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RISK MANAGEMENT PROGRAM GUIDANCE FOR WASTEWATER TREATMENT PLANTS (40 CFR PART 68)

RMP SERIES

This document provides guidance to help owners and operators of wastewater treatment plants to determine if their processes are subject to chemical accident prevention regulation under section 112(r) of the Clean Air Act and 40 CFR part 68 and to comply with regulations. This document does not substitute for EPA's regulations, nor is it a regulation itself. Thus, it cannot impose legally binding requirements on EPA, states, or the regulated community, and may not apply to a particular situation based upon circumstances. EPA may change this guidance in the future, as appropriate.

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INTRODUCTION

WHY SHOULD I READ THIS GUIDANCE?

If you handle, manufacture, use, or store any of the toxic and flammable substances listed in 40 CFR 68.130 (see Appendix A of this document) above the specified threshold quantities in a process, you are required to develop and implement a risk management program under a rule issued by the U.S. Environmental Protection Agency (EPA). This rule, "Chemical Accident Prevention Provisions" (part 68 of Title 40 of the Code of Federal Regulations (CFR)), applies to a wide variety of facilities that handle, manufacture, store, or use toxic substances, including chlorine and ammonia and highly flammable substances such as propane. This document provides guidance on how to determine if you are subject to part 68 and how to comply with part 68. If you are subject to part 68, you must be in compliance no later than June 21, 1999, or the date on which you first have more than a threshold quantity of a regulated substance in a process, whichever is later.

This model risk management program is intended for wastewater treatment plants (WWTPs), including publicly owned treatment works (POTWs) and other industrial treatment systems. It provides guidance on how to comply with part 68 with respect to chlorine, ammonia (anhydrous and aqueous), sulfur dioxide, digester gas, and propane, the substances WWTPs usually use for treatment, produce as a result of treatment, or store as fuel. We expect that any regulated substances present in your wastestreams will be in concentrations too low to require compliance. The sections on propane included in this model are taken from the *Risk Management Program Guidance for Propane Storage Facilities.*

The goal of part 68 — the risk management program — is to prevent accidental releases of substances that can cause serious harm to the public and the environment from short-term exposures and to mitigate the severity of releases that do occur. The 1990 Amendments to the Clean Air Act (CAA) require EPA to issue a rule specifying the type of actions to be taken by facilities (referred to in the statute as stationary sources) to prevent accidental releases of such hazardous chemicals into the atmosphere and reduce their potential impact on the public and the environment. Part 68 is that rule.

In general, part 68 requires that:

- Covered facilities must develop and implement a risk management program and maintain documentation of the program at the site. The risk management program will include an analysis of the potential offsite consequences of an accidental release, a five-year accident history, a release prevention program, and an emergency response program.

- Covered facilities also must develop and submit a risk management plan (RMP), which includes registration information, to EPA no later than June 21, 1999, or the date on which the facility first has more than a threshold quantity in a process, whichever is later. The RMP provides a summary of the risk

management program. The RMP will be available to federal, state, and local government agencies and the public.

- Covered facilities also must continue to implement the risk management program and update their RMPs periodically or when processes change, as required by the rule.

The phrase "risk management program" refers to all of the requirements of part 68, which must be implemented on an on-going basis. The phrase "risk management plan (RMP)" refers to the document summarizing the risk management program that you must submit to EPA.

HOW DO I USE THIS DOCUMENT?

This is a technical guidance document designed for owners and operators of WWTPs covered by part 68. It will help you to:

- Determine if you are covered by the rule;
- Determine what level of requirements is applicable to your covered process(es);
- Understand which specific risk management program activities must be conducted;
- Select a strategy for implementing a risk management program, based on your current state of compliance with other government rules and industry standards and the potential offsite impact of releases from your process(es); and
- Understand the reporting, documentation, and risk communication components of the rule.

This document provides guidance and reference materials to help you comply with EPA's risk management program regulations. You should view and retain this guidance as a reference document for use when you are unsure about what a requirement means. This document does not provide guidance on any other rule or part of the CAA. Even if you are not covered by this rule, you should be aware that under the General Duty Clause of CAA section 112(r)(1), you are required to design and maintain a safe facility.

WHAT DO I DO FIRST?

Before developing a risk management program, you should do five things:

(1) Determine which, if any, of your processes are covered by this program

Only WWTPs having one or more processes with a threshold quantity of a regulated substance (see 40 CFR 68.130 in Appendix A) in a "process" need to comply with part 68. "Process" is defined by the rule in § 68.3 and does not necessarily correspond with an engineering concept of process. The

STATE PROGRAMS

This guidance applies to 40 CFR part 68. You should check with your state government to determine if the state has its own accidental release prevention rules or has obtained delegation from EPA to implement and enforce part 68 in your state. State rules may be more stringent than EPA's rules. They may cover more substances or cover the same substances at lower thresholds. They may also impose additional requirements. For example, California's state program requires a seismic study. See Chapter 10 for information on state implementation of part 68. Unless your state has been granted delegation, you must comply with part 68 as described in this document even if your state has different rules under state law.

requirements apply only to covered processes. See Chapter 1 for more information on how to define your processes and determine if they are subject to the rule.

(2) **Determine the appropriate program level for each covered process**

Depending on the specific characteristics of a covered process, the results of the offsite consequence analysis for that process, and whether your state implements OSHA programs, it may be subject to one of three different sets of requirements (called program levels). See Chapter 2 for more information.

(3) **Determine EPA's requirements for the facility and each covered process**

Certain requirements apply to the facility as a whole, while others are process-specific. See Chapter 2 for more information.

(4) **Assess your operations to identify current risk management activities**

Because you probably conduct some risk management activities already (e.g., employee training, equipment maintenance, and emergency planning), you should review your current operations to determine the extent to which they meet the provisions of this rule. EPA does not expect you to redo these activities if they already meet the rule's requirements. See Chapters 5 to 8 individually for guidance on how to tell if your existing practices can meet those required by EPA.

(5) **Review the regulations and this guidance to develop a strategy for conducting the additional actions you need to take for each covered process. Discuss the requirements with management and staff.**

The risk management program takes an integrated approach to assessing and managing risks and will involve most of the operations of covered processes. Early involvement of both management and staff will help develop an effective program.

REQUIREMENTS ARE PERFORMANCE BASED

Finally, keep in mind that many of these requirements are performance-based; for example, part 68 does not specify how often you must inspect storage tanks, only that you do so in a manner that minimizes the risk of a release. This allows you to tailor your program to fit the particular conditions at your facility. The degree of complexity required in a risk management program will depend on the complexity of the facility. To illustrate, the operating procedures for a WWTP that does only primary treatment are likely to be less complex than those of WWTP that does secondary or tertiary treatment. Similarly, the length of training necessary to educate employees on such procedures will be proportional to the complexity of your operating procedures. And while a large WWTP with multiple processes may benefit from a computerized maintenance tracking system, a small WWTP with a simpler process may be able to track maintenance activities using a logbook.

There is no one "right" way to develop and implement a risk management program. Even for the same rule elements, your program will be different from everyone else's program (even those in the same industry) because it will be designed for your specific situation and hazards — it will reflect whether your facility is near the public and sensitive environmental areas, the specific equipment you have installed, the managerial decisions that you have made previously, and other relevant factors.

WHERE DO I GO FOR MORE INFORMATION?

EPA's risk management program requirements may be found in Part 68 of Volume 40 of the Code of Federal Regulations. The relevant sections were published in the *Federal Register* on January 31, 1994 (59 FR 4478) and June 20, 1996 (61 FR 31667). A consolidated copy of these regulations is available in Appendix A. In addition, EPA has finalized a rule adopting the provisions covered by the Stay of Applicability included in the June 20, 1996, final rule, 40 CFR §68.2 (January 6, 1998, 63 FR 640).

EPA is working with industry and local, state, and federal government agencies to assist sources in complying with these requirements. For more information, refer to Appendix E (Technical Assistance). Appendices C and D also provide points of contact for EPA and OSHA at the state and federal levels for your questions. Your local emergency planning committee (LEPC) also can be a valuable resource and can help you discuss issues with the public.

Finally, if you have access to the Internet, EPA has made copies of the rules, fact sheets, and other related materials available at the home page of EPA's Chemical Emergency Preparedness and Prevention Office (http://www.epa.gov/ceppo/). Please check the site regularly as additional materials are posted.

PART 68 REGULATORY TERMS

A few words and phrases have very specific meanings within the regulation. Some of these are unusual, which is to say they are not used in everyday language. Others are defined by the rule in ways that vary to some degree from their everyday meaning. The following are the major regulatory terms used in this document and a brief introduction to their meaning within the context of part 68. They are defined in § 68.3 of the rule.

"Stationary source" basically means facility. The CAA and, thus Part 68 use the term "stationary source" and we explain it in Chapter 1. Generally, we use "facility" in its place in this document.

"Process" is given a broad meaning in this rule and document. Most people think of a process as the mixing or reacting of chemicals. Its meaning under this rule is much broader. It basically means any equipment, including storage vessels, and activities, such as loading, that involve a regulated substanc and could lead to an accidental release. Chapter 1 discusses the definition of process under this rule i detail.

"Regulated substance" means one of the 140 chemicals listed in part 68.

"Threshold quantity" means the quantity, in pounds, of a regulated substance which, if exceeded, triggers coverage by this rule. Each regulated substance has its own threshold quantity. If you have more than a threshold quantity of a regulated substance in a process, you must comply with the rule. Chapter 1 explains how to determine whether you have a threshold quantity.

"Vessel" means any container, from a single drum or pipe to a large storage tank or sphere.

"Public receptor" generally means any place where people live, work, or gather, with the exception of roads. Buildings, such as houses, shops, office buildings, industrial facilities, the areas surrounding buildings where people are likely to be present, such as yards and parking lots, and recreational areas, such as parks, sports arenas, rivers, lakes, beaches, are considered public receptors. Chapter 2 discusses public receptors.

"Environmental receptor" means a limited number of natural areas that are officially designated by the state or federal government. Chapter 2 discusses this definition.

WHAT IS A LOCAL EMERGENCY PLANNING COMMITTEE?

Local emergency planning committees (LEPCs) were formed under the federal Emergency Planning and Community Right-to-Know Act (EPCRA) in 1986. The committees are designed to serve as a community forum for issues relating to preparedness for emergencies involving hazardous substances. They consist of representatives from local government, local industry, transportation groups, health and medical organizations, community groups, and the media. LEPCs:

- Collect information from facilities on hazardous substances that pose a risk to the community;
- Develop a contingency plan for the community based on this information; and
- Make information on hazardous substances available to the general public.

Contact the mayor's office or the county emergency management office for more information on your LEPC.

CHAPTER 1: GENERAL APPLICABILITY

1.1 INTRODUCTION

The purpose of this chapter is to help you determine if you are subject to Part 68, the risk management program rule. Part 68 covers you if you are:

- The owner or operator of a stationary source (facility)
- That has more than a threshold quantity
- Of a regulated substance
- In a process.

The goal of this chapter is to make it easy for you to identify processes that are covered by this rule so you can focus on them.

This chapter walks you through the key decision points (rather than the definition items above), starting with those provisions that may tell you that you are not subject to the rule. We first outline the general applicability provisions and the few exemptions and exclusions, then discuss which chemicals are "regulated substances." If you do not have a "regulated substance" at your site, you are not covered by this rule. The exemptions may exclude you from the rule or simply exclude certain activities from consideration. (Throughout this document, when we say "rule" we mean the regulations in part 68.)

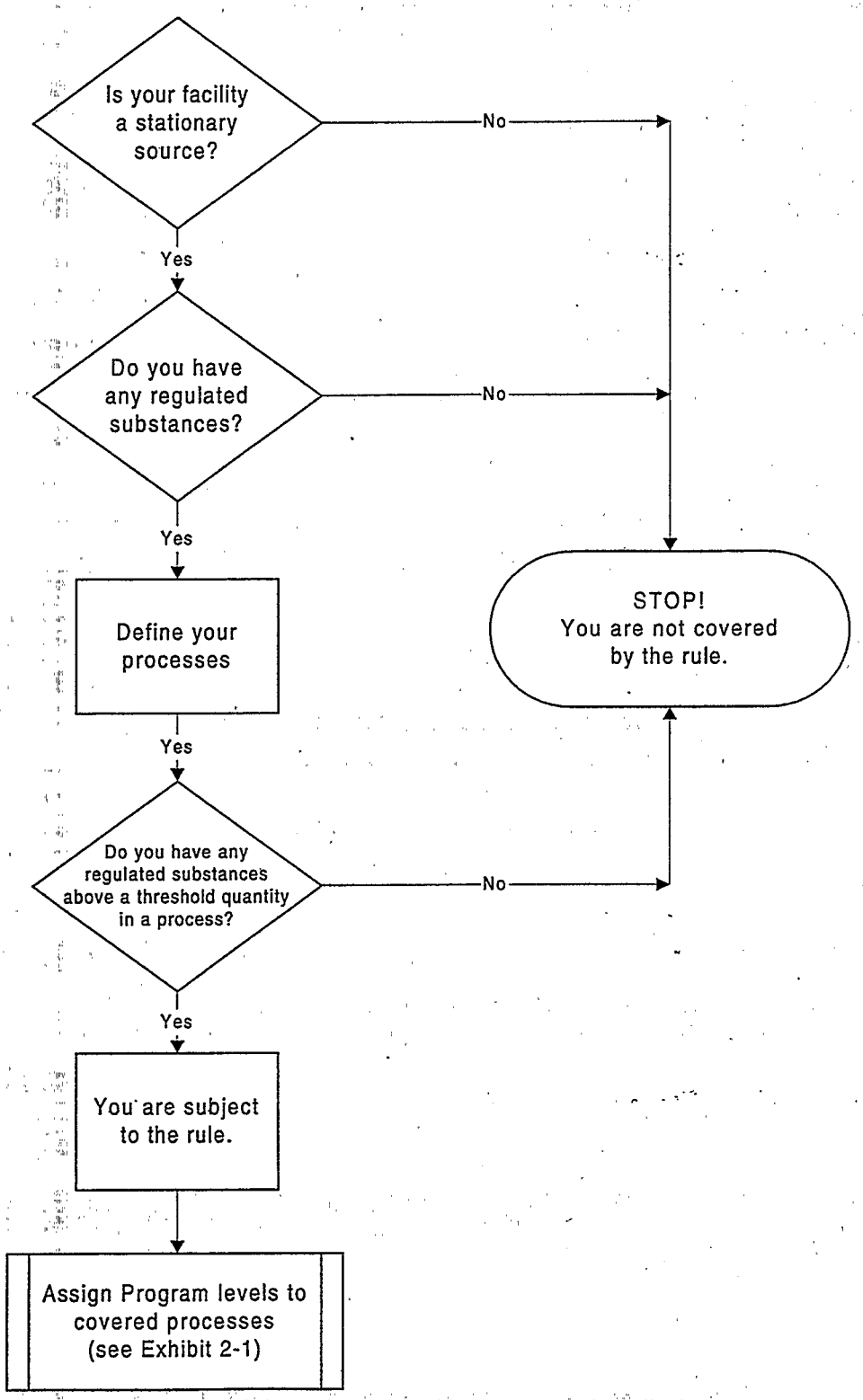
We then describe what is considered a "process," which is critical because you are subject to the rule *only* if you have more than a threshold quantity in a process. The chapter next describes how to determine whether you have more than a threshold quantity.

Finally, we discuss how you define your overall stationary source and when you must comply. These questions are important once you have decided that you are covered. For most WWTPs covered by this rule, the stationary source is basically all covered processes at your site. Exhibit 1-1 presents the decision process for determining applicability.

