Preface

This guide was developed by the U.S. Environmental Protection Agency in conjunction with the Federal Emergency Management Agency (FEMA) and the Department of Transportation (DOT).

In November 1985, as part of its National Strategy for Toxic Air Pollutants, EPA published the Chemical Emergency Preparedness Program (CEPP) Interim Guidance and invited public review and comment. The Interim Guidance contained information on how to organize planning committees, write a plan, and conduct a hazards analysis on a site-specific basis. In April 1986, EPA began collaborating with FEMA and other Federal agency members of the National Response Team (NRT) in the revision of FEMA's widely-distributed Planning Guide and Checklist for Hazardous Materials Contingency Plans (popularly known as "FEMA-10"). In October 1986, during the time that a revised FEMA-10 was being prepared, the Superfund Amendments and Reauthorization Act of 1986 (SARA) was enacted. Title III of SARA is also known as the Emergency Planning and Community Right-to-Know Act. Section 303 of SARA required the NRT to publish guidance to assist local emergency planning committees (LEPCs) with the development and implementation of comprehensive hazardous materials emergency response plans. The Federal agencies revising FEMA-10 prepared a document that included guidance for meeting the SARA Title III planning requirements. The NRT published this document as the Hazardous Materials Emergency Planning Guide (NRT-1) on March 17, 1987.

This current guide supplements NRT-1 by providing technical assistance to LEPCs to assess the lethal hazards related to potential airborne releases of extremely hazardous substances (EHSs) as designated under Section 302 of Title III of SARA. Future revisions of this guidance (scheduled for publication in 1988) will consider flammables, corrosives, explosives, and other hazards. Anyone using this guide also needs to acquire and use NRT-1.

There are many definitions of "hazards analysis." In an effort to develop and maintain consistency among Federal guidance documents, this guide adopts the approach to community level hazards analysis adopted by 14 Federal agencies in NRT-1. NRT-1 defines "hazards analysis" as a three step process: hazards identification, vulnerability analysis, and risk analysis, and provides general descriptions and specific procedures for each. This guide provides a technical discussion of, and specific procedures for, a method that can be employed in conducting a hazards analysis that will allow planners to consider the potential risks in their local communities.

Although the use of this guide is not mandatory, it does have many advantages, some of which are the following:

- It enables local planners to conduct a hazards analysis, which is an essential step in the planning process, and thereby assists local planners in meeting planning requirements of SARA Title III;
- It will facilitate community awareness of the potential risks of chemical releases while helping the community to plan for, respond to, and reduce those risks.
- It is consistent with NRT-1 mandated under SARA and approved by 14 Federal agencies;
- It is consistent with training programs (e.g. contingency planning) that are being conducted by the Emergency Management Institute in Emmitsburg, Maryland;
- It can be used by software developers who want their products to be consistent with the planning requirements of Title III of SARA; and
- It will promote consistency among local emergency plans.

Techniques presented in this guide and NRT-1 will also be helpful to LEPCs during the annual review and updating of their plans, as required by SARA Title III.

Table of Contents

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

List of Exhibits

List of Exhibits

1. Introduction and Overview

1.1 Purpose of This Guide

The purpose of this guide is to help local emergency planning committees (LEPCs) conduct site-specific hazards analyses for airborne releases of extremely hazardous substances (EHSs) as required by Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). Although these substances may also threaten property and the environment, this guide is primarily concerned with lethal effects of airborne substances on humans. An expanded version of this document which will also address hazards such as flammability, explosivity, corrosivity, and reactivity, is planned. The hazards analysis guidance in this present document will help to identify potential problems and serve as the foundation for planning and prevention efforts with emphasis on EHSs. (See Section 1.3 for a definition and brief description of "hazards analysis." See Section 1.5.3 for a description of "extremely hazardous substance.")

This document represents a joint effort by the Environmental Protection Agency (EPA), the Federal Emergency Management Agency (FEMA), and the Department of Transportation (DOT) to provide coordinated and coherent technical guidance. Although this guide can be useful to all community and industry planners, it is intended especially for LEPCs established under the provisions of SARA. The three steps of hazards analysis--hazards identification, vulnerability analysis, and risk analysis--provide a decision-making process for the LEPCs to follow as they undertake the development of comprehensive emergency plans mandated by SARA Title III. This chapter includes a description of: the relationship of this guide to general planning guidance, a general description of hazards analysis, the legislative and programmatic background for this technical guidance, and an overview of the remaining chapters.

