

## **PILOT STUDY REPORT ANNEX**

### **Principle Working Documents Summation Chapters**

## **HEALTH AND MEDICAL RESPONSE PREPAREDNESS FOR CHEMICAL RELEASES**

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Determining how to resolve the health issues associated with a chemical release is made easier if one approaches the topic with an awareness of the basic concerns of society. All emergency preparedness and response activities for a release must be designed to address these basic societal concerns.

The world in which we live is continually evolving. However, the basic needs of people remain unchanged. In any society, people need four things:

- ◆ Shelter
- ◆ Health
- ◆ Food and water
- ◆ Security

Social groups and individuals constantly evaluate the environment in which they live to determine whether these basic needs are going to be met. Individuals develop a belief that their expectations will be fulfilled. The daily activities of the population reflect these needs. When an expectation is not met, the situation can be considered an emergency by the individual.

The same basic concerns exist on a societal level where individuals form groups to address common issues. These groups may be governmental, corporate, volunteer, special interest, occupational, social, family, etc. Groups exist for a common reason and function. The issues facing a society will determine the nature and activities of the groups in it and determine where they will place their emphasis and expend their resources. A common purpose of all organizations is to enhance the lives of its constituent members and organizations and to ensure that the purpose of the group is met.

There are currently more than 14 million chemical substances registered and more than 1,000 new compounds listed every week. The use of chemicals in our society is generally accepted when it improves the conditions of our lives. For example, chemicals are used to enhance crop production, manufacture products and housing, and treat medical conditions. In addition, technology is continually finding new chemical substances to meet the demand of people for new products.

Most of these substances, when properly used, pose a minimal risk to our communities or to individuals. However, when chemicals are improperly used or when they are inadvertently released into the environment, the basic needs of people may be threatened. The health, shelter, food, and security of the population in the immediate area of the release may disappear the moment a hazardous chemical is released. The issues posed by a release are further compounded by a general lack

of information that can be used to define the magnitude of the threat.

**Our society is more successful at developing chemicals than it is at determining the effects they may have on man or the environment.**

In addition to posing a physical health threat, the threat of a chemical release may also create severe psychological problems among members of the affected population. These problems are directly related to the actual degree of threat, the perception of threat, and the ability of the population to control the outcome. A "chemophobia" may develop within a society, and members of that society may substantially modify their life style. People's unreasonable, excessive fear of chemical hazards can have a major economic and societal impact.

Furthermore, the general population may grow to distrust authorities who they believe failed to protect the public from chemical releases. Officials responsible for emergency response planning need to consider these concerns as they plan how to respond to a chemical release.

A release also creates potential economic problems for the owner of the chemical. Such problems include the cost of the loss of the use of the product; the cost of repairing facilities, transport vehicles, or other equipment; the cost of lost time and manufacturing ability; and the cost of litigation resulting from the event. A corporation will also face a loss of public and governmental confidence.

The government with jurisdiction over the affected area can expect to be criticized for "allowing the release to occur" and failing to respond appropriately to the situation. New citizen action groups may form to protest. The release will generally serve as the focus for comments in the media, at public forums, and in the general population. If the event resulted in significant economic loss or affected the health of a broad segment of the population, there will be demands for new laws and regulations, the application of additional governmental and industrial resources, and specialty programs. Such new activities will ostensibly be to reimburse those damaged or harmed and to prevent the possible recurrence of a release in the future. There will be calls for the development of emergency response plans, the training of response staff, the acquisition of new and specialized equipment, and other activities designed to ensure an appropriate response to a hazardous material release.

## **EMERGENCY, DISASTER, CATASTROPHE, AND CRISIS**

A chemical hazard is a potential threat to the health and well-being of the people in the immediate environment. When a hazard is mismanaged, and a potential threat becomes an immediate danger, then action must be taken. There is no question that a chemical release can disrupt daily activities. Whether a chemical release constitutes an "emergency," however, depends on whether it threatens people's basic needs. An emergency in community X would not constitute an emergency in community Y located 30 miles away unless the problem impinges directly upon the

well-being of community Y. The same holds true within a community. If there is a household fire, the occupants of the structure have an emergency; however, the residents of the building across the street do not, unless the fire threatens to spread to their structure. If the residents across the street perceive the fire as a threat they will experience an emergency although an actual threat does not exist for them.

