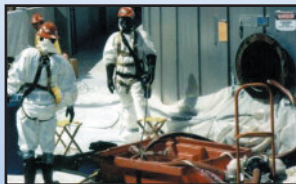# Response Protocol Toolbox:
Planning for and Responding to Drinking Water Contamination Threats and Incidents

Interim Final - December 2003

Overview and Application

EPA
United States
Environmental Protection
Agency

DEC 1 8 2003

OFFICE OF
WATER

Dear Colleague,

I am writing to announce the release of the interim final *Response Protocol Toolbox: Planning for and Responding to Drinking Water Contamination Threats and Incidents* (the *Response Protocol Toolbox*). The *Response Protocol Toolbox* was produced by EPA, building on the experience and expertise of several drinking water utilities, in particular, the Metropolitan Water District of Southern California. Our objective in providing this interim final guidance is to help the water sector effectively and appropriately plan for and respond to contamination threats and incidents.
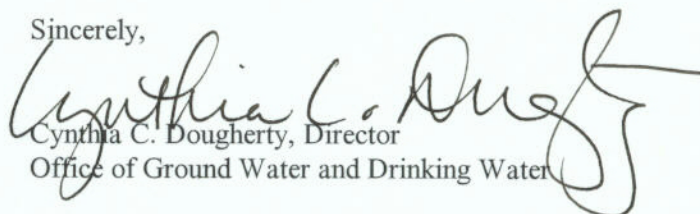
The *Response Protocol Toolbox* will be of value to drinking water utilities, laboratories, emergency responders, state drinking water programs, technical assistance providers, and public health and law enforcement officials. While the *Response Protocol Toolbox* provides useful direction, it is primarily a planning tool. EPA recommends that users practice implementing this proposed framework and carry-out drills and training to improve preparedness. This draft release includes Modules 1 through 4, as well as an overview of the entire *Response Protocol Toolbox*. Users are encouraged to read the overview before using other Modules. Please note that Modules 5 and 6 will be included in the final release, due in spring 2004. The titles of the Modules are as follows:

- *Overview of the Response Protocol Toolbox* (EPA-817-D-03-007)
- *Water Utility Planning Guide* - Module 1 (EPA-817-D-03-001)
- *Contamination Threat Management Guide* - Module 2 (EPA-817-D-03-002)
- *Site Characterization and Sampling Guide* - Module 3 (EPA-817-D-03-003)
- *Analytical Guide* - Module 4 (EPA-817-D-03-004)
- *Public Health Response Guide* - Module 5 (EPA-817-D-03-005) *under development*
- *Remediation and Recovery Guide* - Module 6 (EPA-817-D-03-006) *under development*

The *Response Protocol Toolbox* modules can be found in electronic PDF format on the EPA website at: http://www.epa.gov/safewater/security/ under *Emergency Response Tools*. Printed copies, in limited quantity, can be obtained from the Water Resource Center by phone: 800-832-7828 or 202-566-1729, by fax: 202-566-1736, or by e-mail: center.water-resource@epa.gov. If additional information is needed, please call the Safe Drinking Water Hotline at 1-800-426-4791.