STATE PROGRAMS

This guidance applies to only 40 CFR part 68. You should check with your state government to determine if the state has its own accidental release prevention rules or has obtained delegation from EPA to implement and enforce part 68 in your state. State rules may be more stringent than EPA's rules. Unless your state has been granted delegation, you must comply with part 68 as described in this document even if your state has different rules under state law. See Chapter 10 for a discussion of state implementation of part 68.

EXHIBIT 1-1
EVALUATE FACILITY TO IDENTIFY COVERED PROCESSES



mixtures above 1 percent concentration) or do not have them above their listed threshold quantities, you do not need to read any further because you are not covered.

The list includes the following chemicals that are commonly used at WWTPs:

	EPA Threshold Quantity	OSHA Threshold Quantity
Chlorine	2,500 pounds	1,500 pounds
Anhydrous Ammonia	10,000 pounds	10,000 pounds
Aqueous Ammonia (concentration 20% or greater)	20,000 pounds	15,000 pounds (>44%)
Anhydrous Sulfur Dioxide	5,000 pounds	1,000 pounds (Liquid)
Methane	10,000 pounds	10,000 pounds
Propane	10,000 pounds	10,000 pounds

For methane, the 10,000-pound threshold applies to the total weight of the flammable mixture of digester gases, not just the weight of methane or flammables in the mixture. For aqueous ammonia, the threshold applies only to the weight of ammonia in the mixture.

In general, regulated chemicals in a wastestream at a POTW will not exceed one percent of a mixture and thus will not be covered by part 68. If an industrial WWTP has more than 1 percent of a regulated substance in the wastestream, the quantity of the substance in the wastestream will have to be determined and compared to the threshold quantity. Oxygen is not subject to either part 68 or OSHA PSM. Ozone is also not subject to part 68, although it is covered by OSHA PSM.

1.4 WHAT IS A PROCESS

The concept of "process" is key to whether you are subject to this rule. Process is defined in 40 CFR § 68.3 as:

"Any activity involving a regulated substance, including any use, storage, manufacturing, handling, or on-site movement of such substances, or combination of these activities. For the purposes of this definition, any group of vessels that are interconnected, or separate vessels that are located such that a regulated substance could be involved in a potential release, shall be considered a single process."

"Vessel" in § 68.3 means any reactor, tank, drum, barrel, cylinder, vat, kettle, boiler, pipe, hose, or other container.

EPA's definition of process is identical to the definition of process under the OSHA PSM standard. Understanding the definition of process is important in determining whether you have a threshold quantity of a regulated substance and what level of requirements you must meet if the process is covered.

What does this mean to you?

- If you store a regulated substance in a single vessel in quantities above the threshold quantity, you are covered.
- If you have interconnected vessels that altogether hold more than a threshold quantity, you are covered. The connections need not be permanent. If two or more vessels are connected occasionally, they are considered a single process for the purposes of determining whether a threshold quantity is present.
- If you have multiple unconnected vessels, containing the same substance, you will have to determine whether they need to be considered together as co-located.

A process can be as simple as a single storage vessel or a group of drums or cylinders in one location or as complicated as a system of interconnected vessels, pumps, piping, and storage vessels.

SINGLE VESSELS

If you have only a single vessel containing regulated substances, you need not worry about the other possibilities for defining a process and can skip to section 1.5. For the purposes of defining a threshold quantity, you need only consider the quantity in this vessel.

INTERCONNECTED VESSELS

In general, if you have two or more vessels containing a regulated substance that are connected through piping or hoses for the transfer of the regulated substance, you must consider the total quantity of a regulated substance in all the connected vessels and piping when determining if you have a threshold quantity in a process. If the vessels are connected for transfer of the substance using hoses that are sometimes disconnected, you still have to consider the contents of the vessels as one process, because if one vessel were to rupture while the hose was attached or the hose were to break during the transfer, both tanks could be affected. Therefore, you must count the quantities in both tanks and in any connecting piping or hoses. You cannot consider the presence of automatic shutoff valves or other devices that can limit flow, because these are assumed to fail for the purpose of determining the total quantity in a process.

Once you have determined that a process is covered (the quantity of a regulated substance exceeds its threshold), you must also consider equipment, piping, hoses, or other interconnections that do not carry or contain the regulated substance, but that are important for accidental release prevention. Equipment or connections which contain utility services, process cooling water, steam, electricity, or other non-regulated substances may be considered part of a process if such equipment could cause a regulated substance release or interfere with mitigating the consequences

of an accidental release. Your prevention program for this process (e.g., PSM program) will need to cover such equipment. If, based on your analysis, it is determined that interconnected equipment or connections not containing the regulated substance cannot cause a regulated substance release or interfere with mitigation of the consequences of such a release, then such equipment or connections could safely be considered outside the limits or boundaries of the covered process.

In some cases, determining the boundaries of a process for purposes of the RMP rule may be complicated. In the preamble to the June 20, 1996 rule (61 FR 31668), EPA clearly stated its intent to be consistent with OSHA's interpretation of "process" as that term is used in OSHA's PSM rule. Therefore, if your facility is subject to the PSM rule, the limits of your process(es) for purposes of OSHA PSM will be the limits of your process(es) for purposes of RMP (except in cases involving atmospheric storage tanks containing flammable regulated substances, which are exempt from PSM but not RMP). If your facility is not covered by OSHA PSM and is complicated from an engineering perspective, you should consider contacting your implementing agency for advice on determining process boundaries.

CO-LOCATION

The third possibility you must consider is whether you have separate vessels that contain the same regulated substance that are located such that they could be involved in a single release. If so, you must add together the total quantity in all such vessels to determine if you have more than a threshold quantity. This possibility will be particularly important if you store a regulated substance in cylinders or barrels or other containers in a warehouse or outside in a rack. In some cases, you may have two vessels or systems that are in the same building or room. For each of these cases, you should ask yourself:

- Could a release from one of the containers lead to a release from the other? For example, if a cylinder of propane were to rupture and burn, would the fire spread to other propane cylinders?

- Could an event external to the containers, such as a fire or explosion or collapse of collision (e.g., a vehicle collides with several stored containers), have the potential to release the regulated substance from multiple containers?

You must determine whether there is a credible scenario that could lead to a release of a threshold quantity.

For flammables, you should consider the distance between vessels. If a fire could spread from one vessel to others or an explosion could rupture multiple vessels, you must count all of them. For toxics, a release from a single vessel will not normally lead to a release from others unless the vessel fails catastrophically and explodes, sending metal fragments into other vessels. Co-located vessels containing toxic substances, however, may well be involved in a release caused by a fire or explosion that occurs from another source. The definition of process is predicated on the

assumption that explosion will take place. In addition, a collapse of storage racks could lead to multiple vessels breaking open.

If the vessels are separated by fire walls or barricades that will contain the blast waves from explosions of the substances, you will not need to count the separated vessels, but you would count any that are in the same room.

You may not dismiss the possibility of a fire spreading based on an assumption that your fire brigade will be able to prevent any spread. You should ask yourself how far the fire would spread if the worst happens — the fire brigade is slow to arrive, the water supply fails, or the local fire department decides it is safer to let the fire burn itself out. If you have separate vessels containing a regulated substance that could be affected by the same accident, you should count them as a single process.

PROCESSES WITH MULTIPLE CHEMICALS

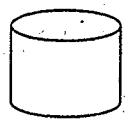
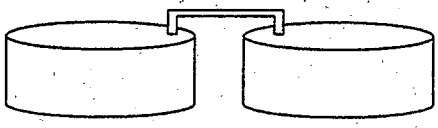
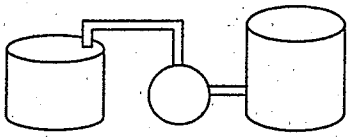
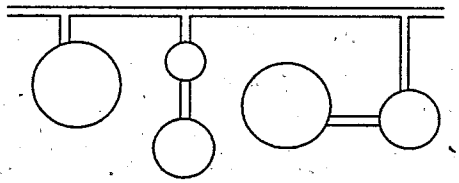
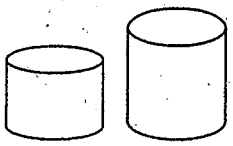
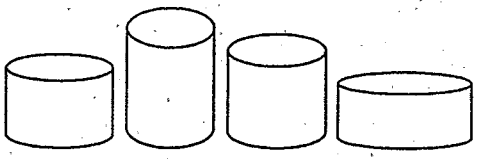
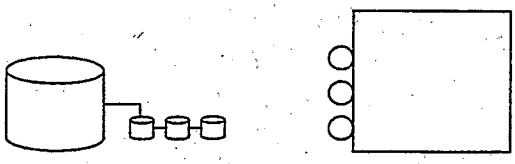
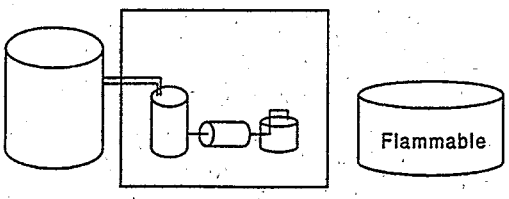
When you are determining whether you have a covered process, you should not limit your consideration to vessels that have the same regulated substance. A covered process includes any vessels that altogether hold more than a threshold quantity of regulated substances and that are interconnected or co-located. Therefore, if you have four storage or reactor vessels holding four different regulated substances above their individual thresholds and they are located close enough to be involved in a single event, they are considered a single process. One implication of this approach is that if you have two vessels, each containing slightly less than a threshold quantity of the same regulated substance and located a considerable distance apart, and you have other storage or process vessels in between with other regulated substances above their thresholds, the two vessels with the first substance may be considered to be part of a larger process involving the other intervening vessels and other regulated substances, based on co-location.

Exhibit 1-2 provides illustrations of what may be defined as a process.

DIFFERENCES WITH OSHA

OSHA aggregates different flammable liquids across vessels in making threshold determinations; OSHA also aggregates different flammable gases (but does not aggregate flammable liquids with flammable gases); EPA aggregates neither. Therefore, if you have three co-located or connected reactor vessels each containing 5,000 pounds of a different flammable liquid, OSHA considers that you have 15,000 pounds of flammable liquids and are covered by the PSM standard. Under EPA's rule, you would not have a covered process because you do not meet the threshold quantity for any one of the three substances. OSHA, like EPA, does not aggregate quantities for toxics as a class (i.e., each toxic substance must meet its own threshold quantity).

EXHIBIT 1-2: PROCESS

Schematic Representation	Description	Interpretation
	1 vessel 1 regulated substance above TQ	1 process
	2 or more connected vessels *same* regulated substance above TQ	1 process
	2 or more connected vessels *different* regulated substances each above TQ	1 process
	pipeline feeding multiple vessels total above TQ	1 process
	2 or more vessels co-located *same* substance total above TQ	1 process
	2 or more vessels co-located *different* substances each above TQ	1 process
	2 vessels, located so they won't be involved in a single release *same* or *different* substances each above TQ	2 processes
	2 locations with regulated substances each above TQ	1 or 2 processes depending on distance
	1 series of interconnected vessels *same* or *different* substances above TQs *plus* a co-located storage vessel containing flammables	1 process

Qs & As
Process

Q. How far apart do separate vessels have to be to be considered different processes?

A. There is no hard and fast rule for how great this distance should be before you do not need to consider the vessels as part of one process. Two vessels at opposite ends of a large warehouse room might have to be considered as one process if the entire warehouse or room could be engulfed in a fire. Two vessels separated by the same distance out of doors might be far enough apart that a fire affecting one would be unlikely to spread to the other. You may want to consult with your local fire department. You should then use your best professional judgment. Ask yourself how much of the regulated substance could be released if the worst happens (you have a major fire, an explosion, a natural disaster).

Q. We add chlorine to a wastestream which dilutes it. At what point does the process end?

A. The process ends when the concentration of chlorine in the wastestream is no longer above one percent, unless other regulated substances are present above their threshold quantities or the vessel is otherwise considered part of the process because it could cause a release of the covered vessels holding regulated substances or hinder a response to such a release.

1.5 THRESHOLD QUANTITY IN A PROCESS

The threshold quantity for each regulated substance is listed in 40 CFR 68.30, in Appendix A. You should determine whether the maximum quantity of each substance in a process is greater than the threshold quantity listed. If it is, you must comply with this rule for that process. Even if you are not covered by this rule, you may still be subject to reporting requirements under the Emergency Planning and Community Right to Know Act (EPCRA) because EPCRA section 312 requires reporting at lower thresholds for toxics and counts for threshold determination purposes the maximum quantity of each substance on the site as a whole rather than in a single process.

Quantity in a Vessel

To determine if you have the threshold quantity of a regulated substance in a vessel involved in a single process, you need to consider the maximum quantity in that vessel at any one time. You do not need to consider the vessel's maximum capacity if you never fill it to that level. Base your decision on the actual maximum quantity that you may have in the vessel. Your maximum quantity may be more than your normal operating maximum quantity; for example, if you may use a vessel for emergency storage, the maximum quantity should be based on the quantity that might be stored.

AGGREGATION OF SUBSTANCES

A toxic substance is never aggregated with a different toxic substance to determine whether a threshold quantity is present. If your process consists of co-located vessels with different toxic substances, you must determine whether each substance exceeds its threshold quantity.

A flammable substance in one vessel is never aggregated with a different flammable substance in another vessel to determine whether a threshold quantity is present. However, if a flammable mixture meets the criteria for NFPA-4 and contains different regulated flammables, it is the mixture, not the individual substances, that is considered in determining if a threshold quantity is present.

"At any one time" means you need to consider the largest quantity that you ever have in the vessel. If you fill a tank with 50,000 pounds and immediately begin using the substance and depleting the contents, your maximum is 50,000 pounds.

If you fill the vessel four times a year, your maximum is still 50,000 pounds. Throughput is not considered because the rule is concerned about the maximum quantity you could release in a single event.

For tanks, the maximum capacity can usually be found from "U1A"certificates for the vessels. The U1A certificates on all vessels constructed under the ASME Boiler and Pressure Vessel Code are kept on file by the National Board of Boiler and Pressure Vessel Inspectors.[1] The nominal nameplate capacity can also be found on the permanently attached nameplate for your storage tank. The nameplate will also have the National Board Number for your vessel, which is the key to retrieving your U1A form from the Board. These nameplates may be located on one of the hemispherical heads, the manway, or the manway cover of the tank. The nominal capacity will usually be the water capacity, and you may want to convert it to pounds.

If you use transportation containers (railcars or tank trucks) as storage vessels, you can obtain the capacity from the required DOT nameplate, identification plate, or specification plate or from the owner of the containers. Smaller shipping containers are also marked.

In calculating the quantity in a tank, you may take into account industry recommendations or regulatory limits on the percentage of the tank's total capacity that can be used, provided you comply with these limits. The Chlorine Institute recommends that chlorine tanks not be filled beyond 95 percent at a maximum temperature of 122 F. OSHA regulations (29 CFR 1910.111) limit liquid volumes of anhydrous ammonia. NFPA-58 (the National Fire Protection Association's

[1] National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229; http://www.nationalboard.org.

Standard for Storage and Handling of Liquified Petroleum Gases) recommends that propane tanks not be filled beyond 88 percent at 60 F. Aqueous ammonia may be held in various concentrations; your supplier can provide the density and weight. You can use this information, with your tank capacity, to estimate the quantity of ammonia being stored. The Compressed Gas Association provides recommendations on filling sulfur dioxide tanks at varying temperatures (CGA pamphlet G-3).