The actions necessary to respond to an event can be anticipated. Planners must attempt to specify the equipment, personnel, and activities necessary to address specific hazards. They should also define the time frame within which the response actions must occur. The very use of the term "emergency" generally conveys the need for rapid action on the part of others to assist in addressing a situation for which the requesting individual or organization is not equipped, trained, or prepared.

### **Preparedness activities can prevent a situation from becoming an emergency**

There are several other terms that may be used to classify a situation affecting the health and well-being of a community. They are **catastrophe**, **disaster**, and **crisis**. The first two terms are used to describe events of great impact. They are also generally applied for political purposes to describe a chemical hazard that was mismanaged. "Catastrophe" and "disaster" may also refer to the results of misdirected actions to ameliorate the situation. These two classifications may differ according to the individual assessing the situation. The perceived "degree of severity" of a situation tends to increase as the level of personal involvement increases. The term **crisis**, although its meaning is similar to that of "emergency," differs in that it implies that the response forces do not know how to address the issues presented by the situation. All of these terms (i.e., emergency, catastrophe, disaster, and crisis) imply that an individual or community was not prepared. Thus, the primary goal of preparedness activities is to ensure that if a release occurs it will not be an emergency, catastrophe, disaster, or crisis, but will instead be an anticipated event for which only the time of occurrence was unknown.

## **PREPAREDNESS**

Preparedness, a term generally used by the emergency response community, encompasses planning, training, and the acquisition of resources necessary to respond to an anticipated event. Officials preparing for possible releases of hazardous materials must always keep in mind exactly what constitutes a "hazardous material" and what their preparations are designed to effect.

**Hazardous materials are labeled as such because they can have an adverse impact on human or animal health, not because of their impact on plants, rocks, etc.**

Most response activities are designed to ensure the continued health of people affected. Such issues as environmental contamination, worker safety, the control of

chemical releases, and the mitigation are generally health driven, although they may also be influenced by economic considerations.

People who become ill and seek medical treatment do so with an expectation that they will survive and regain their health. After all, doctors have trained for many years to become healers, and hospitals are equipped to handle people who are sick. Hospitals deal every day with sick people, and every day they save lives and prevent human suffering. However, most hospitals are ill prepared to address chemical exposures. Because of their highly specialized training, health care providers generally have minimal communication or interaction with people outside the medical community other than with their patients. As a result, hospital personnel have little information about chemicals in their community; few chemical response protocols; marginal medical information on health effects resulting from chemical exposures; and limited experience in dealing with a chemical event.

Public health departments have similar limitations. In many communities the major public health activities are in the areas of communicable disease control and preventive health programs; the relatively few environmental activities mostly involve efforts to control vector-borne diseases and inspection services associated with food, water, and waste management. Although health department personnel are aware of the role that environmental pathways play in dispersing toxic substances, of community concerns regarding environmentally induced diseases, and of the need to have disease prevention strategies, they tend to believe that the control of released hazardous materials is the responsibility of other organizations. Public health personnel also believe the response groups "will call if there is a health problem."

Emergency medical technicians and related ambulance personnel play a major role in responding to injured individuals. They are dedicated and trained to extract the injured, provide first aid, stabilize patients, and transport them rapidly to the hospital where definitive care is provided. While responding to chemical releases, however, these rescue personnel are at great risk of exposure. If they act inappropriately, they may themselves be contaminated and require hospitalization, or they may allow their vehicles or other equipment to become contaminated.

In general, health professionals are not prepared to handle the health issues that will be presented during a chemical release. They receive little academic training in toxicology and few physicians and health professionals know what to do to prevent or mitigate exposures to hazardous materials. They have generally not trained, prepared, or acquired the equipment and supplies to handle patients that are believed to have been exposed to, or contaminated by, a toxic chemical.