1.2 Emergency Planning; the National Response Team Planning Guide

Title III of SARA requires each LEPC to prepare a comprehensive emergency plan by October 17, 1988. For general assistance in preparing a comprehensive emergency plan, planners should consult the Hazardous Materials Emergency Planning Guide (NRT-1) prepared by the National Response Team (NRT). NRT-1 is a statutory requirement under SARA and was published on March 17, 1987. It is available free of charge from:

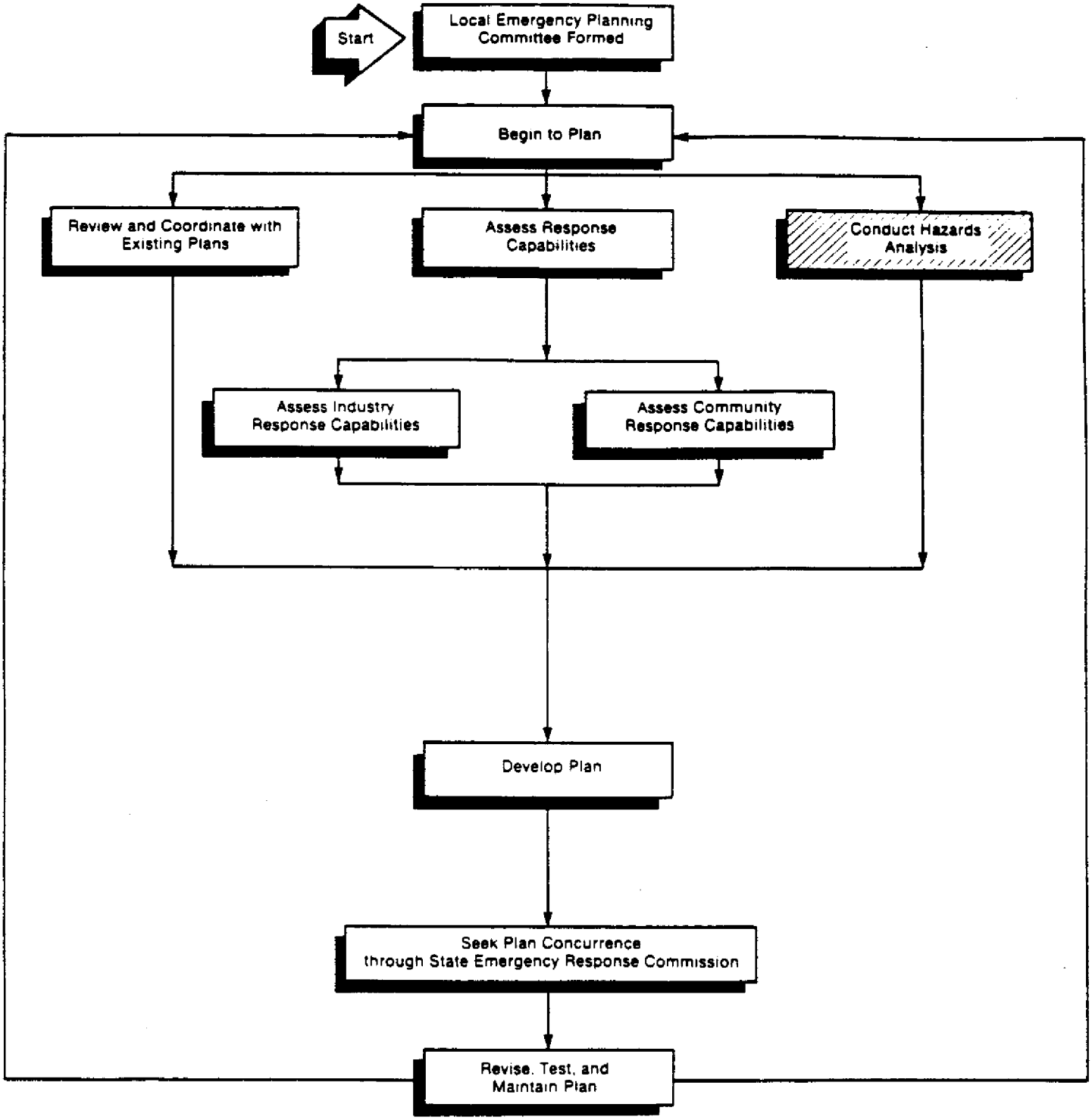
Hazardous Materials Emergency
Planning Guide
WH-562A
401 M Street, S.W.
Washington, DC 20460