Methane, a regulated flammable substance, is a component of digester gas, commonly making up about 65 to 70 percent by volume of the total. Digester gas usually meets the NFPA-4 criteria that determine whether flammable mixtures are subject to part 68. You are more likely to have a threshold quantity of methane if you compress and store it, but you may also have a threshold quantity in the head space of the digester(s) and associated piping. To determine whether more than the threshold quantity of 10,000 pounds is present in the head space and connected piping, you must consider the total quantity of a flammable mixture containing a regulated flammable substance, so you must estimate the total quantity of digester gas, not just the quantity of methane in the gas, to determine whether you have a threshold quantity. For digester gas that is about 70 percent methane, at pressures not much above atmospheric pressure and temperatures of about 95 to 105 F, you may assume a density of approximately 0.06 pounds per cubic foot. The quantity of digester gas can be estimated from the volume of the digester in cubic feet (the overhead space and pipeline volume) as follows:

Quantity (pounds) = 0.06 pounds per cubic foot x Digester Volume (cubic feet)

For example, if the volume of digester gases in the head space and piping is 200,000 cubic feet, you would multiple 200,000 by 0.06; the quantity of digester gas is, therefore, 12,000 pounds. The digester volume must be about 167,000 cubic feet or more to contain a threshold quantity of flammable gas. At a methane percentage by volume of 64 percent, the density would be 0.062 pounds per cubic foot.

If you have compressed digester gas, you may estimate the density by applying a pressure factor as follows:

Density at pressure Y = 0.06 x Y (absolute pressure)/atmospheric pressure

If you have more accurate information about the composition and properties of the digester gas, you may use this to develop a better estimate of the density of the gas and the quantity. If you are not sure of the concentration of methane, you should use 70 percent as a conservative estimate.

If the above calculations result in quantities close to the 10,000 pound threshold quantity, you may use the following general equation:

M_t =Vol x MW/379.5 x 520/(460+T) x (P)/14.7

where M_t = total mass

MW	=	average molecular weight (lbs/mole) including water vapor
T	=	operating temperature (°F)
P	=	operating gauge pressure (psi)
1 psi	=	27.7 inches water column

Q & A
CHANGING INVENTORIES

Q. I am considering changing from 2 one-ton tanks of chlorine to ten 150-pound cylinders to reduce my chlorine inventory below the RMP threshold quantity. Are there any reasons not to do this?

A. Reducing the inventory of regulated substances can be a sensible and appropriate risk-reduction option in some circumstances, but before you decide to switch to multiple smaller chlorine containers, you should carefully evaluate whether you might actually be *increasing* the risks to your workers and potentially the public. Using smaller containers or using the same one-ton chlorine tanks with a smaller quantity in each tank will require more frequent equipment connections and handling of chlorine containers. Each time workers must unload, move, and connect tanks or cylinders, there is an increased risk of a release. Also, 150-pound cylinder systems generally feed gaseous chlorine under pressure, while one-ton tanks use a safer vacuum-feed system. It may be easier, safer, and less costly in the long run to continue to use the larger containers that require less frequent handling, while implementing the appropriate accident prevention measures required by the rule.

Sources are advised that their standing in relation to the thresholds set under part 68 does not affect th applicability of the general duty clause under section 112(r)(1) of the Clean Air Act, which applies to all facilities that handle extremely hazardous substances. This clause creates a duty for the owner or operator of a stationary source having extremely hazardous substances, which include chlorine, "to identify hazards which may result from [accidental] releases..., to design and maintain a safe facility, and to minimize the consequences of accidental releases which do occur." In view of the increased potential for accidental releases that 150-pound cylinders may pose in some circumstances, switching to such cylinders from safer one-ton tanks may raise questions as to whether you have fulfilled your obligations under the general duty clause. The general duty clause is already in effect, and EPA may take action to enforce it.

QUANTITY IN A PIPELINE

The maximum quantity in a pipeline will generally be the capacity of the pipeline (volume). In most cases, pipeline quantity will be calculated and added to the interconnected vessels. The quantity in a pipe can be calculated using the following general equation:

$$V = Pi\, r^2 L$$

Where	V	=	Volume
	r	=	Radius of the pipe

L = Length of the pipe.

INTERCONNECTED/CO-LOCATED VESSELS

If your process consists of two or more interconnected vessels, you must determine the maximum quantity for each vessel and the connecting pipes or hoses. The maximum for each individual vessel and pipe is added together to determine the maximum for the process.

If you have determined that you must consider co-located vessels as one process, you must determine the maximum quantity for each vessel and sum up the quantities of all such vessels.

QUANTITY OF A SUBSTANCE IN A MIXTURE

TOXICS WITH LISTED CONCENTRATION

Four toxic substances have listed concentrations in the rule: hydrochloric acid — 37 percent or greater; hydrofluoric acid — 50 percent or greater; nitric acid — 80 percent or greater; and ammonia — 20 percent or greater.

- If you have these substances in solution and their concentration is less than the listed concentration, you do not need to consider them at all.

- If you have one of these four above their listed concentration, you must determine the weight of the substance in the solution and use that to calculate the quantity present. If that quantity is greater than the threshold, the process is covered. For example, aqueous ammonia is covered at concentrations above 20 percent, with a threshold quantity of 20,000 pounds. If the solution is 25 percent ammonia, you would need 80,000 pounds of the solution to meet the threshold quantity; if the solution is 44 percent ammonia, you would need 45,455 pounds to meet the threshold quantity (quantity of mixture x percentage of regulated substance = quantity of regulated substance).

Note that in a revision to part 68, EPA changed the concentration for hydrochloric acid to 37 percent or greater (see Appendix A).

TOXICS WITHOUT A LISTED CONCENTRATION

For toxics without a listed concentration, if the concentration is less than one percent you need not consider the quantity in your threshold determination. If the concentration in a mixture is above one percent, you must calculate the weight of the regulated substance in the mixture and use that weight to determine whether a threshold quantity is present. However, if you can measure or estimate (and document) that the partial pressure of the regulated substance in the mixture is less than 10 mm Hg, you do not need to consider the mixture.

EPA treats toxic mixtures differently from OSHA. Under the OSHA PSM standard, the entire weight of the mixture is counted toward the threshold quantity; under part 68, only the weight of the toxic substance is counted.

FLAMMABLES

Flammable mixtures are subject to the rule only if there is a regulated substance in the mixture above one percent and the entire mixture meets the NFPA-4 criteria. If the mixture meets both of these criteria, you must use the weight of the entire mixture (not just the listed substance) to determine if you exceed the threshold quantity. The NFPA-4 definition is as follows:

"Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and that will burn readily. This degree usually includes:

- Flammable gases
- Flammable cryogenic materials
- Any liquid or gaseous material that is liquid while under pressure and has a flash point below 73 F (22.8 C) and a boiling point below 100 F (37.8 C) (i.e., Class 1A flammable liquids)
- Materials that will spontaneously ignite when exposed to air."

You do not need to consider gasoline, when in storage for use as fuel for internal combustion engines when you determine the applicability of the rule.

EXCLUSIONS (§ 68.115)

The rule has a number of exclusions that allow you to ignore certain items that contain a regulated substance when you determine whether a threshold quantity is present. Most of these exclusions will not be relevant to WWTPs.

ARTICLES (§ 68.115(b)(4))

You do not need to include in your threshold calculations any manufactured item defined at § 68.3 (as defined under 29 CFR 1910.1200(b)) that:

- Is formed to a specific shape or design during manufacture,
- Has end use functions dependent in whole or in part upon the shape or design during end use, and
- Does not release or otherwise result in exposure to a regulated substance under normal conditions of processing and use.

This exclusion is unlikely to apply to WWTPs.

USES (§ 68.115(b)(5))

You also do not need to include regulated substances in your calculation when in use for the following purposes:

- Use as a structural component of the stationary source;
- Use of products for routine janitorial maintenance;
- Use by employees of foods, drugs, cosmetics, or other personal items containing the regulated substances; and
- Use of regulated substances present in process water or non-contact cooling water as drawn from the environment or municipal sources, or use of regulated substances present in air used either as compressed air or as part of combustion.

ACTIVITIES IN LABORATORIES (§ 68.115(b)(6))

If a regulated substance is manufactured, processed, or used in a laboratory at a stationary source under the supervision of a technically qualified individual (as defined by § 720.3 (ee) of 40 CFR), the quantity of the substance need not be considered in determining whether a threshold quantity is present. This exclusion does not extend to:

- Specialty chemical production;
- Manufacture, processing, or use of substances in pilot plant scale operations; and
- Activities conducted outside the laboratory.

A technically qualified individual is "a person or persons (1) who, because of education, training, or experience, or a combination of these factors, is capable of understanding the health and environmental risks associated with the chemical substance which is used under his or her supervision, (2) who is responsible for enforcing appropriate methods of conducting scientific experimentation, analysis, or chemical research to minimize such risks, and (3) who is responsible for the safety assessments and clearances related to the procurement, storage, use, and disposal of the chemical substance as may be appropriate or required within the scope of conducting a research and development activity."

This exclusion is unlikely to apply to WWTPs because you probably will not have more than a threshold quantity of a regulated substance in a lab.

1.6 STATIONARY SOURCE

The rule applies to "stationary sources" and each stationary source with one or more covered processes must file an RMP that includes all covered processes.

SIMPLE SOURCES

For most WWTPs covered by this rule, determining what constitutes a "stationary source" is simple. If you own or lease a property, your processes are contained within the property boundary, and no other companies (or agencies) operate on the property, then your stationary source is defined by the property boundary and covers any process within the boundaries that has more than a threshold quantity of a regulated substance. You must comply with the rule and file a single RMP for all covered processes. If this description applies to you, you may skip the rest of this section.

To belong to the same industrial group, either the operations at the site must be in the same three-digit North American Industy Classification System (NAICS) code (the equivalent of the old two-digit SIC codes), or one or more operations must be considered support activities for the main operation. POTWs are in NAICS code 22132 (sewage treatment); other WWTPs may be in NAICS code 56221 (waste treatment and disposal).

MULTIPLE OPERATIONS OWNED BY A SINGLE COMPANY

If the property is owned or leased by your company, but several separate operating divisions of the company have processes at the site, the divisions' processes may be considered a single stationary source because they are controlled by a single company. Two factors will determine if the processes are to be considered a single source: Are the processes located on one or more contiguous properties? Are all of the operations in the same industrial group?

If your company does have multiple operations that are on the same property and are in the same industrial group, each operating division may develop its prevention program separately for its covered processes, but you must file a single RMP for all covered processes at the site. You should note that this is different from the requirements for filing under CAA Title V, and EPCRA section 313 (the annual toxic release inventory), where each division could file separately if your company chose to do so.

OTHER SOURCES

There are situations where two or more separate companies occupy the same site. The simplest of these cases is if multiple companies lease land at a site (e.g., an industrial park). Each company that has covered processes must file an RMP that includes information on its own covered processes at the site. You are responsible for filing an RMP for any operations that you own or operate.

Another possibility is that one company owns the land and operates there while leasing part of the site to a second company. If both companies have covered processes, each is considered a separate stationary source and must file separate RMPs even if they have contractual relationships, such as supplying product to each other or sharing emergency response functions.

If you and another company jointly own a site, but have separate operations at the site, you each must file separate RMPs for your covered processes. Ownership of the land is not relevant; a stationary source consists of covered processes located on the same property and controlled by a single owner.

MULTIPLE LOCATIONS

If you have multiple operations in the same area, but they are not on physically connected land, you must consider them separate stationary sources and file separate RMPs for each, even if the sites are connected by pipelines that move chemicals among the sites. Remember, the rule applies to covered processes at a single location.

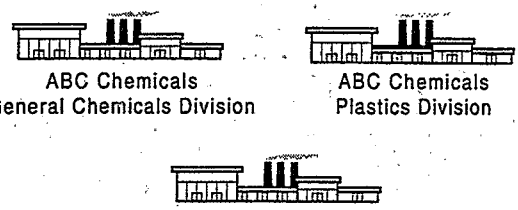
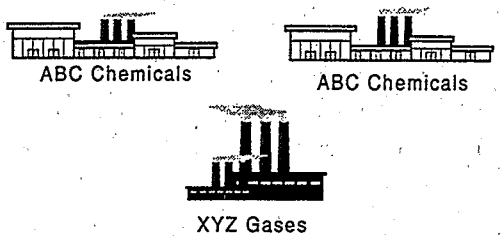
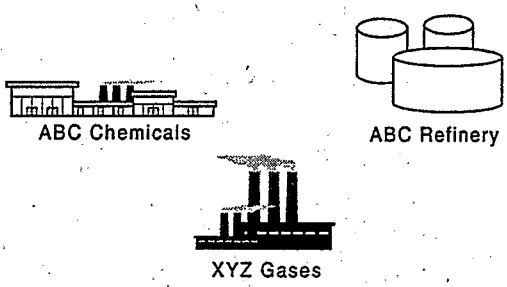
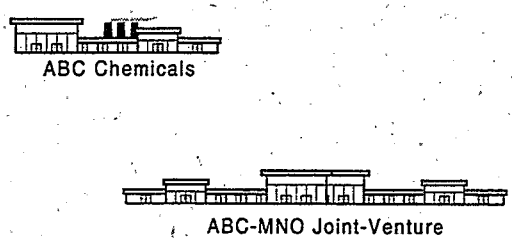
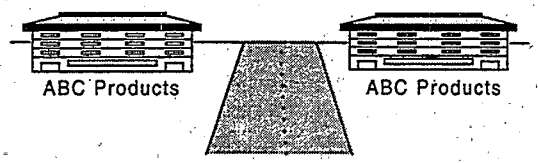
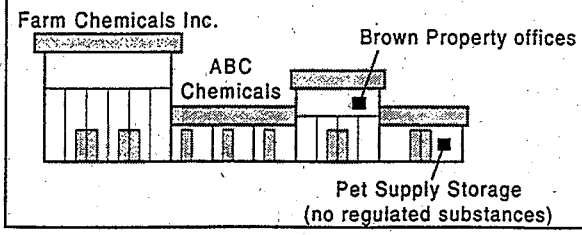
Exhibit 1-3 provides examples of stationary source decisions.

1.7 WHEN YOU MUST COMPLY

Prior to June 21, 1999, if you determine that you have a covered process, you must comply with the requirements of part 68 no later than June 21, 1999. This means that if you have the process now or start it on June 1, 1999, you must be in compliance with the rule on June 21, 1999. By that time you must have developed and implemented all of the elements of the rule that apply to each of your covered processes, and you must submit an RMP to EPA in a form and manner that EPA will specify prior to that time.

If the first time you have a covered process is after June 21, 1999, or you bring a new process on line after that date, you must comply with part 68 no later than the date on which you first have more than a threshold quantity of a regulated substance in a process.

EXHIBIT 1-3: STATIONARY SOURCE

Schematic Representation	Description	Interpretation
	*same* owner *same* industrial group	1 stationary source 1 RMP
	two owners	2 stationary sources 2 RMPs 1 ABC 1 XYZ
	two owners three industrial groups	3 stationary sources 1 ABC Chemicals 1 ABC Refinery 1 XYZ Gases
	two owners	2 stationary sources 2 RMPs
	*same* owner *same* industrial group contiguous property	1 stationary source 1 RMP
	two owners	2 stationary sources 2 RMPs 1 ABC Chemicals 1 Farm Chemicals

QS & AS
COMPLIANCE DATES

Q. What happens if I bring a new covered process on line (e.g., install a second storage tank) after June 21, 1999?

A. For a new covered process added after the initial compliance date, you must be in compliance on the date you first have a regulated substance above the threshold quantity. There is no grace period. You must develop and implement all the applicable rule elements and update your RMP before you start operating the new process.

Q. What if EPA lists a new substance?

A. You will have three years from the date on which the new listing is effective to come into compliance for any process that is covered because EPA has listed a new substance.