Those attempting to minimize the gravity of this lack of preparedness could point out that chemical releases are not common: a small percentage of hospital admissions are due to a chemical exposure, and the public is only rarely compromised. Nevertheless the public has the right to expect a community to be prepared to deal with the effects of chemical exposure. Unfortunately, the ability of the health and

medical community to address the health issues associated with such an exposure is rarely questioned during response planning since the health professionals are "health professionals." The public naively assumes the medical community to be prepared.

Thus, during a chemical release, response forces are truly facing an emergency. The very people the public counts on to provide health care, the ones they expect to have the knowledge and resources to resolve their problems, may not be qualified. The problem is further compounded by the planners and response personnel. Because the staffs of hospitals and health departments are miles from the release, they are generally not considered a part of the response force. Many health components do not even maintain a system with which to quickly contact health personnel whose expertise would be needed at the site of the release. Furthermore, response forces seldom understand the role of public health personnel, and health and medical personnel rarely understand the structure of or need for the response forces. As a result response forces seldom consider "those health people" as a response asset, and in some cases, they actually view them as a liability. Health and medical personnel are thus generally not involved in preparedness activities with members of the response forces.

## **PLANNING**

All individuals and organizations make plans. They determine, after assessing a given situation, what they consider the desired objective. For an individual, the process of defining an objective is simple. For groups, however, it becomes more difficult, because each member of the group may have a different concept of the desired endpoint and when it should be achieved. Nowhere do such differences become more obvious than in response planning. Failures to communicate specific objectives and to gain the acceptance of the planning and response team result in more response difficulties than any other factors. Unless an objective is specific, measurable, and time-framed, one cannot determine whether it is achieved. Objectives must also be realistic. While it might be helpful to have the response forces on scene within 5 minutes it is generally not realistic.

In contingency planning, the planners postulate a problem that could conceivably occur; they define the most probable causes of that problem; and then they specify the actions, resources, and time frames necessary to alleviate the problem.

Planners must delineate the resources required, the actions to be taken, the sequence and timing of those actions, and a means to determine when the objectives are attained. The plan should then be reviewed, and if reviewers determine that the objectives would not be attained by following the plan, the plan should be revised. This planning and review process should then be repeated until the planners and reviewers are satisfied with the plan.

A contingency plan for responding to chemical releases is an operational structure, not a recipe to solve a problem. Therefore, the components of a plan may vary, and

all potential responders must participate in developing the plan. No one individual or organization has the detailed knowledge to define the roles of every component of the response force or the resources that each one will need. All components should be expected to contribute to the plan in the areas they are responsible for during routine operations. Fire fighters should not be expected to address traffic issues, nor should police personnel be expected to define fire-fighting tactics. Health and medical personnel should address and make health decisions.

Hazardous materials can be found in industrial settings, in storage, and in transit, and a plan is needed for dealing with the release of such materials wherever it could occur. Given our reliance on chemicals and the fact that tons of hazardous materials are transported by air, water, truck, and rail each year, some inadvertent release of hazardous material is certain to occur--and we must have a plan in place if we are to respond efficiently.

In the first stages of planning, one must define the nature and type of situations that could occur and determine who is or should be responsible for leading the planning effort given the laws or political structure of the community. Someone within the community, such as a member of the planning commission, fire command, or civil protection organization, may already be assigned this responsibility. There may also be general plans to protect the population from effects of natural disasters such as floods or storms, and the authors of those plans may provide a starting point in the planning process. In any case, there must be a commitment to the process of planning, and there must be a leader or coordinator of the planning effort--someone who has the necessary resources and community support.

A community should not find itself in a position where specialists do all the planning, responders do all the responding, and the two groups never meet. Responders must be actively involved in the planning process.