LEPCs should obtain, read, and understand NRT-1 before using this technical guide.

Exhibit 1-1 illustrates the various activities that are part of the emergency planning process.

Exhibit 1-1

Overview of Planning Process*



*From NRT-1

NRT-1 offers general guidance on how to accomplish all of these planning activities. This present document offers specific technical guidance for conducting a hazards analysis for the airborne release of EHSs, as well as a general consideration of other hazardous substances. The shaded box in Exhibit 1-1 indicates where the material in this technical guide fits into the overall planning process described in NRT-1.

1.3 Beginning to Plan

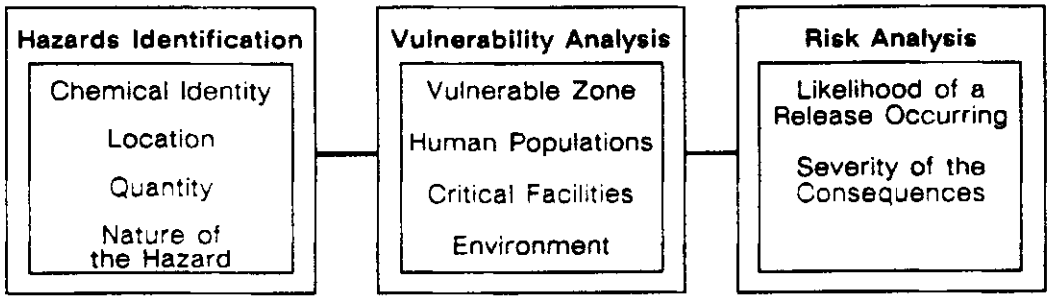
Before actually developing a plan, the LEPC should: review existing plans, review existing response capabilities, and conduct a hazards analysis.

Information from existing plans will prove helpful in the development of an emergency plan under Title III. Existing plans may have been prepared by individual facilities, by communities, by the State, or by the Regional Response Team (RRT) of the Federal government. The plans can be reevaluated and information in them can be tailored to present needs.

NRT-1 and Appendix I of this guide include lists of questions that LEPCs can use to identify what prevention and response capabilities are present at facilities, among transporters, and within local communities.

LEPCs should conduct a hazards analysis of all facilities reporting that they have EHSs in quantities greater than the threshold planning quantity (TPQ). This hazards analysis should help planners identify what additional response capabilities are needed. This analysis serves as the basis for development or revision of the emergency response plans that are mandatory under Title III of SARA.

1.4 Hazards Analysis



A hazards analysis[1] is a necessary step in comprehensive emergency planning for a community. Comprehensive planning depends upon a clear understanding of what hazards exist and what risk they pose for various members of the community. This guide follows the definition of "hazards analysis" used in NRT-1 and focuses principally on hazards analysis for airborne releases of EHSs.

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[1] Hazards analysis as presented in this guidance is intended for use in emergency response planning for EHSs. Its purpose and the meaning of its terminology are different from the purpose and terms used in "risk assessment" as defined by NAS. Because local communities will be conducting hazards analyses (as described in this guide) and risk assessments under different sections of SARA, a discussion of risk assessment can be found in NAS Press, 1983. *Risk Assessment in the Federal Government: Managing the Process*. Washington D.C. 191 pp.