Q. What if I change a Program 2 process by adding new digester vessels, but do not change the substances?

A. Because increasing the number of digester vessels is a major change to your Program 2 process, you will have six months to come into compliance and update your RMP to reflect changes in your prevention program elements and report any other changes.

Q. What if the quantity in the process fluctuates? I may not have a threshold quantity on June 21, 1999, but I will before then and after then.

A. You do not need to comply with the rule and file an RMP until you have more than threshold quantity in a process; however, once you have more than threshold quantity in a process after June 21, 1999, you must be in compliance immediately. In this situation, with fluctuating quantities, it may be prudent to file by June 21, 1999, so you will be in compliance when your quantity exceeds the threshold.

Q. If we plan to switch chemicals in two years to non-regulated substances, do we have to comply by June 1999 if we are still using chlorine.

A. Yes, if you have more than a threshold quantity of a regulated substance in a process on June 21, 1999, you must comply with the rule and file your RMP by to that date. When you make the switch, if your facility as a whole is no longer covered, you should revise the registeration on your RMP within six months to notify EPA that your facility is not subject to the rule. If only the chlorine process is n longer covered, you still must revise the RMP within six months.

CHAPTER 2: APPLICABILITY OF PROGRAM LEVELS

2.1 WHAT ARE PROGRAM LEVELS?

Once you have decided that you have one or more processes subject to this rule (see Chapter 1), you need to identify what actions you must take to comply. The rule defines three Program levels based on processes' relative potential for public impacts, the level of effort needed to prevent accidents, and coverage by other regulations. The Program levels are as follows:

Program 1: Processes with no public receptors within the distance to an endpoint from a worst-case release and with no accidents with specific offsite consequences within the past five years are eligible for Program 1, which imposes limited hazard assessment requirements and minimal prevention and emergency response requirements.

Program 2: Processes not eligible for Program 1 or subject to Program 3 are placed in Program 2, which imposes streamlined prevention program requirements, as well as additional hazard assessment, management, and emergency response requirements.

Program 3: Any process not eligible for Program 1 and subject to OSHA's PSM standard under federal or state OSHA programs is subject to Program 3, which imposes OSHA's PSM standard (see section 2.5) as the prevention program as well as additional hazard assessment, management, and emergency response requirements.

If you can qualify a process for Program 1, it is in your best interests to do so, even if the process is already subject to OSHA PSM. For Program 1 processes, the implementing agency will enforce only the minimal Program 1 requirements. If you assign a process to Program 2 or 3 when it might qualify for Program 1, the implementing agency will enforce all the requirements of the higher program levels. If, however, you are already in compliance with the prevention elements of Program 2 or Program 3, you may want to use the RMP to inform the community of your prevention efforts.

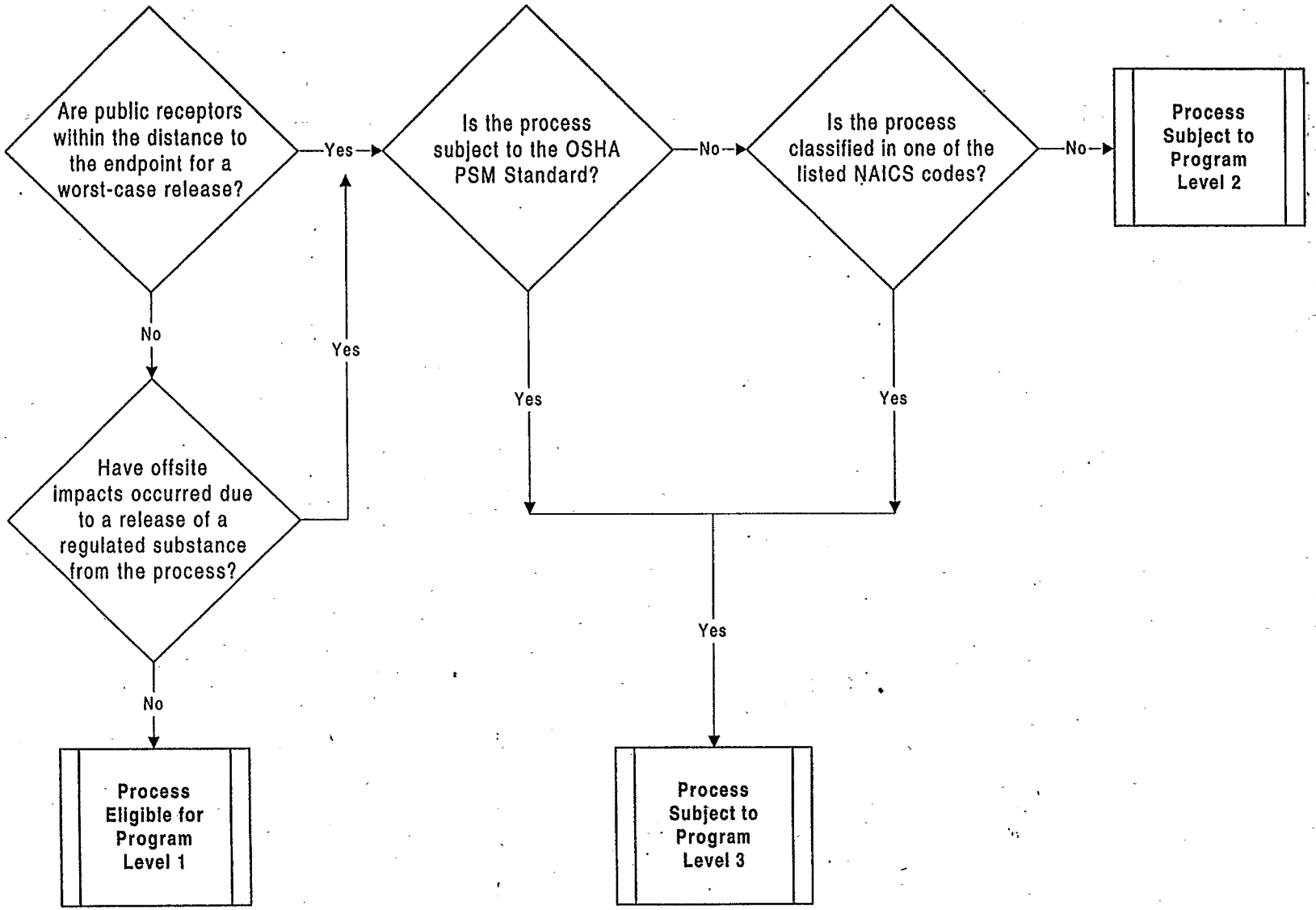
See Exhibit 2-1 for a diagram of the decision rules on Program level.

KEY POINTS TO REMEMBER

In determining program level(s) for your process(es), keep in mind the following:

(1) **Each process is assigned to a program level,** which indicates the risk management measures necessary to comply with this regulation for that process, not the facility as a whole. The eligibility of one process for a program level does not influence the eligibility of other covered processes for other program levels.

EXHIBIT 2-1
EVALUATE PROGRAM LEVELS FOR COVERED PROCESSES



(2) **Any process that meets the criteria for Program 1 can be assigned to Program 1**, even if it is subject to OSHA PSM or is in one of the SIC codes listed for Program 3.

(3) **Program 2 is the default program level.** There are no "standard criteria" for Program 2. Any process that does not meet the criteria for either Programs 1 or 3 is subject to the requirements for Program 2.

(4) **Only one Program level can apply to a process.** If a process consists of multiple production or operating units or storage vessels, the highest Program level that applies to any segment of the process applies to all parts.

Q & A
PROCESS AND PROGRAM LEVEL

Q. My process includes a series of interconnected units, as well as several storage vessels that are co-located. Several sections of the process could qualify for Program 1. Can I divide my process into sections for the purpose of assigning Program levels?

A. No, you cannot subdivide a process for this purpose. The highest Program level that applies to any section of the process is the Program level for the whole process. If the entire process is not eligible for Program 1, then the entire process must be assigned to Program 2 or Program 3.

2.2 POTW PROGRAM LEVELS

Unlike private WWTPs, a POTW will determine its Program levels based, in part, on the state in which it is located. If OSHA has delegated its programs to the state in which your POTW is located, you are covered by OSHA standards under state law (it is a condition of gaining delegation that the state apply OSHA rules to state and local governments). If your state has not been granted delegation by Federal OSHA, you are not subject to OSHA standards because federal OSHA cannot regulate state and local governments. If you are in one of the states without a delegated OSHA program (listed in Exhibit 2-2), your processes will be in either Program 1 or Program 2.

If you are in one of the states or territories with a delegated OSHA program (listed in Exhibit 2-3), your processes will be in Program 1, if eligible; otherwise, processes involving regulated toxics substances or digester gas production will be in Program 3 because they are subject to OSHA PSM. If you store a regulated flammable substance as fuel for workplace consumption, that storage may be in Program 2 if it is not considered part of an otherwise covered process.

EXHIBIT 2-2
FEDERAL OSHA STATES

Alabama	Kansas	North Dakota
Arkansas	Louisiana	Ohio
Colorado	Maine	Oklahoma
Delaware	Massachusetts	Pennsylvania
DC	Missouri	Rhode Island
Florida	Mississippi	South Dakota
Georgia	Montana	Texas
Idaho	Nebraska	West Virginia
Illinois	New Hampshire	Wisconsin
	New Jersey	

EXHIBIT 2-3
STATES WITH DELEGATED OSHA PROGRAMS

Alaska	Maryland	South Carolina
Arizona	Michigan	Tennessee
California	Minnesota	Utah
Connecticut	Nevada	Vermont
Hawaii	New Mexico	Virginia
Indiana	New York	Virgin Islands
Iowa	North Carolina	Washington
Kentucky	Oregon	Wyoming
	Puerto Rico	

2.3 PROGRAM 1

WHAT ARE THE ELIGIBILITY REQUIREMENTS?

Your process is eligible for Program 1 if:

(1) There are no public receptors within a distance to an endpoint from a worst-case release;

(2) The process has had no release of a regulated substance in the past five years where exposure to the substance, its reaction products, overpressures generated by explosion involving the substance, or radiant heat from a fire involving the substance resulted in one or more offsite deaths, injuries, or response or restoration activities for exposure of an environmental receptor; and

(3) You have coordinated your emergency response activities with the local responders. (This requirement applies to any covered process, regardless of program level.)

See Exhibit 2-6 for the requirements for Program 1.

WHAT IS A PUBLIC RECEPTOR?

The rule (§ 68.3) defines **public** as "any person except an employee or contractor of the stationary source." Consequently, employees of other facilities that may share your site are considered members of the public even if they share the same physical location. Being "the public," however, is not the same as being a public receptor.

Public receptors include "offsite residences, institutions (e.g., schools and hospitals), industrial, commercial, and office buildings, parks, or recreational areas inhabited or occupied by the public at any time without restriction by the stationary source where members of the public could be exposed to toxic concentrations, radiant heat, or overpressure, as a result of an accidental release." **Offsite** means areas beyond your property boundary and "areas within the property boundary to which the public has routine and unrestricted access during or outside business hours."

The first step in identifying public receptors is determining what is "offsite." For most facilities, that determination will be straightforward. If you restrict access to all of your property all of the time, "offsite" is anything beyond your property boundaries. Ways of restricting access include fully fencing the property, placing security guards at a reception area or using ID badges to permit entry.

If you do not restrict access to a section of your property and the public has routine and unrestricted access to it during or after business hours, that section would be "offsite." For example, if your operations are fenced but the public has unrestricted access to your parking lot during or after business hours, the parking lot is "offsite."

In the case of facilities such as hospitals, schools, and hotels that shelter members of the public as part of their function or business, the parts of the facility that are used to shelter the public would be "offsite."

Not all areas offsite are potential public receptors. The point of identifying public receptors is to locate those places where there are likely to be, at least some of the time, members of the public whose health could be harmed by short-term exposure to an accidental release at your site. The basic test for identifying a public receptor is thus whether an area is a place where it is reasonable to expect that members of the public will routinely gather at least some of the time.

The definition of "public receptor" itself specifies the types of areas where members of the public may routinely gather at least some of the time: residences, institutions such as hospitals and schools, buildings in general, parks and recreational areas. There should be little difficulty in identifying residences, institutions and businesses as such, and virtually any residence, institution and business will qualify as a public receptor, even when the property is used only seasonally (as in a vacation home). Notably, a residence includes its yard, if any, and an institution or business includes its grounds to the extent that employees or other members of the public are likely to routinely gather there at least some of the time for business or other purposes (see discussion of recreational areas below). The only circumstances that would justify not considering such a property a public receptor would be where your facility owns or controls the property and restricts access to it, or no member of the public inhabits or occupies it at any time. Where a hospital, school, hotel or other entity that provides public shelter is itself subject to the part 68 rule (e.g., because of on-site propane storage tanks), it will be its own public receptor except for those areas where members of the public are not allowed to go at any time.

Buildings other than residences, institutions or businesses are also highly likely to qualify as public receptors since the function of most buildings is at least in part to shelter people. Accordingly, toll booth plazas, transit stations, and airport terminals would qualify as public receptors. For a building not to qualify as a public receptor, one of the circumstances mentioned above would have to apply.

Every designated park or recreational area, or at least some portion thereof, is apt to be a public gathering place by virtue of facilities made available to the public (e.g., visitors' center, playground, golf course, camping or picnic area, marina or ball field) or attributes that members of the public routinely seek to use (e.g., beach). It does not matter whether use of such facilities is seasonal; routine use for at least part of the year would qualify the area as a public receptor.

At the same time, some portion of a designated park or recreational area may not be a public receptor. For instance, a large state or national park may include relatively inaccessible tracts of land that do not contain public facilities or receive routine use. Occasional hiking, camping or hunting in such areas would not qualify the areas as public receptors.

QS & AS
PUBLIC RECEPTORS

Q. My processes are fenced, but my offices and parking lot for customers are not restricted. What is considered offsite? What is considered a public receptor?

A. The unrestricted areas would be considered offsite. However, they would not be public receptors because you are responsible for the safety of those who work in or visit your offices and because parking lots are not generally public receptors.

Q. What is considered a recreational area?

A. Recreational areas would include land that is designed, constructed, designated, or used for recreational activities. Examples are national, state, county, or city parks, other outdoor recreational areas such as golf courses or swimming pools and bodies of waters (oceans, lakes, rivers, and streams) when used by the public for fishing, swimming, or boating. Public and private areas that are predictably used for hunting, fishing, bird watching, bike riding, hiking, or camping or other recreational use also would be considered recreational areas. EPA encourages you to consult with land owners, local officials, and the community to reach an agreement on an area's status; your local emergency planning committee (LEPC) can help you with these consultations. EPA recognizes that some judgment is involved in determining whether an area should be considered a recreational area.

Q. Does public receptor cover only buildings on a property or the entire property? If the owner of the land next to my site restricts access to the land, is it still a public receptor?

A. Public receptors are not limited to buildings. For example, if there are houses near your property, both the houses and their yards are considered public receptors because it is likely that residents will b present in one or the other at least some of the time, and, in fact, people are likely to be in more dange if they are outside when a release occurred. The ability of others to restrict access to an area does not change its status as a public receptor. You need to consider whether that land is generally unoccupied. If the land is undeveloped or rarely has anyone on it, it is not a public receptor. If you are not sure o the land's use of occupancy, you should talk with the landowner and the community about its status. Because it is the landowner and members of the local community who are likely to be affected by your decision, you should involve them in the decision is you have doubts.