## **PLANNING TEAM**

The next step is to form a planning team. The planning team should include representatives from those organizations with resources or responsibilities for the type of actions that may be required should a release occur. However, although the team should include some individuals and organizations who have experience with hazardous materials, it should not exclude others involved in the outcome. At a minimum, the planning team should include top government officials (mayor, city manager) and representatives from the fire brigade, police department; emergency management teams, hospitals, health departments, emergency medical personnel, environmental agencies, industry, transportation agencies, the news media (newspaper, radio, and television), and, most important, the community. It should include representatives from volunteer organizations, labor unions, public works and utilities, and schools. All of the above have a role in planning and in responding to a release. Unless these groups are involved in the planning process, the plan will be less than desirable.

In this initial phase of planning, the participation of health officials is imperative. If the medical and health issues posed by a chemical release are to be addressed, health professionals must be a part of the planning team assessing the potential health impact of a possible release.

## **PLANNING TASKS**

The planning process should include a review of the existing response plans within the community. Such a review should include those plans developed by the various response forces, industry, and other organizations. Members of the planning team should provide copies of their organizations' plans for review by the others. During this review, planners should identify common plan formats, response issues, and response team structures; any overlapping organizational jurisdictions; and inconsistencies in plan assumptions and proposed actions. The review should also provide the planning team a basis for determining where and how hazardous material response activities would interface with the existing response structures.

It is particularly important that health care providers be included in this emergency response planning. Members of the health and medical community often discover that plans developed without their input reflect erroneous health assumptions. A health facility may be listed as the primary provider of a service when in fact it no longer offers such a service, or a particular form of response may be medically inappropriate for a particular scenario.

It is also important that planners obtain data on releases of hazardous materials within the community (reported chemical exposures, fires involving chemicals, etc.). Some degree of care must be taken in evaluating the data, however, since reporting may be a function of the requirements of the reporting system and not necessarily a function of the possible health impact. In the American Journal of Public Health(1), Dr. Sue Binder of CDC reported the results of a comparison of three of the largest U.S. sources of data on deaths and injuries from chemical releases. She evaluated 587 releases that occurred in 1986 and found that they resulted in 115 deaths, 2254 injuries, and 111 evacuations. Although reporting requirements existed, only 8 (1 percent) of the 587 releases were reported by all three systems. Because all three systems were found to have significant reporting biases, as well as limitations in completeness and accuracy, the chemical release data must be interpreted cautiously. However, these data probably represent a low estimate of the actual events and types of substances released.

The parameters of reporting systems vary in such elements as the type of substances reported, the minimum quantity of a released substance that is reported, and the type of event. When developing a reporting system for their community, planners should be aware of these differences. Clearly, reporting systems are necessary, and reporting requirements and laws should be enforced. All potential users of the data should participate in the construction of such a system. This is particularly true when it comes to health input. If health professionals are not



involved in the design of reporting systems, such systems will have limited value for documenting the public health impact of a release.

After reviewing the chemicals that are in or transported through the community, the history of releases and potential for exposures in the planning area, and the area plans, planning teams may determine that additional planning activities are not required. We suggest that planning teams include in their decision process the results of hazard, vulnerability, and risk analyses. These terms are used with the following definitions:

- ◆ Hazard -- a situation's potential for causing harm to an individual or to the environment
- ◆ Vulnerability -- the susceptibility of an individual or environment to harm
- ◆ Risk -- the probability of harm occurring

Significant health and medical input is required in defining whether or not a situation is hazardous. The planning team must determine the level of hazard analysis that should be performed. Because analyzing all hazards within a community may be resource and time intensive, a limited approach focusing on only the major hazards may be appropriate on the initial review. A qualitative rather than a quantitative analysis may be sufficient to provide an informative profile of the major hazards within the planning area, including their location, type, and quantity. Obviously, if no hazards could possibly impinge upon people or the environment, for an emergency response plan is not needed. The same would hold true were the population and the environment not vulnerable should a release occur.