I ask for your assistance in publicizing the availability of the *Response Protocol Toolbox* to ensure that it reaches the drinking water systems, government officials, laboratories, and first responders who will benefit from it most.
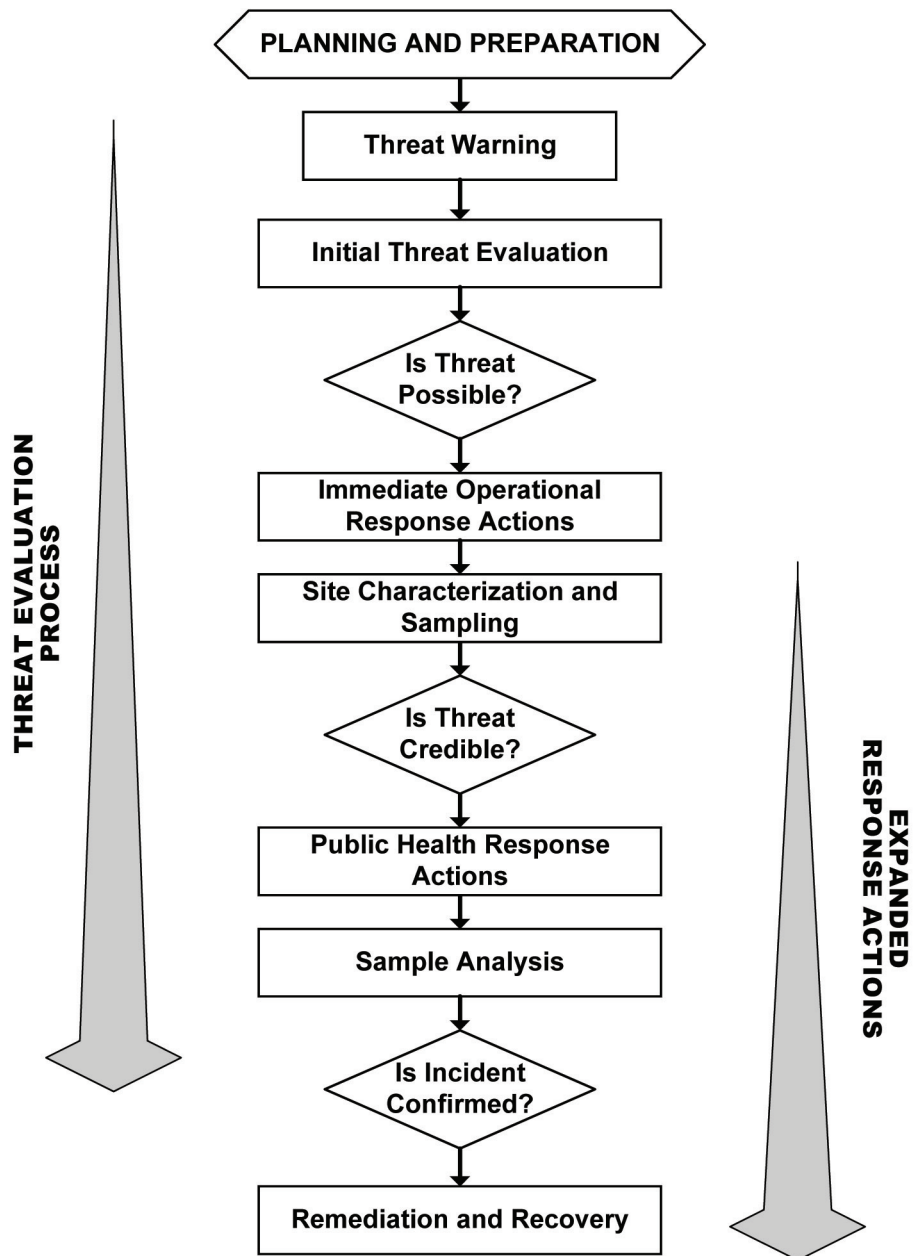
Sincerely,

Cynthia C. Dougherty, Director
Office of Ground Water and Drinking Water

Response Protocol Toolbox:
Planning for and Responding to Drinking Water Contamination Threats and Incidents

Overview and Application

Interm Final - December 2003

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              PLANNING AND PREPARATION

                  Threat Warning

               Initial Threat Evaluation

                   Is Threat
                   Possible?

              Immediate Operational
               Response Actions

              Site Characterization and
                    Sampling

                   Is Threat
                   Credible?

              Public Health Response
                    Actions

                  Sample Analysis

                   Is Incident
                   Confirmed?

              Remediation and Recovery
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THREAT EVALUATION PROCESS

EXPANDED RESPONSE ACTIONS

ACKNOWLEDGEMENTS

The Response Protocol Toolbox has been reviewed by U.S. EPA Office of Water, Office of Research and Development, and Office of General Counsel, and approved for release as non-binding guidance.