The hazards analysis described in this guide is a 3-step decision-making process to identify the potential hazards facing a community with respect to accidental releases of EHSs. All three steps should be followed even though the level of detail will vary from site to site. The hazards analysis is designed to consider all potential acute health hazards within the planning district and to identify which hazards are of high priority and should be addressed in the emergency response planning process. The Title III emergency response plan must address all EHSs that are reported to the State Emergency Response Commission (SERC), but other substances including EHSs below their TPQs may also be included. Depending upon the size and nature of a planning district, the hazards analysis may be complex or relatively easy. LEPCs that have access to the necessary experts might want to conduct a detailed quantitative hazards analysis. Such a complete analysis of all hazards may not always be feasible or practical, however, given resource and time constraints in individual planning districts.

General information and an approach to understanding the three components of hazards analysis as it is applied to the EHSs are discussed in Chapter 2. A brief overview is presented below.

A. Hazards identification typically provides specific information on situations that have the potential for causing injury to life or damage to property and the environment due to a hazardous materials spill or release. A hazards identification includes information about:

- Chemical identities;
- The location of facilities that use, produce, process, or store hazardous materials;
- The type and design of chemical container or vessel;
- The quantity of material that could be involved in an airborne release; and
- The nature of the hazard (e.g., airborne toxic vapors or mists which are the primary focus of this guide; also other hazards such as fire, explosion, large quantities stored or processed, handling conditions) most likely to accompany hazardous materials spills or releases.

B. Vulnerability analysis identifies areas in the community that may be affected or exposed, individuals in the community who may be subject to injury or death from certain specific hazardous materials, and what facilities, property, or environment may be susceptible to damage should a hazardous materials release occur. A comprehensive vulnerability analysis provides information on:

- The extent of the vulnerable zones (i.e., an estimation of the area that may be affected in a significant way as a result of a spill or release of a known quantity of a specific chemical under defined conditions);
- The population, in terms of numbers, density, and types of individuals (e.g., facility employees; neighborhood residents; people in hospitals, schools, nursing homes, prisons, day care centers) that could be within a vulnerable zone;
- The private and public property (e.g., critical facilities, homes, schools, hospitals, businesses, offices) that may be damaged, including essential support systems (e.g., water, food, power, communication, medical) and transportation facilities and corridors; and
- The environment that may be affected, and the impact of a release on sensitive natural areas and endangered species.

Chapter 2 discusses vulnerability analysis with a special emphasis on human populations.

C. Risk analysis is an assessment by the community of the likelihood (probability) of an accidental release of a hazardous material and the actual consequences that might occur, based on the estimated vulnerable zones. The risk analysis is a judgement of probability and severity of consequences based on the history of previous incidents, local experience, and the best

available current technological information. It provides an estimation of:

- The likelihood (probability) of an accidental release based on the history of current conditions and controls at the facility, consideration of any unusual environmental conditions (e.g., areas in flood plains), or the possibility of simultaneous emergency incidents (e.g., flooding or fire hazards resulting in the release of hazardous materials);
- Severity of consequences of human injury that may occur (acute, delayed, and/or chronic health effects), the number of possible injuries and deaths, and the associated high-risk groups;
- Severity of consequences on critical facilities (e.g., hospitals, fire stations, police departments, communication centers);
- Severity of consequences of damage to property (temporary, repairable, permanent); and
- Severity of consequences of damage to the environment (recoverable, permanent).

To have an accurate view of the potential problems in a district, the LEPC would need to address all of the steps in hazards analysis outlined above. Each of the three steps should be followed even if extensive information is not available for each site. The process anticipates that local judgement will be necessary.

1.5 Background

This section briefly describes EPA's original Chemical Emergency Preparedness Program (CEPP), other recent public and private sector programs, and EPCRA.

1.5.1 EPA's Chemical Emergency Preparedness Program

For the past several years, EPA has pursued an active voluntary program to enhance preparedness and response capabilities for incidents involving the airborne release of EHSs. In June 1985, EPA announced a two-part National Strategy for Toxic Air Pollutants. The first part, established under Section 112 of the Clean Air Act, deals with routine releases of hazardous air pollutants. The second part was the development of the CEPP, designed to address, on a voluntary basis, accidental airborne releases of acutely toxic chemicals. Since its inception, CEPP has had two goals: to increase community awareness of chemical hazards and to enhance State and local emergency planning for dealing with chemical accidents. These goals and initial activities influenced the legislative action that led to the enactment of Title III of SARA, where many CEPP objectives are addressed (see Section 1.5.3).

