the public about the costs of long-term options:

A. Notice Directly to Customers -- By special mailing, or included with rate notices.

Appendix J (continued)

PUBLIC EDUCATION

B. Statutory Requirements -- In some States, there may be notification requirements if rate increases or other funding mechanisms are contemplated.

C. Press Notification -- By progress report or press conference.

Appendix K

CLASSIFICATION OF WATER USES AND OPTIONS FOR DEALING WITH SHORTAGES AND WATER QUALITY PROBLEMS[1]

Public water suppliers should develop a classification system of water uses to reflect water use priorities. A classification system clarifies issues of fairness, hardship and, ultimately, management effectiveness. Four classes of water use are recommended: First, Second, and Third Class Essential Uses and Non-Essential Uses. Essential uses might include water for domestic use, health care facilities, other public institutions, emergency shelters, and firefighting. Non-essential uses might include water used for ornamental purposes, outdoor non-commercial watering, etc. Even though a system might choose to use a standby pricing structure or other measures to curb water use demand, classifying and analyzing uses according to their contribution to the system's overall demand may reveal a plan weakness or need for a back-up strategy. In managing water during a drought, plans that primarily rely on non-restrictive options (i.e., pricing, pressure reduction, etc.) could also superimpose a scheme of restrictions where necessary to establish a balance between water use and supply. "Recommended Water Use Classes and Class Restrictions," illustrated below, shows an approach for managing water under deteriorating supply conditions. Under more quickly developing water shortage situations, such as those caused by a chemical spill, power outage, etc., the options listed under "emergency" conditions, as appropriate, should be incorporated into the development of the system's emergency operations procedures.

Recommended Water Use Classes and Class Restrictions
(Wood and others, 1986)

	Program Phase		
General Water Use Class	Conservation	Restrictions	Emergency
Essential, First Class	Voluntary Cutbacks	Voluntary Cutbacks	Mandatory or Voluntary Cutbacks
Essential, Second Class	Voluntary Cutbacks	Mandatory or Voluntary Cutbacks	Mandatory Bans
Essential, Third Class	Voluntary Cutbacks	Mandatory Bans	Mandatory Bans
Non-Essential	Mandatory Cutbacks or Bans	Mandatory Bans	Mandatory Bans

[1] Adapted from Local Drought Management Planning Guide for Public Water Suppliers, Tennessee Department of Health and Environment, May 1988.

Appendix K (continued)

CLASSIFICATION OF WATER USES AND OPTIONS FOR DEALING WITH SHORTAGES AND WATER QUALITY PROBLEMS

Options for Dealing with Shortages

Water management options which a supplier should consider are listed below under the management phase thought to be most appropriate:

I. "Normal" Conditions

- A. Water Conservation
  1. Water Conservation Education
  2. Water Saving Devices
  3. Repair of Household Leaks
  4. Pricing
  5. Universal Metering
- B. Pressure Adjustment
- C. Leak Detection
- D. Reservoir Evaporation Suppression
- E. Water Saving Plumbing Codes
- F. Reuse

II. Under "Conservation" Conditions

- A. Water Conservation (most of the measures applicable under "normal" conditions are effective in reducing water use under "Conservation" conditions) and Mandatory Cutbacks or Bans on Non-essential uses.
- B. Media Attention

III. Under "Restriction" Conditions

- A. Water Conservation (Voluntary Cutbacks of First and Second Class Essential Water Uses) and Mandatory Cutbacks or Bans of Non-Essential and Third Class Essential Water Uses.
- B. Rationing
- C. Service Interruptions
- D. Mutual Aid Agreements (Interconnections with nearby systems)
- E. Temporary Pipelines and Sources
- F. Additional Wells and Reactivation of Abandoned Wells
- G. Temporary Impoundments
- H. Water Recycling
- I. Modification of Reservoir Management
- J. Dredging to Improve Intake Capability

IV. Under "Emergency" Conditions

- A. Restrictive Responses (Many of the Responses Appropriate under the "Restrictions" phase also apply under "Emergency" Conditions)
- B. Hauling Water
- C. Bottled Water
- D. Sanitation Measures

Appendix L

SUPPORT FUNCTIONS EVALUATION

State planners should seek the answers to specific questions when undertaking an evaluation of State capacity to provide support in specific categories of response activities.