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1   Introduction

The Response Protocol Tool Box (RPTB) is composed of six interrelated modules, in addition to this overview, which focus on different aspects of **planning** a response to contamination threats and incidents, long **before** they occur. The RPTB is primarily concerned with drinking water contamination threats, whereas physical and cyber attacks are mostly related to other security issues and are the subject of documents being prepared separately. Figure O-1 illustrates the interconnected relationships among the modules. Module 1 is an overarching document that serves both as a primer on contamination threats to drinking water systems and an overall guide to utility planning for such incidents. As depicted in Figure O-1, Module 2 is the hub of the toolbox in that it addresses the overall management of a contamination threat. The remaining modules support Module 2 by presenting information and protocols for investigating the contamination threat or implementing actions in response to a contamination threat or incident. The current overview describes the entire RPTB and provides guidance on its application.
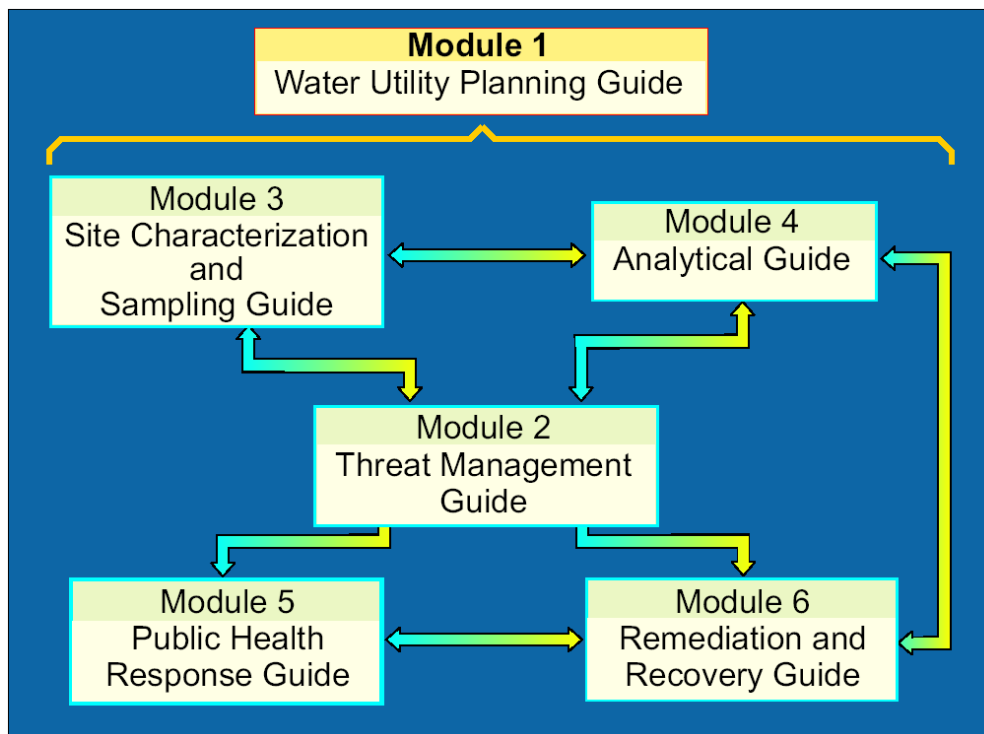
Figure O-1. Relationships among the Modules in the Response Protocol Toolbox (RPTB).

The RPTB is a planning tool, and should be integrated into a user's specific emergency response planning activities in order to effectively manage an actual threat. The modules in the RPTB were **not** prepared for use during the response to an emergency. **Response Guides are intended for that purpose** and are described below in Section 3.3. Furthermore, the RPTB does not implement any specific statutory directive and does not establish any requirements. It is provided as guidance to aid utilities and other users in planning a response to contamination threats.

2 Overview of the Response Protocol Toolbox

The six modules that constitute the RPTB are:
1. Water Utility Planning Guide
2. Contamination Threat Management Guide
3. Site Characterization and Sampling Guide
4. Analytical Guide
5. Public Health Response Guide
6. Remediation and Recovery Guide

This section provides an overview, presents the objectives, and describes the intended audience for each of these modules. While various modules were developed with a specific target audience in mind, any user may benefit from review of all the modules in the RPTB in order to become familiar with the various aspects of the response to a drinking water contamination threat or incident.

2.1 Module 1, Water Utility Planning Guide

Overview. Module 1 provides a brief discussion of the nature of the contamination threat to the public water supply. The module also describes the planning activities that a utility may undertake to effectively manage contamination threats and incidents.

Objectives. The objectives of Module 1 are to:
1) Familiarize the reader with the nature of water contamination threats and incidents.
2) Provide an understanding of the various planning activities associated with the management of water contamination threat or incident.