The health community can contribute substantially to the planning process by providing information on health demographics, results of surveillance systems, and hospital and institutional data regarding previous exposures to the hazards within the area. Health professionals must be prepared to assist in defining the health indicators and the levels of medical concern that must be used in hazard and vulnerability analysis. For example, one organization might find it acceptable to define the level of concern as being "10% lethality of the individuals within the immediate area." Other community responders, such as the resident population, may find that level somewhat high and suggest a lower threshold. Considerable disagreement is also possible over what data the level of concern should be based on (deaths, chronic health conditions, acute health conditions, etc.). It might even be postulated that unless health resources would be consumed or health-related economic loss would be significant, a chemical spill should be considered a nonevent and classified as being of "no concern."

As mentioned earlier, risk analysis also plays a role in planning for response activities. This is an extremely difficult area in planning. A multitude of approaches have been developed to assess the probability of a given event occurring and to

estimate the damage or injury that might result. The summation chapter "Health Hazard Assessment" provides a detailed discussion of risk analysis.

Readers should approach the topic of risk analysis with appropriate attention and caution. In no case should the planner assume the values to be absolute. A risk analysis should include consideration of available data, reflect previous verification studies, and provide the best risk estimate science is capable of supporting. However, given current medical knowledge, the variability of the release scenarios, the general absence of human data, and the myriad of factors that can influence the results, one can expect extreme variability in risk estimates. Estimates may vary by as much as five orders of magnitude. It is extremely important that the analysis be consistent in methodology and that its assumptions be defined so that the variance will be consistent and that the values derived can serve as "indicators" for the planning process.

### **CAPABILITY ASSESSMENT**

The mission of the planning team necessitates identifying and assessing the response needs that would arise, given the existing response plans, hazards, vulnerabilities, and risks, for each event selected for consideration. The team must be selective in its approach to this phase of the planning process. Planners must also identify the "level of concern" or "threshold level" (i.e., the conditions that will trigger activation of the plan.) If the plan will only be activated when large numbers of deaths occur, then a value such as 10% lethality could be considered a valid "threshold" by the planners. In any case, planners should rank potential events to ensure that the most credible situations are considered.

A diversified team that includes representatives from the various response forces and community organizations is necessary to ensure proper issue identification. All members of the team should articulate what they believe to be the most important issues. By doing so, they can help define the response objectives. For instance, the fire brigade may believe it desirable to let a fire continue without attempting to extinguish it. Home owners, on the other hand, may believe that every effort should be made to extinguish the blaze. The community representative may want to achieve yet a different outcome to avoid additional risk to the residents. A key element of this type of evaluation is that all members of the team are forced to specify the resources required to respond to a particular situation and achieve the particular objective that they feel is desirable.

Planners will have to reach a consensus about what their objectives are and ensure that the desired objectives are realistic given the resources that would be available. A great deal of discussion may be required to reach agreement on the objectives for a response to a hypothetical event. Once that is achieved, all members of the planning team should define their organizations' requirements. The fire command should define the number of fire personnel and pieces of equipment needed. If evacuation of the area is an anticipated action, then planners must specify the number of shelters needed, their location, and their support requirements. Entities

responsible for such services as law enforcement, emergency medical services, environmental protection, transportation, and public health must also define the resources they need to carry out their mission and achieve the response objectives. The discussions regarding resources must also include topics such as the availability of information, communication systems, specialized personnel, warning systems, transportation systems, and evacuation routes.

Most planning teams merely attempt to delineate resource requirements, assess resource availability, and develop source lists for the resources. However, if planners do not also define what objectives can be met with specific resources, they usually fail to identify critical resource needs and response time requirements. In addition, poorly defined objectives often lead to criticism of response activities because members of response forces and the community will have varying conceptions of what the objectives of the response team are. If the planning team does not identify the resource requirements for a given set of objectives, it will be unable to define resource shortfalls.