1.5.2 Other Public and Private Sector Programs

Awareness of the 1984 Bhopal, India tragedy and less catastrophic incidents in the United States has led many State and local governments to improve their preparedness and response capabilities for chemical emergencies. They developed emergency plans for chemical accidents, enacted right-to-know legislation to provide citizens access to information about chemicals in their community, and organized hazardous materials planning councils and response teams.

In the private sector, the Chemical Manufacturers Association (CMA) has developed and implemented the Community Awareness and Emergency Response (CAER) program. The CAER program encourages chemical plant managers to contact community leaders and assist them in preparing for possible incidents involving hazardous materials, including those involving airborne toxics. CAER industry participants can provide information about chemicals and chemical processes that exist within the community (an important source for the "hazards identification" phase of a hazards analysis); professional

expertise to help communities develop emergency plans; equipment and personnel to assist local officials during emergency notification and response operations; and specific assistance in training responders and exercising emergency plans.

1.5.3 Emergency Planning and Community Right-to-Know Act of 1986 (Title III of SARA)

On October 17, 1986, SARA became law. Title III of SARA contains numerous requirements for Federal, State, and local governments as well as private industry in the areas of emergency planning, community right-to-know, hazardous emissions reporting, and emergency notification. These requirements build upon the original CEPP (elements of which are now mandatory), numerous existing State and local programs aimed at community right-to-know and preparedness, and the CMA CAER program.

The objectives of Title III are to improve local chemical emergency response capabilities (primarily through improved emergency planning and notification) and to provide citizens and local governments access to information about chemicals in their localities.

Title III addresses planning by: (1) identifying the EHSs that trigger the planning process; (2) requiring facilities to identify themselves if they have quantities of EHSs exceeding the TPQs; (3) requiring the establishment of a State and local planning structure and process (including specifics on committee membership); (4) requiring facilities to make information available to local planners; and (5) specifying the minimum contents of local emergency plans. This guidance includes information about all of these topics. (See NRT-1 for an additional discussion of plan contents and guidance for planning). Exhibit 1-2 summarizes the types of information that will be available as a result of compliance with Title III, and indicates how local planners can use the information. Planners should not only be aware of Federal, but also of State and local requirements that apply to emergency planning.

A. Identifying the Extremely Hazardous Substances that Trigger the Planning Process.

Title III required EPA to publish a list of EHSs and TPQs for each of those substances. EPA fulfilled this requirement in a rule published on April 22, 1987 (Federal Register, Vol. 52, No. 77, pp. 13378-13410). The list of EHSs included the 402 chemicals found in the CEPP Interim Guidance List of Acutely Toxic Chemicals[2] and four additional chemicals added as a result of new information. Four chemicals have been removed from the list and 36 others are proposed for delisting as they do not meet the acute lethality criteria. (See Appendix C for the list of EHSs and Appendix B for an explanation of the criteria used in identifying these chemicals.)

B. Planning Structure and Process.

Sections 301-303 of Title III include the following required steps:

i. State Governors appointed SERCs by April 17, 1987. SERCs identified local emergency planning districts (LEPDs) by July 17, 1987 and appointed members of the LEPC by August 17, 1987. SERCs are to coordinate and supervise the work of the LEPCs, and review all emergency plans to ensure that all the local plans for any one State are coordinated.

ii. Facilities had to notify SERCs by May 17, 1987 if they have any listed EHS(s) that exceed the designated TPQ. The TPQ is a specific quantity assigned to each of the EHSs. If a facility has present at any time an EHS in an amount greater than the TPQ, the facility must identify itself to the SERC. The SERC notifies the LEPC to include the facility, if appropriate, in its comprehensive emergency plan. SERCs can specify other facilities to be included in the emergency plan.

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[2] Title III of SARA replaces the term "acutely toxic chemical" with "extremely hazardous substance".