Audience. While the planning aspects of this module are targeted at drinking water utilities, much of the information provided will be of interest to any user that might support a drinking water utility during response to a contamination threat. This extended audience might include drinking water primacy agencies, law enforcement agencies, public health agencies, or crisis management organizations.

Highlights. Module 1:
- Provides an overview of contamination threats.
- Describes the various warning signs of a potential contamination incident.
- Discusses the concept of "due diligence" in responding to contamination threats.
- Lists several areas where planning and preparation are necessary to the effective management of a contamination threat.

2.2 Module 2, Contamination Threat Management Guide

Overview. The threat management process involves two parallel and interrelated activities: 1) Evaluating the threat, and 2) Making decisions regarding appropriate actions to take in response to the threat. The first step of the threat evaluation process involves the collection of information to help determine if the threat is **'possible'**; that is, do the circumstances of a threat

indicate the opportunity for contamination? Following the determination that the threat is 'possible', additional information is gathered to help determine if the threat is **'credible'**; that is, does the additional information corroborate the information already known about the threat? Finally, efforts are taken to **'confirm'** the contamination incident; that is, is there definitive evidence that the water has actually been contaminated with a harmful substance? This is a progressive evaluation in which more serious response actions are considered as the threat is elevated through these three stages.

There are a number of difficult management decisions that must be made before, during, and after a contamination threat, such as: 1) How to decide if an incident has occurred, as opposed to a hoax; 2) What actions to take in response to a threat; 3) How to determine that a perceived threat is not 'credible' and can be dismissed; and 4) How to manage a confirmed contamination incident.

Objectives. The objectives of Module 2 are to:
1) Present a framework for evaluating a water contamination threat and making decisions at key points in the process.
2) Describe the type of information that may be useful for conducting a threat evaluation.
3) Describe the actions that might be implemented in response to a contamination threat, giving consideration to the potential consequences of various actions.

Audience. The primary audience for this module is the water utility emergency response manager (WUERM), who will likely have some role in the threat management process throughout the response. Furthermore, other individuals that might be involved in the management of a contamination threat, such as members of law enforcement, the drinking water primacy agency, and the public health department, should also review this module.

Highlights. Module 2:
- Describes the three stages of a threat evaluation: possible, credible, and confirmed.
- Describes the information that might support both the threat evaluation and the response actions that might be considered at each of these stages.
- Identifies the types of individuals and organizations that might become involved at various stages of the contamination threat management process.
- Provides examples regarding the manner in which the threat management process is applied to different incident warnings.
- Contains various forms that might aid in the documentation of incident warnings and the subsequent threat evaluation process. The readers may find these forms useful in preparing their own Response Guidelines, described below in Section 3.3 below.

2.3 Module 3, Site Characterization and Sampling Guide

Overview. Site characterization is defined as the process of collecting information from the site of a suspected contamination incident at a drinking water system. Site characterization activities include the site investigation, field safety screening, rapid field testing of the water, and sample collection.

Objectives. The objectives of Module 3 are to:
1) Describe considerations for personnel involved in the planning or execution of site characterization activities in response to a water contamination threat.
2) Present protocols and procedures for the site investigation, field safety screening, rapid field testing, and sample collection.

Audience. Any individuals involved in planning or implementing site characterization activities are encouraged to review this module in its entirety. Laboratories that may tend to focus on Module 4 (Analytical Guide) may also find the information in Module 3 useful, particularly with respect to the screening activities that occur in the field and directly impact the safety considerations of the laboratory.

Highlights. Module 3:
- Provides an overview of planning for safe and effective site characterization.
- Describes the qualifications of individuals sent to the site, as well as the steps taken to ensure the safety of the site characterization team.
- Contains various sample forms that may be useful for planning and documenting the results of site characterization and sampling activities, including chain of custody. The readers may find these forms useful in preparing their own Response Guidelines, as described in Section 3.3.
- Describes field safety screening and the contents of a core and an expanded field test kit.
- Lists the contents of a model sample collection kit.
- Presents considerations for shipping the collected samples to the laboratory for analysis.