If planners determine that a certain level of response support would be required and only part of these response resources can be made available within the required time, the planning team must either change the objectives to be attained, gain access to additional resources through mutual assistance agreements with other communities or organizations, or use community assets to acquire additional resources. These adjustments may require modification of the priority for other routine activities of the organizations that may become involved in a response. The movement or reallocation of resources for a potential hazardous material event may become a political issue. Resource expenditures of the community, industry, or governmental organizations can result in controversy as these various groups make opposing programmatic demands, and compete so that they can meet the public's expectations. In all cases, planners need to know what resources are available and what they can reasonably expect to achieve should a release occur.

A generic plan outline developed by the U.S. National Response Team has been widely accepted in the United States. Although this outline (known as NRT-1)(2) is not all encompassing, it does provide a starting point for local planners. Some areas of the plan outline may require more or less development than others depending upon the assessment of the planning team and the needs of the community involved. The planning elements articulated in NRT-1 are:

**A. Introduction**

1. Incident Information Summary
2. Promulgation Document
3. Legal Authority and Responsibility for Responding
4. Table of Contents
5. Abbreviations and Definitions
6. Assumptions/Planning Factors
7. Concept of Operations

- a. Governing Principles
  - b. Organizational Roles and Responsibilities
  - c. Relationship to other Plans
- 8. Instructions on Plan Use
  - a. Purpose
  - b. Plan Distribution
- 9. Record of Amendments

**B. Emergency Assistance Telephone Roster**

**C. Response Functions**

- 1. Initial Notification of Response Agencies
- 2. Direction and Control
- 3. Communications (among Responders)
- 4. Warning Systems and Emergency Public Notification
- 5. Public Information/Community Relations
- 6. Resource Management
- 7. Health and Medical Services
- 8. Response Personnel Safety
- 9. Personal Protection of Citizens
  - a. Indoor Protection
  - b. Evacuation Procedures
  - c. Other Public Protection Strategies
- 10. Fire and Rescue
- 11. Law Enforcement
- 12. Ongoing Incident Assessment
- 13. Human Services
- 14. Public Works
- 15. Others

**D. Containment and Cleanup**

- 1. Techniques for Spill Containment and Cleanup
- 2. Resources for Cleanup and Disposal

**E. Documentation and Investigative Follow-up**

**F. Procedures for Testing and Updating Plan**

- 1. Testing the Plan
- 2. Updating the Plan

**G. Hazards Analysis (Summary)**

**H. References**

1. Laboratory, Consultant, and Other Technical Support Resources
2. Technical Library

Both the UN and the Organization for Economic Cooperation and Development (OECD) suggest a similar approach to these elements of planning. In 1982, the OECD published Guiding Principles for Chemical Accident Prevention, Preparedness and Response(3). The United Nations Environment Programme/Industry and Environment Program, in concert with industry and government, has established the Awareness and Preparedness for Emergencies at Local Level (APELL) Program (5), which promotes the prevention of technological emergencies, improved community awareness, and a rational approach to emergency preparedness particularly applicable in developing countries.

Although each community or country may need to emphasize different elements and planning requirements, the basic issues addressed by each chemical response plan should be similar. In addition, communities and organizations can better help one another if they have similar emergency response plans, command and control structures, and communication systems and response tactics, as well as compatible response equipment.

The process of planning, if properly done, may be more important than the plan itself because the process of planning allows each participating organization and individual to become aware of the expectations of each response group and of the community residents.

After a plan is developed, it must be adopted by the responders, with each responsible component accepting the operational tenets of the plan, the response mission, and the objectives to be achieved. While developing response plans, planners should also establish criteria with which to review their finished plans. In May 1988, the U.S. National Response Team issued a document entitled "Criteria for Review of Hazardous Materials Emergency Plans"(4). These criteria have proved useful in the United States and can be used to assess a plan before it is adopted by the community. Acceptance of this plan is particularly critical for command and control issues. There must be an overall leader of the response to ensure proper coordination of the resources, to provide a unified direction of response, and to serve as the primary spokesperson of the response forces. It is this individual who must direct emerging issues to the appropriate response component for resolution.