Exhibit 1-2

TITLE III INFORMATION FROM FACILITIES PROVIDED IN SUPPORT OF PLAN DEVELOPMENT

Information Generated by Title III Compliance	Title III Authority	How LEPC Can Use the Information
Facilities subject to Title III planning requirements (including those designated by the Governor or SERC)	Section 302; Notice from Governor/SERC	Hazards analysis -- Hazards identification
Additional facilities near subject facilities (such as hospitals, natural gas facilities, etc.)	Sections 302(b)(2); 303(c)(1)	Hazards analysis -- Vulnerability analysis
Transportation routes	Sections 303(c)(1); 303(d)(3)	Hazards analysis -- Hazards identification
Major chemical hazards (chemical name, properties, location, and quantity)	Section 303(d)(3) for extremely hazardous substances used, produced, stored Section 311 MSDSs for chemicals manufactured or imported Section 312 inventories for chemicals manufactured or imported	Hazards analysis -- Hazards identification
Facility and community response methods, procedures, and personnel	Sections 303(c)(2); 303(d)(3)	Response functions (see pp. 49ff of NRT Planning Guide)
Facility and community emergency coordinators	Sections 303(c)(3); 303(d)(1)	Assistance in preparing and implementing the plan (see p. 11 of NRT Planning Guide)
Release detection and notification procedures	Sections 303(c)(4); 303(d)(3)	Initial notification; Warning systems (see pp. 50, 53 respectively of NRT Planning Guide)
Methods for determining release occurence and population affected	Sections 303(c)(5); 303(d)(3)	Hazards analysis -- Vulnerability analysis and risk analysis
Facility equipment and emergency facilities; persons responsible for such equipment and facilities	Sections 303(c)(6); 303(d)(3)	Resource management
Evacuation plans	Sections 303(c)(7); 303(d)(3)	Evacuation planning
Training programs	Sections 303(c)(8); 303(d)(3)	Resource management
Exercise methods and schedules	Sections 303(c)(9); 303(d)(3)	Testing and updating

iii. Facilities must provide the following information to the LEPC: the name of a facility representative (by September 17, 1987) to serve as facility emergency coordinator and assist the LEPC in the planning process; information requested by the LEPC that is necessary for developing and implementing the emergency plan (see Section 303(d)(3) of Title III of SARA); and any changes at the facility that could affect emergency planning. (Facility compliance with this SARA requirement will make available much information that should prove helpful for hazards analysis and annual plan revisions.)

iv. LEPCs must prepare comprehensive emergency plans for all facilities subject to the regulations by October 17, 1988.

v. Transporters of EHSs do not have to notify SERCs under Section 302. Section 327 of Title III of SARA states that Title III does not apply to any substance or chemical being transported, including transportation by pipeline, except as provided in Section 304. Section 304 requires notification of releases of EHSs and Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) hazardous substances from facilities, pipelines, motor vehicles, rolling stock and aircraft. Barges and other vessels are exempted from Section 304 reporting.

The Title III planning structure for receiving information and formulating plans is displayed in Exhibit 1-3.

C. Other Title III Information for Planners.

This guide does not include a detailed description of Sections 304, 311, 312, and 313 of Title III. Details of these sections may be found in Appendix A of NRT-1. What is important for users of this guide to know is that facilities complying with these sections of Title III will provide information to LEPCs that may prove useful for hazards analysis and emergency plan development and revision.