2.4 Module 4, Analytical Guide

Overview. The analytical guide presents an approach to the analysis of samples that may be collected from the site of a suspected contamination incident. The purpose of the Analytical Guide is **not** to provide a detailed protocol. Rather, it describes a framework for developing an approach for the analysis of water samples collected during site characterization. The framework is flexible and will allow the approach to be crafted based on available information about the threat and the requirements of the specific situation. The framework is also designed to promote the effective and defensible performance of laboratory analysis.

Objectives. The objectives of Module 4 are to:
1) Describe special laboratory considerations for handling and processing emergency water samples suspected of contamination with a harmful substance.
2) Present model approaches and procedures for analysis of water samples suspected of contamination with a known or unknown substance(s).
3) Encourage planners to develop site-specific analytical approaches that follow the general principles of the framework and model analytical approaches presented in Module 4.

Audience. This module should be reviewed by both laboratory and utility planners and by laboratory personnel.

Highlights. Module 4:
- Describes existing laboratory infrastructure for the analysis of water contaminants, including a link to a compendium of laboratories that might support utilities in the analysis of emergency water samples.
- Discusses considerations for the analysis of water samples collected during an emergency, including safety, quality assurance, and legal admissibility of scientific evidence.
- Summarizes those aspects of site characterization issues that relate to laboratory safety and analysis.
- Introduces a general approach for the analysis of unknowns, which integrates site characterization results to produce a rapid, defensible, and comprehensive analysis.
- Presents an analytical approach for chemicals and pathogens based on two forms of screening for specific classes of contaminants. This approach utilizes a combination of standardized methods and sound exploratory techniques.
- Provides examples of the customization of the analytical approach to specific laboratory objectives.

2.5   Module 5, Public Health Response Guide (in preparation)

Overview: Module 5 deals with the public health response measures that would potentially be used to minimize public exposure to potentially contaminated water. It discusses the important issue of who is responsible for making the decision to initiate public health response actions, and considers the role of the water utility in this decision process. Specifically, it examines the role of the utility during a public health response action, as well as the interactions between the utility, the drinking water primacy agency, the public health community, and other parties with a public health mission.

Objectives: The objectives of Module 5 are to:
1) Identify the organizations and officials responsible for making and implementing public health response decisions for drinking water.
2) Describe the role of the drinking water utility in the public health response to a water contamination threat.
3) Develop communication protocols and structures within the responding public health agencies and also for communication with the public and the media.
4) Identify resources and techniques to aid in evaluation of public health consequences associated with specific contaminants.
5) Consider acute and chronic effects via ingestion, inhalation, and dermal exposure pathways.
6) Develop response options, including containment and public notification.
7) Identify potential short-term alternative water supplies.

Audience. The primary intended users of this module include water utility staff and entities that will assist small water utilities (e.g., drinking water primacy agencies). In addition, public health response agencies (e.g., public health departments) are encouraged to read this module since they will likely make the decisions regarding the public health response actions that are taken (e.g., public notification) during a water contamination threat.

Highlights. Module 5:
- Describes the organizations that may be involved in making public health decisions, various response options that may be considered, and the need for an effective communication plan.
- Describes the contaminant characteristics that should be considered when making public health decisions.
- Describes methods of estimating the spread of contaminated water and containment options.
- Discusses public notification, including applicable regulatory requirements, as a means of reducing or mitigating exposure and avoiding public panic, types of notifications, and information that is readily available or may be developed to educate the public (e.g., fact sheets).
- Discusses alternate water supply issues pertaining to domestic consumption, sanitation, fire-fighting, and needs of critical customers.

2.6   Module 6, Remediation and Recovery Guide (in preparation)

Overview. Following a confirmed water contamination incident, it will be necessary to remediate the system and demonstrate that the system has been successfully restored prior to resuming normal operation. This process involves a sequence of activities, including system characterization and selection of remedy options. Following implementation of the remediation plan, steps must be taken to demonstrate that the system can be returned to normal operation. Furthermore, plans will need to be made for the long-term supply of alternate drinking water during remediation. Module 6 describes the planning and implementation of these remediation and recovery activities, the types of organizations that would likely be involved in this stage of a response, and the utility's role during remediation and recovery.