An area need not be designated a recreational area to be one in fact. If an area is routinely used for recreational purposes, even if only seasonally, it is a recreational area for purposes of the part 68 rule. For example, a marina may not bill itself as a "recreational area," but if a marina houses recreational boats, it qualifies as a public receptor. Further, if your facility or a neighboring property owner allows the public to make routine recreational use of some portion of land (e.g., a ball field or fishing pond), that portion of land would qualify as a public receptor.

Roads and parking lots are not included as such in the definition of "public receptor." Neither are places where people typically gather; instead they are used to travel from one place to another or to park a vehicle while attending an activity elsewhere. However, if a parking lot is predictably and routinely used as a place of business (e.g., a farmer's market) or for a recreational purpose (e.g., a county fair), it would qualify as a public receptor.

In general, farm land would not be considered a public receptor. However, if farm land, or a portion thereof, is predictably and routinely occupied by farm workers or other members of public, even if only on a seasonal basis, that portion of the land would be a public receptor.

If you are in doubt about whether to consider certain areas around your facility as public receptors, you should consult with the relevant local officials and land owners and your implementing agency for guidance.

WHAT IS A DISTANCE TO AN ENDPOINT FROM A WORST-CASE RELEASE?

In broad terms, the distance to an endpoint is the distance a toxic vapor cloud, fire, or explosion from an accidental release will travel before dissipating to the point that serious injuries from short-term exposures will no longer occur. The rule establishes "endpoints" for each regulated substance and defines the circumstances of a worst-case release scenario (e.g., scenario, weather, release rate and duration) (see Chapter 4 or the *RMP Offsite Consequence Analysis Guidance* for more information). You will have to define a worst-case release (usually the loss of the total contents of your largest vessel) for each Program 1 process and either use EPA's guidance or conduct modeling on your own to determine the distance to the endpoint for that worst-case release. Beyond that endpoint, the effects on people are not considered to be severe enough to merit the need for additional action under this rule.

To define the area of potential impact from the worst-case release, draw a circle on a map, using the process as the center and the distance to the endpoint as the radius. If there are public receptors within that area, your process is not eligible for Program 1.

ACCIDENT HISTORY

To be eligible for Program 1, no release of the regulated substance from the process can have resulted in one or more offsite deaths, injuries, or response or restoration activities at an environmental receptor during the five years prior to submission of your RMP. A release of the regulated substance from another process has no bearing on whether the first process is eligible for Program 1.

Q and A
Determining Distances

Q. Our distance to the endpoint for the worst-case release is 0.3 miles. The nearest public receptor is 0.32 miles away. What tools are available to document that the public receptor is beyond the distance to the endpoint so we can qualify for Program 1?

A. The results of any air dispersion model (from EPA's guidance documents or other models) are not precise predictions. They represent an estimate, but the actual distance to the endpoint could be closer to or farther from the point of release. If your distance to the endpoint and distance to a public receptor are so close that you cannot document, using a USGS map, that the two points are different, it would be advisable to comply with the higher Program level. (The most detailed maps available from the US Geological Survey (scale of 1:24,000) are not accurate enough to document that these two points (which are about 100 feet apart) differ. Civilian GPS systems generally have a margin of error of 100 meters (about 0.05 miles).)

What is an Injury?

An injury is defined as "any effect on a human that results either from direct exposure to toxic concentrations; radiant heat; or overpressures from accidental releases or from the direct consequences of a vapor cloud explosion (such as flying glass, debris, and other projectiles) from an accidental release." The effect must "require medical treatment or hospitalization." This definition is taken from the OSHA regulations for keeping employee injury and illness logs and should be familiar to most employers. Medical treatment is further defined as "treatment, other than first aid, administered by a physician or registered professional personnel under standing orders from a physician." The definition of medical treatment will likely capture most instances of hospitalization. However, if someone goes to the hospital following direct exposure to a release and is kept overnight for observation (even if no specific injury or illness is found), that would qualify as hospitalization and so would be considered an injury.

What is an Environmental Receptor?

The environmental receptors you need to consider are limited to natural areas such as national or state parks, forests, or monuments; officially designated wildlife sanctuaries, preserves, refuges, or areas; and Federal wilderness areas. All of these areas can be identified on local U.S. Geological Survey maps.

What Are Restoration and Response Activities?

The type of restoration and response activity conducted to address the impact of an accidental release will depend on the type of release (volatilized spill, vapor cloud, fire, or explosion), but may include such activities as:

- Collection and disposal of dead animals and contaminated plant life;
- Collection, treatment, and disposal of soil;
- Shutoff of drinking water;
- Replacement of damaged vegetation; or
- Isolation of a natural area due to contamination associated with an accidental release.

Q & A
ENVIRONMENTAL RECEPTORS

Q. Do environmental receptors include areas that are not Federal Class I areas under the CAA?

A. Yes. The list of environmental receptors in Part 68 includes areas in addition to those that qualify as Federal Class I areas under CAA section 162. Under Part 68, national parks, monuments, wilderness areas, and forests are environmental receptors regardless of size. State parks, monuments, and forests are also environmental receptors.

DOCUMENTING PROGRAM 1 ELIGIBILITY

For every Program 1 process at your facility, you must keep records documenting the eligibility of the process for Program 1. For each Program 1 process, your records should include the following:

- A description of the worst-case release scenario, which must specify the vessel or pipeline and substance selected as worst case, assumptions and parameters used, and the rationale for selection. Assumptions may include use of any administrative controls and any passive mitigation that were assumed to limit the quantity that could be released;
- Documentation of the estimated quantity of the worst-case release, release rate, and duration of release;
- The methodology used to determine distance to endpoints;
- Data used to determine that no public receptor would be affected; and
- Information on your coordination with public responders.

QS & AS
ACCIDENT HISTORY

Q. What is the relationship between the accident history criteria for Program 1 and the five-year accident history? If my process is eligible for Program 1, do I still need to do a five-year accident history?

A. The five-year accident history is an information collection requirement that is designed to provide data on all serious accidents from a covered process involving a regulated substance held above the threshold quantity.

In contrast, the Program 1 accident history criteria focus on whether the process in question has the potential to experience a release of the regulated substance that results in harm to the public based on past events. Onsite effects, shelterings-in-place, and evacuations that have occurred must be reported in the five-year accident history, but they are not considered in determining Program 1 eligibility. Therefore, it is possible for process to be eligible for Program 1 and still have experienced a release that must be reported in the accident history for the source.

Q. A process with more than a threshold quantity of a regulated substance had an accident with offsite consequences three years ago. After the accident, we altered the process to reduce the quantity stored on site. Now the worst-case release scenario indicates that there are no public receptors within the distance to an endpoint. Can this process qualify for Program 1?

A. No, the process cannot qualify for Program 1 until five years have passed since any accident with consequences that disqualify a process for Program 1.

Q. A process involving a regulated substance had an accidental release with offsite consequences two years ago. The process has been shut down. Do I have to report anyway?

A. No. The release does not have to be included in your accident history. Your risk management plan only needs to address operating processes that have more than a threshold quantity of a regulated substance.

2.4 QUICK RULES FOR DETERMINING PROGRAM 1 ELIGIBILITY

You generally will not be able to predict with certainty that the worst-case scenario for a particular process will meet the criteria for Program 1. Processes containing certain substances, however, may be more likely than others to be eligible for Program 1, and processes containing certain other substances may be very unlikely to be eligible for Program 1 because of the toxicity and physical properties of the substances. The information presented below may be useful in identifying processes that may be eligible for Program 1.

TOXIC GASES

If you have a process containing more than a threshold quantity of chlorine, ammonia, or sulfur dioxide or any other regulated toxic gas that is not liquefied by refrigeration alone (i.e., you hold it as a gas or liquefied under pressure), the distance to the endpoint estimated for a worst-case release of the toxic gas will generally be several miles. As a result, the distance to endpoint is unlikely to be less than the distance to public receptors, unless the process is very remote. In some cases, however, toxic gases in processes in enclosed areas may be eligible for Program 1.

REFRIGERATED TOXIC GASES

If you have a process containing anhydrous ammonia liquefied by refrigeration alone, and your worst-case release would take place into a diked area, the chances are good that the process may be eligible for Program 1, unless there are public receptors very close to the process. Even if you have many times the threshold quantity of ammonia, the process may still be eligible for Program 1.

The worst-case analysis for a process containing chlorine liquefied by refrigeration is unlikely to show eligibility for Program 1, unless your site is extremely remote from the public or the release would occur within an enclosure.

TOXIC LIQUIDS

The distance to an endpoint for a worst-case release involving toxic liquids kept under ambient conditions may be smaller than the distance to public receptors in a number of cases. If public receptors are not found very close to the process (within ½ mile), the process may be eligible for Program 1. However, facilities on small acreage sites are highly unlikely to meet to be eligible for Program 1 if they are in a developed area. Remotely located facilities or processes found near the center of large (acreage) sites are more likely to be eligible.

WATER SOLUTIONS OF TOXIC SUBSTANCES

The list of regulated substances includes several common water solutions of toxic substances. Processes containing such solutions (e.g., aqueous ammonia) at ambient temperatures may be eligible for Program 1 (depending in some cases on the concentration of the solution), if spills would be contained in diked areas and public receptors are not located close to the process (within ½ mile). As noted above, facilities on small acreage sites in developed areas are highly unlikely to be eligible for Program 1; remotely located facilities or processes found near the center of large acreage sites are more likely to be eligible.

FLAMMABLE SUBSTANCES

Many processes containing regulated flammable substances are likely to be eligible for Program 1, unless there are public receptors within a very short distance. If you have a process containing up to about 20,000 pounds (twice the threshold quantity)

of methane or propane, your process is likely to be eligible for Program 1 if you have no public receptors within about 400 yards (1,200 feet) of the process. If you have up to 100,000 pounds in a process (ten times the threshold quantity), the process may be eligible for Program 1 if there are no public receptors within about 700 yards (2,000 feet). In general, it would be worthwhile to conduct a worst-case analysis for any processes containing only flammables to determine Program 1 eligibility, unless you have public receptors very close to the process. Consequently, you may have to conduct more worst-case analyses if you want to qualify processes for Program 1; for Program 2 and 3 processes, you need analyze only one worst-case release scenario to cover all flammables. For Program 1, you must be able to demonstrate, through your worst-case analysis, that every process you claim is Program 1 meets the criteria.

Remember that the Program level designation for a process is based on the regulated substance that has the greatest distance to an endpoint. If your digesters are considered part of a process that includes chlorine, ammonia, or sulfur dioxide, the toxics will determine whether the process is eligible for Program 1 because the distances to an endpoint will be greater for the toxics.

2.5 PROGRAM 3

Any covered process that is not eligible for Program 1 and is subject to OSHA PSM under federal or state law is subject to Program 3 requirements, which include risk management measures and requirements virtually identical to the OSHA PSM Standard. (The other criterion for Program 3 (§ 68.10(d)(1)) does not apply to WWTPs.)

WHAT IS THE OSHA PSM STANDARD?

The OSHA Process Safety Management standard (codified at 29 CFR 1910.119) is a set of procedures in thirteen management areas designed to protect worker health and safety in case of accidental releases. Similar to EPA's rule, OSHA PSM applies to a range of facilities that have more than a threshold quantity of a listed substance in a process. All processes subject to this rule and the OSHA PSM standard (federal or state) and not eligible for Program 1 are assigned to Program 3 because the Program 3 prevention program is virtually identical to the elements of the PSM standard. If you are already complying with OSHA PSM for a process, you probably will need to take few, if any, additional steps and develop little, if any, additional documentation to meet the requirements of the Program 3 prevention elements (see Chapter 7 for a discussion of differences between Program 3 prevention and OSHA PSM). EPA placed all covered OSHA PSM processes in Program 3 to eliminate the possibility of imposing overlapping, inconsistent requirements on the same process.

Private WWTPs are likely to be subject to OSHA PSM for processes containing more than a threshold quantity of chlorine, anhydrous ammonia, or sulfur dioxide. POTWs in states with delegated OSHA programs are subject to the PSM standard if they have more than a threshold quantity of these substances.

OSHA's thresholds are generally lower than EPA's so it is possible that you may have a process that is subject to OSHA PSM and is not covered by part 68. For example, if you store a single, one-ton cylinder of chlorine, OSHA PSM will coer it because it has a 1,500 pound threshold for chlorine, but EPA's part 68 will not because its threshold quantity for chlorine is 2,500 pounds.

OSHA PSM covers the production of methane in digesters, but does not cover propane or methane when used as a fuel unless the process is otherwise subject to OSHA PSM. If you capture methane from your digesters, store it, and then pipe it back to heat the digesters, the methane storage and piping would be subject to OSHA PSM because the digester (production of methane) is covered by PSM and the storage and piping are interconnected and considered part of the same process.

OSHA PSM covers aqueous ammonia at a concentration of greater than 44 percent (as opposed to EPA's 20 percent or greater); therefore, your aqueous ammonia process may not be subject to OSHA PSM.

2.6 PROGRAM 2

Program 2 is considered a default program level because any covered process that is not eligible for Program 1 or assigned to Program 3 is, by default, subject to Program 2 requirements, including a streamlined accident prevention program. One or more processes at your facility are likely to be in Program 2 if:

- You use propane (or other flammable) as a fuel for heating.
- You are a publicly owned facility in a state that does not have a delegated OSHA program.
- You use aqueous ammonia in solutions with greater than 20 percent concentration but less than 44 percent concentration.
- You use regulated acids in solution in activities.
- You store regulated liquid flammable substances in atmospheric storage tanks.

The last two of these conditions are unlikely to apply to WWTPs.

WHAT ARE THE ELIGIBILITY CRITERIA FOR PROGRAM 2?

Your process is subject to Program 2 if:

- Your process does not meet the eligibility requirements for Program 1; and
- Your process is not subject to OSHA PSM (state or federal).

When determining what program level is appropriate for your covered process, keep in mind that if it does not meet the Program 1 criteria and it is not covered by OSHA PSM, the process automatically is subject to Program 2 requirements.

Exhibit 2-4 provides a summary of the criteria for determining Program level.

EXHIBIT 2-4
PROGRAM LEVEL CRITERIA

Program 1	Program 2	Program 3
No accidents in the previous five years that resulted in any offsite: Death Injury Response or restoration activities at an environmental receptor	The process is not eligible for Program 1 or subject to Program 3.	Process is not eligible for Program 1.
AND		AND
No public receptors in worst-case circle.		Process is subject to OSHA PSM.
AND		OR
Emergency response coordinated with local responders.		Process is classified in SIC code 2611 - Pulp Mills 2812 - Clor-Alkali Manufacturers 2819 - Industrial Inorganics 2821- Plastics and Resins 2865 - Cyclic Crudes and Intermediates 2869 - Industrial Organics 2873 - Nitrogen Fertilizer Manufacturers 2879 - Agricultural Chemicals 2911 - Petroleum Refineries

Note: EPA has proposed to revise part 68 to reflect the shift to the new North American Industry Classification System (NAICS) codes. Check the hotline or the CEPPO web page for up-to-date information on the changes.

2.7 DEALING WITH PROGRAM LEVELS

WHAT IF I HAVE MULTIPLE PROGRAM LEVELS?

If you have more than one covered process, you may be dealing with multiple program levels in your risk management program.

If your facility has processes subject to different program levels, you will need to comply with different program requirements for different processes. Nevertheless, you must submit a single RMP for all covered processes.

If you prefer, you may choose to adopt the most stringent applicable program level requirements for all covered processes. For example, if you have three covered processes, one eligible for Program 1 and two subject to Program 3, you may find it administratively easier to follow the Program 3 requirements for all three covered processes. Remember, though, that this is only an option; we expect that most sources will comply with the set of program level requirements for which each process is eligible.