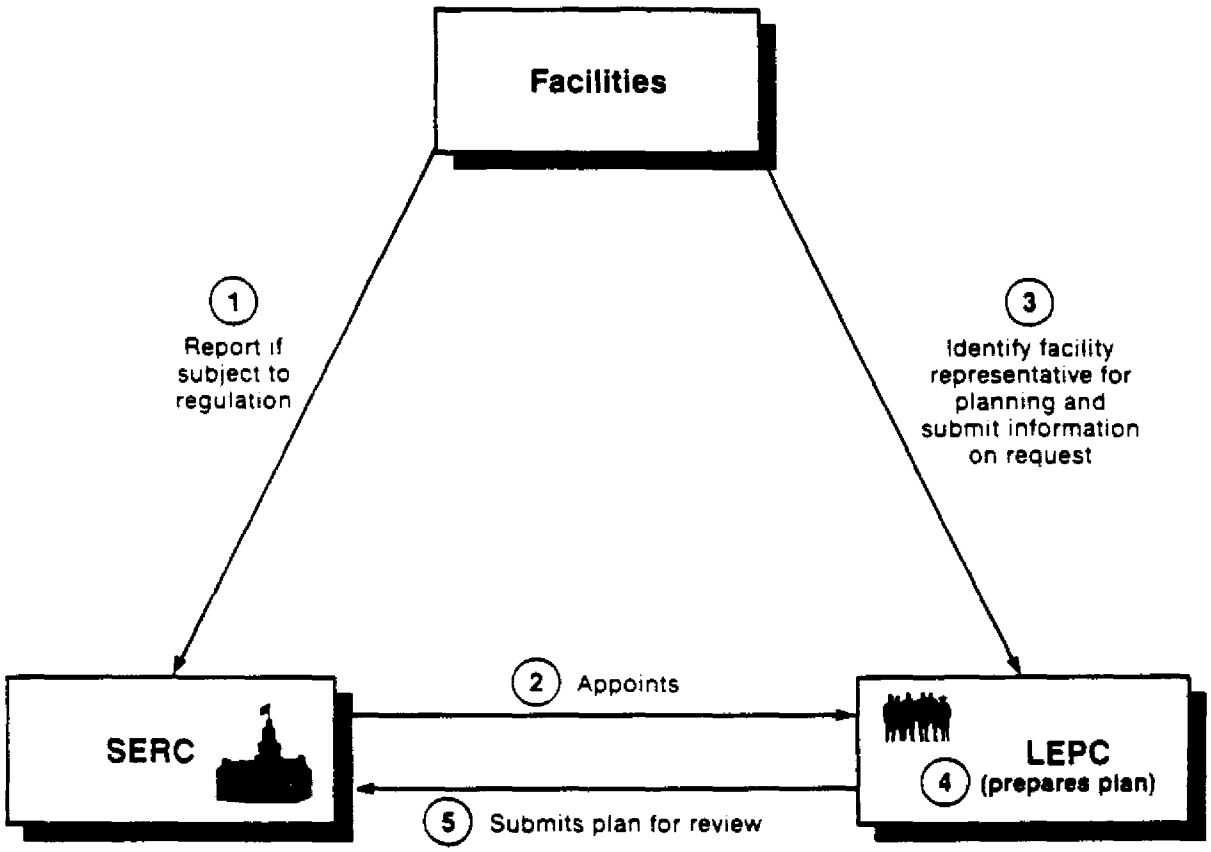
1.6 Contents of this Guide

The components of a hazards analysis are discussed in more detail in the next chapter of this guide. The discussion in Chapter 2 is as simplified and direct as possible, given the complexity of hazards analysis. Additional technical material is in the appendices. Chapter 3 provides a detailed step-by-step procedure for hazards analysis of the EHSs at the local level. Guidance for incorporating results of a hazards analysis into the overall planning process is found in Chapter 4.

Several appendices have been included in this guide. Appendix A contains a list of abbreviations and acronyms and a glossary of technical terms. (Users of this guide should regularly consult Appendix A for help in understanding the terms used). Appendix B describes EPA's criteria for identifying EHSs. Appendix C contains the list of EHSs designated by Title III of SARA both alphabetically and by Chemical Abstract Service (CAS) number. This appendix also provides information on important physical properties of each substance and the levels of concern (LOC) which are required to estimate vulnerable zones. Appendix D provides information and calculations concerning exposure levels of EHSs and the basis for the LOC. Appendix E is a sample chemical profile of one of the EHSs (acrolein). Appendix F contains descriptions of fire and reactivity hazards. Appendix G contains more technical information for estimating and reevaluating vulnerable zones. As a warning to planners to avoid automatically establishing evacuation distances from the estimated vulnerable zones, Appendix H includes a discussion of issues to be considered for evacuation. Appendix I supplements Chapters 3 and 4 with a procedure for gathering important information to evaluate sites for contingency planning. Appendix J details other methods for evaluating hazards and supplements Chapters 2 and 3.

Exhibit 1-3

Title III Planning Steps



SERC = State emergency response commission

LEPC = Local emergency planning committee

Appendix K provides an evaluation guide for the use of computerized systems that could be of assistance in emergency response planning. Appendix L is an annotated bibliography of pertinent references. Appendix M lists the EPA Regional preparedness contacts and coordinators as well as FEMA Regional contacts.