Objectives: The objectives of Module 6 are to:
1) Identify the organizations and officials responsible for making and implementing decisions regarding remediation and recovery activities for contaminated drinking water.
2) Describe the role of the drinking water utility during the remediation and recovery stage of a contamination incident.
3) Describe how a systematic planning process can be applied to ensure that the right type, quantity, and quality of data are obtained to support the remediation and recovery activities.
4) Describes the process for selecting a remedial technology, both for treatment of contaminated drinking water and remediation of contaminated system components.
5) Present the issues and considerations associated with returning to normal operation following remediation and recovery activities.

Audience. The target audience for this module includes individuals that will be involved in system characterization, risk assessment, and remedial response action activities following a confirmed contamination incident. The target audience also includes decision-makers who will determine the need for long-term alternate water supplies, select remedial technologies, determine when to return to normal operations, and communicate with the public.

Highlights. Module 6:
- Presents procedures for characterization of the contaminated area.
- Describes considerations for providing a long-term alternate supply of drinking water during the remediation and recovery stage.
- Describes a flexible sequence of steps designed to select the appropriate remedial response to address a contaminated drinking water system.
- Describes regulations that must be considered when managing wastes generated from the remediation of a contaminated waste system.
- Presents special considerations for system restart with emphasis on public outreach and communication.

3   Application of the Response Protocol Toolbox

The following subsections list three main areas in which the RPTB may be applied, as well as some examples of those applications. Ultimately, the RPTB will be packaged in an electronic format that will allow users to easily integrate the elements best suited to their individual needs and the unique aspects of their water supply. Accordingly, the intent of the material in this section is to encourage users to take advantage of the robust and flexible nature of this toolbox in crafting their own plans.

3.1   Planning a Response to a Contamination Threat

It is important to remember that the RPTB is much more effective as a **planning tool** than as a reference during an actual contamination threat when decisions will need to be made rapidly and with limited information. As a planning tool, it provides a framework to guide the utility's response to contamination threats. These plans can help identify credible threats and dismiss hoaxes, and support decisions regarding response actions that are appropriate for the situation. To increase the effectiveness of these plans, utilities should exercise them under conditions that simulate the stresses resulting from an actual contamination threat.

The RPTB does not attempt to define who will be involved in various stages of a response. These decisions are best left to local authorities, who have an intimate knowledge of the organizations and systems that exist within their water utility, government, and community for providing support during an emergency. For example, the utility and local or state authorities will need to determine:

- Who will respond?
- Who will sample?
- Who will perform analyses?
- Who will make public health decisions?
- Who will manage remediation and recovery activities?

The specific application of the RPTB as a planning tool is based on the particular function and responsibility of the user in responding to a drinking water contamination threat. Figure O-2 illustrates several potential uses of the RPTB by various parties. Figure O-2 is not intended to prescribe a particular use, nor is it intended to be comprehensive. Rather, it is intended to provide several examples and suggestions about how various users might apply the modules that comprise the RPTB.
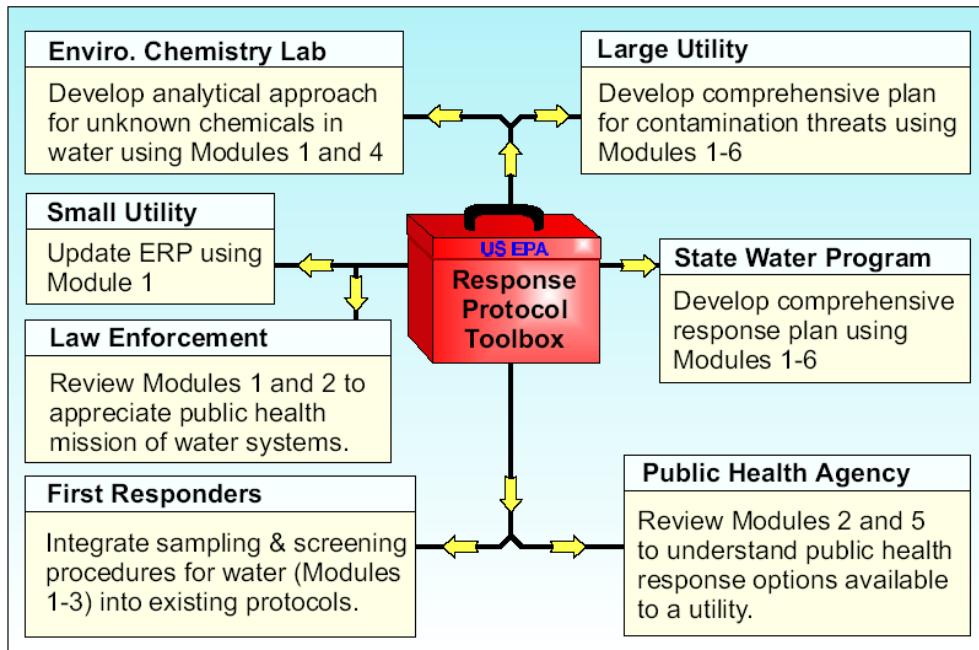
Figure O-2. Examples of the use of the Response Protocol Toolbox (RPTB) by various interest groups.