1) Problem Identification

a) What is the status of the State's ground-water quality monitoring efforts?

- Does your State health department perform drinking water quality monitoring in fulfillment of Federal requirements?
- If the State conducts additional monitoring, which compounds are tested for? Does this include those contaminants most likely to pose a health threat?
- How frequently are wells monitored?
- Do current monitoring procedures allow for the pinpointing of contaminated wells?

b) Does the State have sufficient laboratory capacity and quality assurance?

- Within the State, how many State-owned, private, and university labs are capable of analyzing water samples with quality assurance?
- What is the total volume of sampling labs can handle?
- How much does water sample analysis and verification of results cost?
- Is there a substantial variation in testing charges among labs?
- Are lab results of consistent quality? Are all results automatically double-checked?

2) Public communication and education procedures

- Are the lines of authority and proper communication channels between State, county, and municipal officials well-defined?
- How will information regarding water supply contamination and response be communicated to the public?
- Who will the State designate as official spokesperson?
- Can public education programs or information campaigns be instituted to provide the public with general information about water replacement planning?
- Can education programs or public hearings be held to educate the public about replacement options during a contamination incident?

Appendix L (continued)

SUPPORT FUNCTIONS EVALUATION

3) Provision of technical expertise

- Does the State have technical expertise and information to assist localities in evaluating their replacement options and putting a remedy in place?
- Does the State have a system of contaminant action levels, linking specified levels of contamination to appropriate actions?
- Does or can the State advise system planners on technical options for water treatment and replacement?
- What role will the State play in assisting local implementation of the contingency plan in response to a contamination incident?

4) Information Assistance

- Does the State provide localities with health advisories or other information on the health affects of various contaminants?
- Is any type of incident response training provided to utility managers or local officials by the State?
- Does the State provide local wellhead data?

5) Logistical Support

- Is the State able to provide local logistical support to affected communities?
- Will the State provide or help secure water distribution equipment?
- Is back-up manpower or emergency response personnel available?
- What are the emergency transportation arrangements? Have provisions been made to bring key State personnel to the site of a chemical accident or other emergency?

6) Financial Assistance

- What State funds are available for plan development and implementation at the State and local levels?
- Are State funds available for statewide contingency planning tasks?
- What approximate costs are associated with incident response?
- Are there sufficient State funds for estimated planning needs?

Appendix L (continued)

SUPPORT FUNCTIONS EVALUATION

6) Financial Assistance (continued)

- Are State funds available to assist local water system in the event of contamination? Under what circumstances? Will the State cover initial water replacement costs or operating expenses?

- Will the State lend local water systems the use of consultants, equipment, manpower, materials, and chemicals or help cover the costs of contracting for consultants and equipment?

7) Legal Authority

- What types of legal authorities does the State have to enhance response preparedness at the State and local levels?

- Does the State have any legal mechanisms in place that encourage contamination response at the local level?

- Can such mechanisms be instituted?

- What legal authorities are in place at the State level to secure compensation from parties responsible for polluting ground water or otherwise contaminating drinking water supplies?

Appendix M

ACTION LEVEL SYSTEM

Factors to consider in developing an Action-Level System.

Action-Level 1: Emergency situation requiring immediate action.

Type of Incident Requiring Level 1 Response:

- Occurrence of an incident which has resulted or may result in water supply contamination in the near future.
- Occurrence of such an incident involving toxic contaminants with potential carcinogenic, mutagenic, or other serious health effects.
- Detection of contamination at the supply system at a level regarded as a potential health threat.

Types of Responses that may be appropriate (depending on the specific circumstances) are:

- Immediate containment and removal of potential contamination source.
- Identification of contamination source in cases where contamination is detected in water supply.
- Provision of alternative water supply (see emergency and short-term replacement options in Appendix G and accompanying text).
- Monitoring of various points in the supply system and other media, if appropriate, to detect any change in contaminant situation.
- Public notification of situation and steps taken to protect public health and water supply.
- Corrective action to eliminate or contain identified source of contamination and contaminated soil and water.