**No one organization or individual can address all issues presented during a release.**

Unless all components understand the role and mission of the other responders, they will have difficulty understanding their own role.

Adoption of a plan does not end the overall developmental process. The plan must

be tested periodically, and any deficiencies found must be corrected by updating of the plan and objectives. Plans can be tested in a variety of ways.

One way is to test the individual components of a plan. For example, notification procedures can be tested with a notification drill in which the response forces are contacted according to the procedures in the plan. If the plan objective is to have 95% of the response components notified within 10 minutes of activation of the response plan then the drill can assess the process. Reviews of daily operations of the response organizations can also be used to determine whether an objective is achievable. For example, the time necessary to respond to the emergency needs of a coronary patient may indicate the response time to be expected for other medical casualties.

Tabletop exercises are another means of testing a response plan. In this type of exercise, representatives of the response components meet to discuss the actions that they would take in response to a hypothetical situation or event. Tabletop exercises result in the identification of additional response and planning issues and reinforce the interaction and understanding of the different response components.

Functional exercises constitute a third means of testing elements of a response plan. These exercises involve testing various response components in order to assess their capacity, capabilities, and resources in addressing a particular issue.

The most detailed exercise is a full-field exercise in which the entire response force of the community activates to address a simulated situation. The activation involves the deployment of personnel and resources, the use of communication and information systems and protective equipment, the transportation of mock casualties, and, in some cases, the evacuation of impact areas. Such exercises are extremely valuable if conducted properly. They allow the response components to interact as they would in an actual emergency, and they permit each responder to actually see how the other components of the response team function. They also allow the decision systems to be tested. These exercises require careful planning and expenditure of resources. They must be designed to ensure that the participants are not injured and that the public is not endangered. There must also be provisions to terminate the exercise should a real situation arise requiring the response force.

**Although components of a plan can be tested, one cannot know whether the system will work until the whole plan is tested at the same time.**

Exercises afford the response organizations an opportunity to educate the community about the hazards in the area and about the response system in place to handle a release; exercises also enhance the community members' confidence in the system's ability to protect them.

Obviously, the best test of a plan is when an actual event occurs and response efforts are initiated. Smaller events afford the response team an opportunity to test

its overall plan and to test the proficiency of individual components of the team. It is better to identify a plan deficiency when responding to a small event than to have the problem surface when responding to a major release.

Whenever a plan is used, the response actions and the plan itself should be reviewed after the event has concluded. A complete discussion of the activities, the successes and the failures, allows the difficulties to be addressed and the objectives and systems to be refined.

Many of the difficulties or problems detected will involve the training level of the responders, their experience base, and their understanding of the plan and procedures. A program specifically geared to response training is required for all personnel whether or not they are "on site." The program should also provide opportunities for cross-training and interaction with members of the other response components. The training should be designed with the response objectives in mind, so that team members develop appropriate skills. Because new technologies and tactics are continually emerging, every effort must be made to keep the skill levels of all personnel current. Failure to keep personnel training up to date endanger the response personnel and the community.

### **Specific Health and Medical Preparedness Actions**

The health and medical professionals who are involved in addressing hazardous material situations have a special responsibility to the community and to the response teams. By participating in the planning process, these health professionals will become aware of the hazards in the community, the planned actions of the other components of the response team, the objectives to be achieved during the response, and the expectations of other members of the health and medical community. They will also develop an awareness of the types of injuries they may see in their hospital or practice.

The first responsibility of health and medical personnel is to apply what they have learned in the community planning process in order to carefully assess their organizational capability and to identify planning, resource, procedural, and training shortfalls. If the community planning process includes appropriate input from health personnel, the response force should have reasonable health and medical expectations and objectives.

Individual health and medical organizations must then begin to develop or review their individual contingency plans, which contain specific and measurable objectives unique to their group. They must also ensure that their plans are compatible with the overall community plan.

Not all chemical releases will generate a need for medical care of casualties on site or at a hospital. Previous epidemiological investigations of releases within a