3.2   Revising "Emergency Response Plans"

Information contained in the RPTB may be helpful in the revision of the utility's emergency response plan (ERP), particularly for contamination threats. It should be noted, however, that there is no regulatory requirement to use the RPTB in the revision of the ERP. Guidance on the preparation of ERPs is being prepared separately (EPA, "Drinking Water Model Emergency Response Plan," in preparation). Some of the information from the RPTB that the utilities may find useful in revising their ERPs are:

- The discussion of the nature of the contamination threats (Module 1).
- The framework and approach for managing contamination threats (Module 2).
- The procedures for characterizing a potential contamination site and collecting samples (Module 3).
- A framework for developing an analytical approach for water samples potentially containing an unidentified contaminant (Module 4).
- The public health response measures considered during and after an incident (Module 5).
- Steps in planning for remediation and recovery following a confirmed contamination incident (Module 6).

It is hoped that the RPTB will provide answers to the multitude of questions utilities may ask when revising an ERP to encompass a contamination threat.

3.3 Developing "Response Guidelines"

Although not a formal part of an ERP, utilities may wish to develop Response Guidelines (RGs), which are essentially a field guide for responding to contamination threats. Note that there is no regulatory requirement to do this, but it may be a prudent step in preparing for a response to contamination threats. RGs are discussed in Module 1, and a sample RGs outline is presented in the appendix to Module 1. Development of RGs can be facilitated by extracting information directly from RPTB, including: protocols, figures, tables, forms, etc. and integrating them into a user's own RGs. In this manner, the RPTB can be customized to meet a user's specific needs and responsibilities in responding to a contamination threat.

3.4 Other Applications of the RPTB

Several other types of guides could be crafted from material in the RPTB to meet the needs and responsibilities of various parties, such as EPA, states, utilities, laboratories, and others. These include, but are not limited to, the following:

- Drinking Water Primacy Agency Response Guideline: These will be more generic than a utility RGs and may help the primacy agency to fulfill various responsibilities, such as assisting smaller water utilities in responding to contamination threats.

- Small system guide: The needs and capabilities of small systems vary greatly. Some small systems may be capable of customizing the RPTB to their needs. Others will need some authority, such as EPA or the drinking water primacy agency, to do this for them.

- Laboratory Guide (LG) for laboratories: Module 4 presents a general analytical guide developed from a national perspective. Laboratories may prepare a customized LG based on their local need, capabilities, and responsibilities.

- Emergency Responder Guide (ERG): This guide is designed for responders that will help utilities, particularly with site characterization activities. For example, responders may integrate the information and procedures from part of the RPTB, such as Module 3, into their existing procedures.

- Public Health Guide: Utilities may prepare a guide or fact sheet for their local public health department and water customers explaining the benefits of various public health response actions. It should also briefly summarize relevant system operations (i.e., ability to isolate certain components).

- Remediation and Recovery Guide: This utility document may detail the technical plan for returning the system to service under various contamination scenarios.

- Consumer Guide: Not a technical document, this guide might be aimed at water customers to encourage them to prepare for situations in which there are temporary restrictions on water usage. This could be a variation on existing disaster preparation guides.

- <u>Law Enforcement Guide</u>: This guide may explain to the law enforcement community relevant aspects of water utility operation and contamination response planning. This guide may facilitate coordination in planning and response to contamination threats.

- <u>Utility Coordination Guide</u>: Larger water systems that supply water to smaller, independent water utilities may prepare a suitable guide for their smaller associates. Identifying these roles, capabilities and responsibilities may prove valuable to all parties in preparing a response to a contamination threat or incident.