QS & AS
OSHA

Q. If my state administers the OSHA program under a delegation from the federal OSHA, does that mean that my processes that are subject to OSHA PSM under the state rules are in Program 3?

A. Yes, as long as the process does not qualify for Program 1. Any process subject to PSM, under federal or state rules, is considered to be in Program 3 unless it qualifies for Program 1.

Q. I am a publicly owned facility in a state with a delegated OSHA program. Why are my processes considered to be in Program 3 when the same processes in a state where federal OSHA runs the program are in Program 2?

A. Federal OSHA cannot impose its rules on state or local governments, but when OSHA delegates its program to a state for implementation, the state imposes the rules on itself and local governments. Because these governments are complying with the identical OSHA PSM rules imposed by federal OSHA, they are subject to Program 3. In meeting their obligations under state OSHA rules, they are already substantially in compliance with the Program 3 prevention program requirements. State and local governments in non-state-plan states are not subject to any OSHA rules and must comply with Program 2.

CAN THE PROGRAM LEVEL FOR A PROCESS CHANGE?

A change in a covered process or in the surrounding community can result in a change in the Program level of the process. If this occurs, you must submit an updated RMP within six months of the change that altered the program level for the

covered process. If the process no longer qualifies as a covered process (e.g., as a result of a change in the quantity of the regulated substance in the process), then you will need to amend your RMP registration within six months (see Chapter 9 for more information). Typical examples of switching program levels include:

MOVING UP

From Program 1 to Program 2 or 3. You have a covered process subject to Program 1 requirements. A new residential development results in public receptors being located within the distance to the endpoint for a worst-case release for that process. The process is, thus, no longer eligible for Program 1 and must be evaluated to determine whether Program 2 or Program 3 applies. You must submit a revised RMP within six months of the program level change, indicating and documenting that your process is now in compliance with the new program level requirements.

From Not Covered to Program 1, 2 or 3. You have a process that was not originally covered by part 68, but, due to an expansion in production, the process holds an amount of regulated substance that now exceeds the threshold quantity. You must determine which Program level applies and come into compliance with the rule by June 21, 1999, or by the time you exceed the threshold quantity, whichever is later.

From Program 2 to Program 3. You have a process that involves a regulated substance above the threshold that had not been subject to OSHA PSM. However, due to one of the following OSHA regulatory changes, the process is now subject to the OSHA PSM standard:

- Your state is granted delegation by federal OSHA to implement OSHA standards in your state;
- An OSHA PSM fuel use exemption applicable to your process has been eliminated, or
- The regulated substance has been added to OSHA's list of highly hazardous substances (this is unlikely for WWTPs because the chemicals you use are already subject to PSM).

As a result, the process becomes subject to Program 3 requirements and you must submit a revised RMP to EPA within six months, indicating and documenting that your process is now in compliance with the Program 3 requirements.

SWITCHING DOWN

From Program 2 or 3 to Program 1. At the time you submit your RMP, you have a covered process subject to Program 2/3 requirements because it experienced an accidental release of a regulated substance with offsite impacts four years ago. Subsequent process changes have made such an event unlikely (as demonstrated by

the worst-case release analysis). One year after you submit your RMP, the accident will no longer be included in the five-year accident report for the process, so the process is eligible for Program 1. If you elect to qualify the process for Program 1, you must submit a revised RMP within six months of the program level change, indicating and documenting that the process is now in compliance with the new program level requirements.

From Program 2 or 3 to Not Covered. You have a covered process that has been subject to Program 2 or 3 requirements, but due to a reduction in production, the amount of a regulated substance it holds no longer exceeds the threshold. Therefore, the process is no longer a covered process. You must submit a revised RMP within six months indicating that your process is no longer subject to any program level requirements.

2.8 SUMMARY OF PROGRAM REQUIREMENTS

Regardless of the program levels of your processes, you must complete a five-year accident history for each process (see Chapter 3) and submit an RMP that covers all processes (see Chapter 9). Depending on the Program level of each of your processes, you must comply with the additional requirements described below. Exhibit 2-5 diagrams the requirements in general and Exhibit 2-6 lists them in more detail.

PROGRAM 1

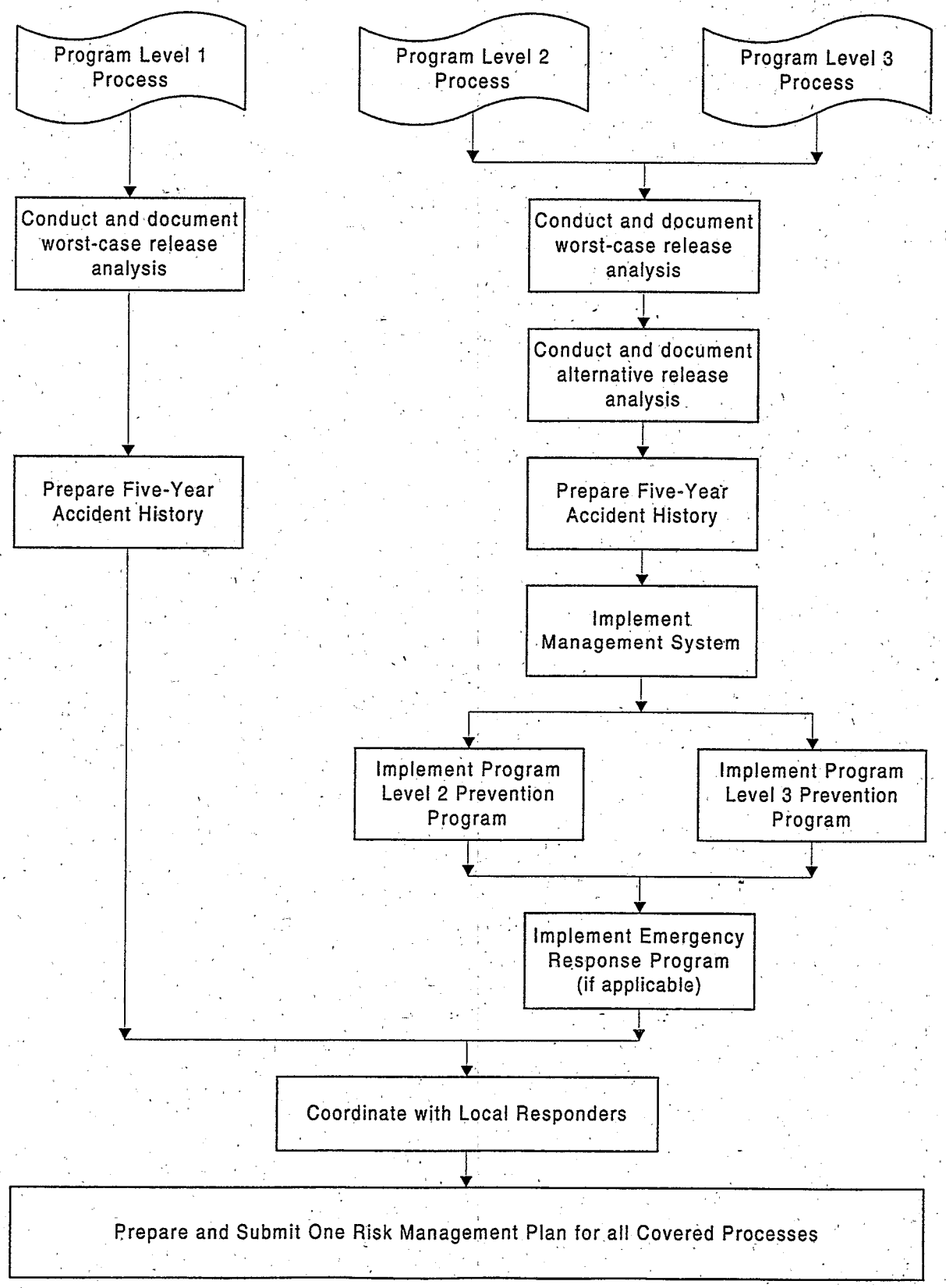
For each Program 1 process, you must conduct and document a worst-case release analysis. You must coordinate your emergency response activities with local responders and sign the Program 1 certification as part of your RMP submission.

PROGRAMS 2 AND 3

For all Program 2 and 3 processes, you must conduct and document at least one worst-case release analysis to cover all toxics and one to cover all flammables. You may need to conduct additional worst-case release analyses if worst-case releases from different parts of your facility would affect different public receptors. You must also conduct one alternative release scenario analysis for each toxic and one for all flammables. See Chapter 4 or the *RMP Offsite Consequence Analysis Guidance* for specific requirements. You must coordinate your emergency response activities with local responders and, if you use your own employees to respond to releases, you must develop and implement an emergency response program. See Chapter 8 for more details.

For each Program 2 process, you must implement all of the elements of the Program 2 prevention program: safety information, hazard review, operating procedures, training, maintenance, compliance audits, and incident investigations. See Chapter 6 for more details.

EXHIBIT 2-2
DEVELOP RISK MANAGEMENT PROGRAM AND RMP



For each Program 3 process, you must implement all of the elements of the Program 3 prevention program: process safety information, process hazard analysis, standard operating procedures, training, mechanical integrity, compliance audits, incident investigations, management of change, pre-startup reviews, contractors, employee participation, and hot work permits. See Chapter 7 for more details.

EXHIBIT 2-6
COMPARISON OF PROGRAM REQUIREMENTS

Program 1	Program 2	Program 3
Worst-case release analysis	Worst-case release analysis	Worst-case release analysis
	Alternative release analysis	Alternative release analysis
5-year accident history	5-year accident history	5-year accident history
	Document management system	Document management system
Prevention Program		
Certify no additional prevention steps needed	Safety Information	Process Safety Information
	Hazard Review	Process Hazard Analysis.
	Operating Procedures	Operating Procedures
	Training	Training
	Maintenance	Mechanical Integrity
	Incident Investigation	Incident Investigation
	Compliance Audit	Compliance Audit
		Management of Change
		Pre-Startup Review
		Contractors
		Employee Participation
		Hot Work Permits
Emergency Response Program		
Coordinate with local responders	Develop plan and program (if applicable) and coordinate with local responders	Develop plan and program (if applicable) and coordinate with local responders
Submit One Risk Management Plan for All Covered Processes		

CHAPTER 3: FIVE-YEAR ACCIDENT HISTORY

The five-year accident history involves an examination of the effects of any accidental releases of one or more of the regulated substances from a covered process in the five years prior to the submission of a Risk Management Plan (RMP). A five-year accident history must be completed for each covered process, including the processes in Program 1, and all accidental releases meeting specified criteria must be reported in the RMP for the process.

Note that a Program 1 process may have had an accidental release that must be included in the five-year accident history, even though the release does not disqualify the process from Program 1. The accident history criteria that make a process ineligible for Program 1 (certain offsite impacts) do not include other types of effects that require inclusion of a release in the five-year accident history (on-site impacts and more inclusive offsite impacts). For example, an accidental release may have led to worker injuries, but no other effects. This release would not bar the process from Program 1 (because the injuries were not offsite), but would need to be reported in the five-year accident history. Similarly, a release may have resulted in damage to foliage offsite (environmental damage), triggering reporting, but because the foliage was not part of an environmental receptor (e.g., national park or forest) it would not make the process ineligible for Program 1.

3.1 WHAT ACCIDENTS MUST BE REPORTED?

The five-year accident history covers only certain releases:

- The release must be from a covered process and involve a regulated substance held above its threshold quantity in the process.
- The release must have caused at least one of the following:
  - On-site deaths, injuries, or significant property damage (§68.42(a)); or
  - Known offsite deaths, injuries, property damage, environmental damage, evacuations, or sheltering in place (§68.42(a)).

If you have had a release of a regulated substance from a process where the regulated substance is held below its threshold quantity, you do not need to report that release even if the release caused one of the listed impacts or if the process is covered for some other substance. You may choose to report the release in the five-year accident history, but you are not required to do so.

3.2 WHAT DATA MUST BE PROVIDED?

The following information should be included in your accident history for every reported release. The descriptions below are those used for the RMP*Submit system

and data element instructions:

Date. Indicate the date on which the accidental release began.

Time. Indicate the time the release began.

Release duration. Indicate the approximate length of time of the release in minutes.

Chemical(s). Indicate the regulated substance(s) released. Use the name of the substance as listed in § 68.130 rather than a synonym (e.g., propane rather than LPG). If the release was of a flammable mixture, list the primary regulated substances in the mixture if feasible; if the contents of the mixture are uncertain, list it as a flammable mixture. If non-regulated substances were also released and contributed to the impacts, you may want to list them as well, but you are not required to do so.

Quantity released. Estimate the amount of each substance released in pounds. The amount should be estimated to two significant digits, or as close to that as possible. For example, if you estimate that the release was between 850 and 900 pounds, provide a best guess. We realize that you may not know precise quantities. For flammable mixtures, you may report the quantity of the mixture, rather than that of the individual regulated substances.

Release event. Indicate which of the following release events best describes your accident. Check all that apply:

- *Gas Release.* A gas release is a release of the substance as a gas (rather than vaporized from a liquid). If you hold a gas liquefied under refrigeration, report the release as a liquid spill.
- *Liquid Spill/ Evaporation.* A liquid spill/evaporation is a release of the substance in a liquid state with subsequent vaporization.
- *Fire.* A fire is combustion producing light, flames, and heat.
- *Explosion.* An explosion is a rapid chemical reaction with the production of noise, heat, and violent expansion of gases.

Release source. Indicate all that apply.

- *Storage Vessel.* A storage vessel is a container for storing or holding gas or liquid. Storage vessels include transportation containers being used for on-site storage.

- *Piping.* Piping refers to a system of tubular structures or pipes used to carry a fluid or gas.

- *Process Vessel.* A process vessel is a container in which substances under certain conditions (e.g., temperature, pressure) participate in a process (e.g., substances are manufactured, blended to form a mixture, reacted to convert them into some other final product or form, or heated to purify).

- *Transfer Hose.* A transfer hose is a tubular structure used to connect, often temporarily, two or more vessels.

- *Valve.* A valve is a device used to regulate the flow in piping systems or machinery. Relief valves and rupture disks open to release pressure in vessels.

- *Pump.* A pump is a device that raises, transfers, or compresses fluids or that attenuates gases by suction or pressure or both.

- *Joint.* The surface at which two or more mechanical components are united.

- *Other.* Specify other source of the release.

Weather conditions at time of event (if known). This information is important to those concerned with assessing and modeling the effects of accidents. Reliable information from those involved in the incident or from an on-site weather station is ideal. However, this rule does not require your facility to have a weather station. If you do not have an onsite weather station, use information from your local weather station, airport, or other source of meteorological data. Historical wind speed and temperature data (but not stability data) can be obtained from the National Climatic Data Center (NCDC) at (828) 271-4800; NCDC staff can also provide information on the nearest weather station. To the extent possible, complete the following:

- *Wind Speed and Direction.* Wind speed is an estimate of how fast the wind is traveling. Indicate the speed in miles per hour. Wind direction is the direction from which the wind comes. For example, a wind that blows from east to west would be described as having an eastern wind direction. You may describe wind direction as a standard compass reading such as "Northeast" or "South-southwest."

  You may also describe wind direction in degrees--with North as zero degrees and East as 90 degrees. Thus, northeast would represent 45 degrees and south-southwest would represent 202.5 degrees. Abbreviations for the wind

direction such as NE (for northeast) and SSW (for south-southwest) are also acceptable.

- *Temperature*. The ambient temperature at the scene of the accident in degrees Fahrenheit. If you did not keep a record, you can use the high (for daytime releases) or low (for nighttime releases) for the day of the release. Local papers publish these data.