Action Level II: Situation which allows more time for response because threat to health or environment is not immediate.

Type of Incident Requiring Level II Response:

- A source of contamination has been identified which has not yet reached well but eventually will do so.
- Contamination has been detected at the well at trace levels.

Appendix M (continued)

ACTION LEVEL SYSTEM

Types of Response:

- Develop model to estimate time of travel to well.
- Identify source of contamination.
- Monitor water supply with increased frequency to detect any change in contamination situation.
- Evaluate the need for alternative supply.
- Notify the public of situation and steps taken as appropriate.

Action Level III: Situation which requires observation to assess potential for contamination.

Type of Incident Requiring Level III Response: Potential source of contamination identified which may or may not reach water supply.

Factors Influencing Response:

- The proximity of the source to the well or wellfield.
- The type and concentration of potential contaminants associated with the source.

Appendix N

SPECIFIC RESPONSE PROCEDURES*

Chemicals Accidentally Introduced Into Public Water Supplies

POLICY

No chemicals shall be (1) applied to treat drinking waters or (2) utilized in the construction of pipes or appurtenances which come in contact with drinking water, unless specifically permitted by the State Commissioner of Health, and approved by or meeting the standards and requirements of the Public Health Service, the American Water Works Association, National Sanitation Foundation or similarly recognized agency as determined by the State Commissioner of Health.

In the event that a toxic chemical has been or may be accidentally introduced into the public water supply, immediate action must be taken by the Water Supply Official, the appropriate Field Response Personnel, and the Bureau of Public Water Supply (BPWS) to eliminate the hazardous potential.

INFORMATION

The State Health Department, United States Public Health Service, Local Poison Control Centers, and chemical manufacturers provide information services whereby advice may be obtained concerning the degree of toxicological hazard of the chemical agent involved.

PROCEDURE

Water Supply Official 1. Notifies the Field Response Personnel of a toxic chemical problem by telephone and provides the following information:

a) Name.
b) Organization.
c) Position.
d) Telephone number.
e) Name of the chemical agent (trade and/or generic and/or formula) and whenever possible the name of the manufacturer.
f) Amount introduced or which might be introduced into the source of supply or system.
g) Point of introduction.
h) Volume of water at point of introduction.

Field Response Personnel 2. Immediately relays information to the BPWS.

---

* Adapted from: New York State Department of Health Engineering and Sanitation Manual Division of Sanitary Engineering.

Appendix N (continued)

SPECIFIC RESPONSE PROCEDURES

Chemicals Accidentally Introduced Into Public Water Supplies

PROCEDURE (continued)

BPWS	3.	Requests toxicological information from the New York State Department of Health Division of Laboratories and Research; United States Public Health Service Poison Control Branch, Washington, D.C. (telephone (202) 963-7512); Local Poison Control Center, and/or chemical manufacturer.
Information Source	4.	Provides the following information: (a) The chemical is not toxic or (b) The chemical is toxic in the following ratios: 1) Acute toxicity in mg/l for a certain period of time. 2) Moderate toxicity in mg/l for a certain period of time. 3) Low toxicity in mg/l.
BPWS	5.	Transmits information to the Field regarding hazards involved and methods of eliminating the hazard.
Field	6.	Advise the water supply official of action to be taken.
	7.	Prepares information memorandum to BPWS.
BPWS	8.	Requests laboratory assistance to establish a surveillance program.
	9.	Prepares post-action department report.

SUPPLEMENTARY INFORMATION

A. Emergency type calls may be placed to the Public Health Service Poison Control Center Clearinghouse, Washington, D.C. (telephone (202) 963-7512) by any individual concerned, providing that the resolution of the problem is coordinated with the Field Response Personnel and/or BPWS.

B. The Local Poison Control Centers primarily provide an information service for the medical profession concerning the prevention and treatment of accidents involving ingestion of poisonous and potentially poisonous substances.

★U.S. GOVERNMENT PRINTING OFFICE: 1995-623-709/82257