- *Stability Class*. Depending on the amount of incoming solar radiation as well as other factors, the atmosphere may be more or less turbulent at any given time. Meteorologists have defined six atmospheric stability classes, each representing a different degree of turbulence in the atmosphere. When moderate to strong incoming solar radiation heats air near the ground, causing it to rise and generating large eddies, the atmosphere is considered unstable, or relatively turbulent. Unstable conditions are associated with stability classes A and B. When solar radiation is relatively weak, air near the surface has less of a tendency to rise and less turbulence develops. In this case, the atmosphere is considered stable or less turbulent with weak winds. The stability class is E or F. Stability classes D and C represent conditions of neutral stability or moderate turbulence respectively. Neutral conditions are associated with relatively strong wind speeds and moderate solar radiation. The neutral category D should be used,regardless of wind speed, for overcast conditions day or night, and for any sky conditions during the hour preceding or following the night. Exhibit 3-1 presents the stability classes associated with wind speeds, time of day, and cloud cover.

- *Precipitation Present*. Precipitation may take the form of hail, mist, rain, sleet, or snow. Indicate "yes" or "no" based on whether there was any precipitation at the time of the accident.

- *Unknown*. If you have no record for some or all of the weather data, indicate "unknown" for any missing item. We realize that you may not have weather data for accidents that occurred in the past. You should, however, collect these data for any future accidents.

EXHIBIT 3-1
ATMOSPHERIC STABILITY CLASSES

SURFACE WIND SPEED AT 10 METERS ABOVE GROUND		DAY			NIGHT†	
		Incoming Solar Radiation			Thinly Overcast or ≥ 4/8 low clou	≤ 3/8 Cloud
Meters per second	Miles per hour	Strong*	Moderate	Slight**		
< 2	<4.5	A	A-B	B		
2-3	4.5-7	A-B	B	C	E	F
3-5	7-11	B	B-C	C	D	E
5-6	11-13	C	C-D	D	D	D
>6	>13	C	D	D	D	D

† Night refers to one hour before sunset to one hour after dawn.
* Sun high in the sky with no clouds.
** Sun low in the sky with no clouds.

On-site impacts. Complete the following about on-site effects.

- *Deaths.* Indicate the number of on-site deaths that are attributed to the accident or mitigation activities. On-site deaths means the number of employees, contract employees, offsite responders, or others (e.g., visitors) who were killed by direct exposure to toxic concentrations, radiant heat, or overpressures from accidental releases or from indirect consequences of a vapor cloud explosion from an accidental release (e.g., flying glass, debris, other projectiles). You should list employee/contractor, offsite responder, and other on-site deaths separately.

- *Injuries.* An injury is any effect that results either from direct exposure to toxic concentrations, radiant heat, or overpressures from accidental releases or from indirect consequences of a vapor cloud explosion (e.g., flying glass, debris, other projectiles) from an accidental release and that requires medical treatment or hospitalization. You should list injuries to employees and contractors, offsite responders, and others separately.

Medical treatment means treatment, other than first aid, administered by a physician or registered professional personnel under standing orders from a physician.

Your OSHA occupational injury and illness log (200 Log) will help complete these items for employees.

- *Property Damage*. Estimate the value of the equipment or business structures (for your business alone) that were damaged by the accident or mitigation activities. Record the value in American dollars. Insurance claims may provide this information. Do **not** include any losses that you may have incurred as a result of business interruption.

Known offsite impacts. These are impacts that you know or could reasonably be expected to know of (e.g., from media reports or from reports to your facility) that occurred as a result of the accidental release. You are not required to conduct an additional investigation to determine offsite impacts.

Q & A
PROPERTY DAMAGE

Q. What level of offsite property damage triggers reporting?

A. Any level of known offsite property damage triggers inclusion of the accident in the five-year accident history. You are not required to conduct a survey to determine if such damage occurred, but if you know, or could reasonably be expected to know (e.g., because of reporting in the newspapers), that damage occurred, you must include the accident.

- *Deaths*. Indicate the number of offsite deaths that are attributable to the accident or mitigation activities. Offsite deaths means the number of people offsite who were killed by direct exposure to toxic concentrations, radiant heat, or overpressures from accidental releases or from indirect consequences of a vapor cloud explosion from an accidental release (e.g., flying glass, debris, other projectiles).

- *Injuries*. Indicate the number of injuries among people offsite. Injury means any effect that results either from direct exposure to toxic concentrations, radiant heat, or overpressures from accidental releases or from indirect consequences of a vapor cloud explosion from an accidental release (e.g., flying glass, debris, other projectiles) and that requires medical treatment or hospitalization.

- *Evacuated.* Estimate the number of people offsite who were evacuated to reduce exposure that might have resulted from the accident. A total count of the number of people evacuated is preferable to the number of houses evacuated. People who were ordered to move simply to improve access to the site for emergency vehicles are not considered to have been evacuated.

- *Sheltered.* Estimate the number of people offsite who were sheltered-in-place during the accident. Sheltering-in-place occurs when community members are ordered to remain inside their residence or place of work until the emergency is over to reduce exposure to the effects of the accidental release. Usually these orders are communicated by an emergency broadcast or similar method of mass notification by response agencies.

- *Environmental Damage.* Indicate whether any environmental damage occurred and specify the type. The damage to be reported is not limited to environmental receptors listed in the rule. Any damage to the environment (e.g., dead or injured animals, defoliation, water contamination) should be identified. You are **not**, however, required to conduct surveys to determine whether such impact occurred. Types of environmental damage include:

  - Fish or animal kills.
  - Lawn, shrub, or crop damage minor defoliation.
  - Lawn, shrub, or crop damage major defoliation.
  - Water contamination.
  - Other (specify).

Initiating event. Indicate the initiating event that was the immediate cause of the accident, if known. If you conducted an investigation of the release, you should have identified the initiating event.

- *Equipment Failure.* A device or piece of equipment failed or did not function as designed. For example, the vessel wall corroded or cracked.

- *Human Error.* An operator performed a task improperly, either by failing to take the necessary steps or by taking the wrong steps.

- *Weather Conditions.* Weather conditions, such as lightning, hail, ice storms, tornados, hurricanes, floods, or high winds, caused the accident.

- *Unknown.*

Contributing factors. These are factors that contributed to the accident, but were not the initiating event. If you conducted an investigation of the release, you may have identified factors that led to the initiating event or contributed to the severity of the release. Indicate all that apply.

- *Equipment Failure.* A device or piece of equipment failed to function as designed, thereby allowing a substance leading to or worsening the accidental release.

- *Human error.* An operator performed an operation improperly or made a mistake lead to or worsened the accident.

- *Improper Procedures.* The procedure did not reflect the proper method of operation, the procedure omitted steps that affected the accident, or the procedure was written in a manner that allowed for misinterpretation of the instructions.

- *Overpressurization.* The process was operated at pressures exceeding the design working pressure.

- *Upset Condition.* Incorrect process conditions (e.g., increased temperature or pressure) contributed to the release.

- *By-pass Condition.* A failure occurred in a pipe, channel, or valve that diverts fluid flow from the main pathway when design process or storage conditions are exceeded (e.g., overpressure). By-pass conditions may be designed to release the substance to restore acceptable process or storage conditions and prevent more severe consequences (e.g., explosion).

- *Maintenance Activity/ Inactivity.* A failure occurred because of maintenance activity or inactivity. For example, the storage racks remained unpainted for so long that corrosion caused the metal to fail.

- *Process Design.* A failure resulted from an inherent flaw in the design of the process (e.g., pressure needed to make product exceeds the design pressure of the vessel).

- *Unsuitable Equipment.* The equipment used was incorrect for the process. For example, the forklift was too large for the corridors.

- *Unusual Weather Conditions.* Weather conditions, such as lightning, hail, ice storms, tornados, hurricanes, floods, or high winds contributed to the accident.

- *Management Error.* A failure occurred because management did not exercise its managerial control to prevent the accident from occurring. This is usually used to describe faulty procedures, inadequate training, inadequate oversight, or failure to follow existing administrative procedures.

Whether offsite responders were notified. If known, indicate whether response agencies (e.g., police, fire, medical services) were contacted.

Changes introduced as a result of the accident. Indicate any measures that you have taken at the facility to prevent recurrence of the accident. Indicate all that apply.

- *Improved/Upgraded Equipment.* A device or piece of equipment that did not function as designed was repaired or replaced.

- *Revised Maintenance.* Maintenance procedures were clarified or changed to ensure appropriate and timely maintenance including inspection and testing (e.g., increasing the frequency of inspection or adding a testing method).

- *Revised Training.* Training programs were clarified or changed to ensure that employees and contract employees are aware of and are practicing correct safety and administrative procedures.

- *Revised Operating Procedures.* Operating procedures were clarified or changed to ensure that employees and contract employees are trained on appropriate operating procedures.

- *New Process Controls.* New process designs and controls were installed to correct problems and prevent recurrence of an accidental release.

- *New Mitigation Systems.* New mitigation systems were initiated to limit the severity of accidental releases.

- *Revised Emergency Response Plan.* The emergency response plan was revised.

- *Changed Process.* Process was altered to reduce the risk (e.g., process chemistry was changed).

- *Reduced Inventory.* Inventory was reduced at the facility to reduce the potential release quantities and the magnitude of the hazard.

- *Other.*

- *None.* No changes initiated at facility as a result of the accident (e.g., because none were necessary or technically feasible). There may be some accidents that could not have been prevented because they were caused by events that are too rare to merit additional steps. For example, if a tornado hit your facility and you are located in an area where tornados are very rare, it may not be reasonable to design a "tornado proof" process even if it is technically feasible.

3.3 OTHER ACCIDENT REPORTING REQUIREMENTS

You should already have much of the data required for the five-year accident history because of the reporting requirements under the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA), EPCRA, and OSHA (e.g., log of occupational injuries and illnesses). This information should minimize the effort necessary to complete the accident history.

At the same time, some of the information originally reported to response agencies may have been inaccurate because it was reported during the release when a full assessment was not possible. It is imperative that you include the most accurate, up-to-date information possible in the five-year accident history. This information may not always match the original estimates from the initial reporting of the accident's effects.

CERCLA Section 103(a) requires you to immediately notify the National Response Center if your facility releases a hazardous substance to the environment in greater than a reportable quantity (see 40 CFR part 302). Toxic substances regulated under part 68 are also CERCLA hazardous substances, but most of the flammable substances regulated under part 68 are not subject to CERCLA reporting. Notice required under CERCLA includes the following information:

- The chemical name or identity of any substance involved in the release

- An indication of whether the substance is on the list referred to in Section 302(a)

- An estimate of the quantity of substance that was released into the environment
- The time and duration of the release
- The medium or media into which the release occurred.

EPCRA Section 304 requires facilities to report to the community emergency coordinator of the appropriate local emergency planning committee (LEPC) and state emergency response commission (SERC) releases of extremely hazardous substances to the environment in excess of reportable quantities (as set forth in 40 CFR part 302). All toxic substances regulated under part 68 are subject to EPCRA reporting; flammables regulated under part 68 are generally not subject to EPCRA reporting. The report required by EPCRA is to include:

- Chemical name or identity of all substances involved in the accident
- An estimate of the quantity of substances released to the environment
- The time and duration of the release.

The owner or operator is also required to release a Follow-up Emergency Notice as soon as possible after a release which requires notification. This notice should update the previously released information and include additional information regarding actions taken to respond to the release, any known or anticipated acute or chronic health risks associated with the release, and where appropriate, advice regarding medical attention necessary for exposed individuals.

OSHA's log of occupational injuries and illnesses. OSHA No. 200, is used for recording and classifying recordable occupational injuries and illnesses, and for noting the extent and outcome of each case. The log shows when the occupational injury or illness occurred, to whom, what the injured or ill person's regular job was at the time of the injury or illness exposure, the department in which the person was employed, the kind of injury or illness, how much time was lost, and whether the case resulted in a fatality, etc. The following are the sections of the illness/ injury log that are useful in completing the accident history.

Descriptive section of the log:

- **Column B:** date of work accident which resulted in injury
- **Column C:** name of injured person
- **Column F:** description of nature of injury or illness

Injury portion of the log:

- **Column 1:** date of death is entered if an occupational injury results in a fatality
- **Column 6:** an injury occurred, but did not result in lost workdays

Illness portion of the log:

- **Column 7:** for occupational illnesses, an entry is placed in one of the columns 7a-7g, depending upon which column is applicable.

PART 68 INCIDENT INVESTIGATION

An incident investigation is a requirement of the rule (§68.60 and 68.81). These requirements are virtually identical to the requirements under OSHA PSM. For accidents involving processes categorized in Program 2 or Program 3, you must investigate each incident which resulted in, or could reasonably have resulted in, a catastrophic release of a regulated substance. A report, which includes the following information, should be prepared at the conclusion of the investigation:

- Date of incident
- Date investigation began
- Description of the incident
- Factors that contributed to the incident
- Any recommendations resulting from the investigation.

Because the incident investigation report must be retained for five years, you will have a record for completing the five-year accident history for updates of the RMP.

QS & AS
ACCIDENT HISTORY

Q. When does the five-year period to be reported in the accident history begin?

A. The five-year accident history must include all accidental releases from covered processes meeting the specified criteria that occurred in five years preceding the date the RMP for the processes was submitted. For example, if an RMP is submitted on June 1, 1999, the five-year accident history must cover the period between June 1, 1994 and June 1, 1999.

Q. If a facility has recently changed ownership, is the new facility owner required to include accidents which occurred prior to the transfer of ownership in the accident history portion of the RMP submitted for the facility?

A. Yes, accidents involving covered processes that occurred prior to the transfer of ownership should be included in the five-year accident history. You may want to explain that the ownership has changed in your Executive Summary.

Q. If I have a large on-site incident, but no offsite impact, would I have to report it in the five-year accident history?

A. It would depend on whether you have onsite deaths, injuries, or significant property damage. You could have a large accident without any of these consequences (e.g., a large spill that was contained); this type of release would not have to be included in the five-year accident history.

Q. I had a release where several people were treated at the hospital and released; they attributed their symptoms to exposure. We do not believe that their symptoms were in fact the result of exposure to the released substance. Do we have to report these as offsite impacts?

A. Yes, you should report them in your five-year accident history. You may want to use the executive summary to state that you do not believe that the impacts can be legitimately attributed to the release and explain why.

CHAPTER 4: OFFSITE CONSEQUENCE ANALYSIS

You are required to conduct an offsite consequence analysis to provide information to the government and the public about the potential consequences of an accidental chemical release at your facility. The offsite consequence analysis (OCA) consists of two elements:

- A worst-case release scenario and
- Alternative release scenarios.

To simplify the analysis and ensure a common basis for comparisons, EPA has defined the worst-case scenario as the release of the largest quantity of a regulated substance from a single vessel or process line failure that results in the greatest distance to an endpoint. In broad terms, the distance to the endpoint is the distance a toxic vapor cloud, heat from a fire, or blast waves from an explosion will travel before dissipating to the point that serious injuries from short-term exposures will no longer occur.

This chapter gives guidance on how to perform the OCA for the six regulated substances that are used or produced at WWTPs:

- Chlorine (toxic)
- Sulfur dioxide (toxic)
- Anhydrous ammonia (toxic)
- Aqueous ammonia (20 percent or greater, toxic)
- Methane (digester gas, flammable), and
- Propane (flammable).

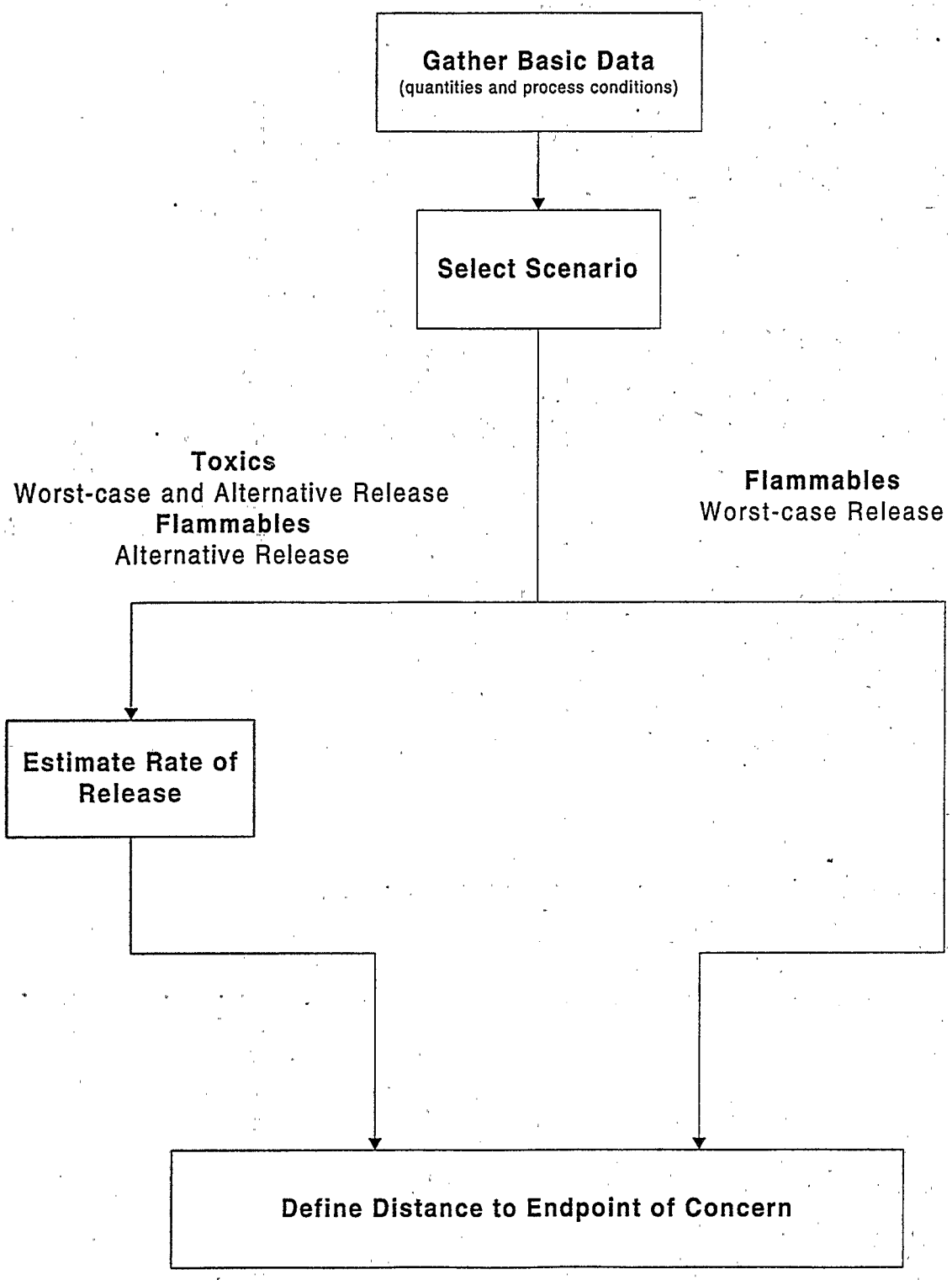
Exhibit 4-1 shows the basic steps used to conduct the OCA.

RMP*Comp™

To assist those using this guidance, the National Oceanic and Atmospheric Administration (NOAA) and EPA have developed a software program, RMP*Comp™, that performs the calculations described in this document. This software can be downloaded from the NOAA Internet website at http://response.restoration.noaa.gov/chemaids/rmp/rmp.html.

The methodology and reference tables of distances presented here are optional. You are not required to use this guidance. You may use publicly available or proprietary air dispersion models to do your offsite consequence analysis, subject to certain conditions. If you choose to use other models, you should review the rule and Chapter 4 of the *General Guidance for Risk Management Programs*, which outline required conditions for use of other models.

EXHIBIT 4-1
STEPS FOR OFFSITE CONSEQUENCE ANALYSIS



Some of the results obtained using the methods in this document may be conservative (i.e., they may overestimate the distance to endpoints). Complex models that can account for many site-specific factors may give less conservative estimates of offsite consequences than the simple methods used in this guidance. This is particularly true for alternative scenarios, for which EPA has not specified many assumptions. However, complex models may be expensive and require considerable expertise to use; this guidance is designed to be simple and straightforward. You will need to consider these tradeoffs in deciding how to carry out your required consequence analyses.

This chapter presents discussions and tables for the worst-case scenario for all six substances listed above (section 4.1), followed by discussions and tables for alternative scenarios for the six substances (section 4.2). Because many WWTPs store chlorine and sulfur dioxide in buildings, section 4.3 discusses methods for estimating the mitigating effects of buildings. The remaining sections provide guidance on defining offsite impacts (section 4.4), documentation (section 4.5), and the symbols used in the chapter (section 4.6).

The guidance presented in this chapter is intended for users — that is, it does not contain any explanations of how the guidance was derived. Those readers who are interested in obtaining an explanation can obtain from EPA a document entitled *Backup Information for the Hazard Assessments in the RMP Offsite Consequence Analysis Guidance, the Guidance for Wastewater Treatment Facilities and the Guidance for Ammonia Refrigeration—Anhydrous Ammonia, Aqueous Ammonia, Chlorine and Sulfur Dioxide.*

4.1 WORST-CASE RELEASE SCENARIOS

This section provides guidance on how to analyze worst-case scenarios. Information is provided on the general requirements of the regulations, followed by specific sections on chlorine, sulfur dioxide, anhydrous ammonia, aqueous ammonia, methane and propane. Exhibit 4-2 presents the parameters that must be used in worst-case and alternative release scenarios.

GENERAL REQUIREMENTS FOR TOXIC SUBSTANCES

The following information is required for worst-case release analysis of toxic substances:

The *worst-case release quantity* Q (lb) is the greater of the following:

- For substances in vessels, the greatest amount held in a single vessel, taking into account administrative controls that limit the maximum quantity; or
- For substances in pipes, the greatest amount in a pipe, taking into account administrative controls that limit the maximum quantity.

For vessels, you need only consider the largest amount in the vessel, regardless of interconnections with pipes and other vessels. Similarly, if the largest quantity is

contained in a pipe, you need not add the quantity in vessels at the end of the pipelines. You may be able to think of scenarios in which a quantity greater than Q as defined above can be released, but EPA does not require you to model such scenarios as worst-case (you may want to consider modeling them as alternative scenarios).

Weather conditions. The rule allows anyone who conducts his or her OCA based on this guidance to use specific default weather conditions for wind speed, stability class, average temperature, and humidity. Liquids other than gases liquefied by refrigeration should be considered to be released at the highest daily maximum temperature, based on local data for the previous three years, or at process temperature, whichever is the higher. You can obtain weather data from local weather stations. You can also obtain temperature and wind speed data from the National Climatic Data Center at (828) 271-4800.

For the worst-case scenario, the release must be assumed to take place at *ground level.*

The *toxic endpoints* are:

Ammonia	0.14 mg/L (200 ppm)
Chlorine	0.0087 mg/L (3 ppm)
Sulfur Dioxide	0.0078 mg/L (3 ppm)

These airborne concentrations are the maximum airborne concentrations below which it is believed that nearly all individuals can be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

The regulations require you to take account of whether your site is rural or urban. The regulations state that "urban means that there are many obstacles in the immediate area; obstacles include buildings or trees. Rural means that there are no buildings in the immediate area and the terrain is generally flat or unobstructed." Some areas outside of cities may still be considered urban if they are forested.

The regulations require you to use tables or models for atmospheric dispersion analysis that appropriately account for gas density. For the specific case of WWTPs, chlorine and sulfur dioxide are always dense gases (that is, denser than air). Anhydrous ammonia, if released from the liquid space of a container in which it is liquefied under pressure, forms a denser-than-air vapor cloud. Ammonia evaporating from a pool of aqueous ammonia is treated as neutrally buoyant (that is, it has about the same density as air).

You are only allowed to take account of passive mitigation systems, not active ones. Passive mitigation systems could include:

- Diked areas that confine a liquid pool and reduce the surface area available for evaporation

EXHIBIT 4-2
REQUIRED PARAMETERS FOR MODELING (40 CFR 68.22)

WORST CASE	ALTERNATIVE SCENARIO
Endpoints (§68.22(a))	
Toxic endpoints are listed in part 68 Appendix A.	Toxic endpoints are listed in part 68 Appendix A.
For flammable substances, endpoint is overpressure of 1 pound per square inch (psi) for vapor cloud explosions.	✦For flammable substances, endpoint is overpressure of 1 psi for vapor cloud explosions ✦Radiant heat level of 5 kilowatts per square meter (kW/m^2) for 40 seconds for heat from fires (or equivalent dose) ✦Lower flammability limit (LFL) as specified in NFPA documents or other generally recognized sources for vapor cloud fires.
Wind speed/stability (§68.22(b))	
This guidance assumes 1.5 meters per second and F stability. For other models, use wind speed of 1.5 meters per second and F stability class unless you can demonstrate that local meteorological data applicable to the site show a higher minimum wind speed or less stable atmosphere at all times during the previous three years. If you can so demonstrate, these minimums may be used for site-specific modeling.	This guidance assumes wind speed of 3 meters per second and stability. For other models, you may use typical meteorologica conditions for your site.
Ambient temperature/humidity (§68.22(c))	
This guidance assumes 25°C (77°F) and 50 percent humidity. For other models for toxic substances, you must use the highest daily maximum temperature and average humidity for the site during the past three years.	This guidance assumes 25°C and 50 percent humidity. For other models, you may use average temperature/humidity data gathered at the site or at a local meteorological station.
Height of release (§68.22(d))	
For toxic substances, you must assume a ground level release.	This guidance assumes a ground-level release. For other models release height may be determined by the release scenario.
Surface roughness (§68.22(e))	
Use urban (obstructed terrain) or rural (flat terrain) topography, as appropriate.	Use urban (obstructed terrain) or rural (flat terrain) topography, a appropriate.
Dense or neutrally buoyant gases (§68.22(f))	
Tables or models used for dispersion of regulated toxic substances must appropriately account for gas density.	Tables or models used for dispersion must appropriately account for gas density.
Temperature of released substance (§68.22(g))	
You must consider liquids (other than gases liquefied by refrigeration) to be released at the highest daily maximum temperature, from data for the previous three years, or at process temperature, whichever is higher. Assume gases liquefied by refrigeration at atmospheric pressure to be released at their boiling points.	Substances may be considered to be released at a process or ambient temperature that is appropriate for the scenario.

- Buildings, provided that the building can be shown to withstand the events that caused the release (see Section 4.3 for more information)

Active mitigation systems include:

- Automatically closing or remotely operated valves
- Sprays and deluge systems
- Relief valves
- Check valves
- Excess flow valves
- Scrubbers

The predicted frequency of occurrence of the worst-case scenario is not an allowable consideration. You are not required to determine a possible cause of the failure of the vessel or pipe.

General Requirements for Flammable Substances

As for toxic substances, the worst-case release quantity Q is either the greatest amount held in a single vessel or the greatest amount in a pipe. In both cases, you may take into account administrative controls that limit the maximum capacity. In the case of the vessel, you need only take into account the quantity in the vessel, regardless of any connections with other vessels.

The worst-case analysis assumes the quantity vaporizes. There is a vapor cloud explosion. If you use a TNT-equivalent model to determine the distance to the endpoint, you must assume that 10 percent of the total quantity is involved in the explosion (that is, the yield factor is 10 percent).

You must determine the distance to the explosion endpoint; that is, the distance at which there is an overpressure of 1 psi (the fartherest distance from the point of release at which the explosion causes the pressure on a person or building to exceed atmospheric pressure by 1 psi).

Chlorine

At WWTPs, chlorine is most likely to be present in 150-lb cylinders, in one-ton (2,000-lb) cylinders, in 17-ton tank trucks, or in 90-ton railcars. The worst-case scenario assumes that these quantities are completely released over a period of 10 minutes (e.g., a 150-lb worst case corresponds to a 15-lb/min rate of release). The predicted distances to the toxic endpoint for each of these scenarios is given in Exhibit 4-3. These distances are for releases that are assumed to take place outdoors. See Section 4.3 for a discussion on buildings.

EXHIBIT 4-3
DISTANCES TO TOXIC ENDPOINTS - CHLORINE
F Stability, Wind Speed 1.5 Meters per Second

Scenario	Release Rate (lb/min)	Distance to Toxic Endpoint (miles)	
		Rural	Urban
150-lb cylinder	15	0.8	0.4
1-ton cylinder	200	3.0	1.3
17-ton tank trucks	3,400	12	5.8
90-ton railcar	18,000	> 25	14

If your facility does not fit into the standard pattern of 150-lb cylinders, one-ton cylinders, 17-ton tank trucks, or 90-ton railcars, you should use Figure 4-1 or Exhibit 4-4. Identify the chlorine vessel that contains the largest quantity of any in your facility and divide that mass by 10 to obtain the release rate in lb/min. Look for that release rate, or the rate nearest to it, in Exhibit 4-4. Then read across to the rural or urban distances.

Alternatively, look along the bottom axis of Figure 4-1, read up to the curve(s) and then across to the corresponding distances on the vertical axis.

As noted above, the results presented in Exhibit 4-3 and 4-4 are for a release that is outside. Many of you will keep your chlorine vessels inside buildings. Some will even have specially designed, leak-tight buildings with chlorine or sulfur dioxide scrubbers. However, the intention of this section is to provide information on the worst-case scenario. There are times when you will be handling the cylinders outside. Nevertheless, in discussions with local agencies and local communities you may well want to explain how your facility is designed to prevent or mitigate worst-case scenarios.

EXHIBIT 4-4
DISTANCES TO TOXIC ENDPOINT FOR CHLORINE
F Stability, Wind Speed 1.5 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
1	0.2	0.1
2	0.3	0.1
5	0.5	0.2
10	0.7	0.3
15	0.8	0.4
20	1.0	0.4
30	1.2	0.5
40	1.4	0.6
50	1.5	0.6
60	1.7	0.7
70	1.8	0.8
80	1.9	0.8
90	2.0	0.9
100	2.2	0.9
150	2.6	1.2
200	3.0	1.3
250	3.4	1.5
300	3.7	1.6
400	4.2	1.9
500	4.7	2.1
600	5.2	2.3
700	5.6	2.5

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
750	5.8	2.6
800	5.9	2.7
900	6.3	2.9
1,000	6.6	3.0
1,500	8.1	3.8
2,000	9.3	4.4
2,500	10	4.9
3,000	11	5.4
4,000	13	6.2
5,000	14	7.0
6,000	16	7.6
7,000	17	8.3
7,500	18	8.6
8,000	18	8.9
9,000	19	9.4
10,000	20	9.9
15,000	25	12
20,000	*	14
25,000	*	16
30,000	*	18
40,000	*	20
50,000	*	*

* More than 25 miles (report distance as 25 miles)

These are results that you can simply quote when you submit your RMP.

SULFUR DIOXIDE

Sulfur dioxide, if present at a WWTP, is also likely to be in 150-lb cylinders, one-ton cylinders, 17-ton tank cars, or 90-ton railcars. The worst-case scenario assumes that these quantities are completely released over a period of 10 minutes. The predicted distances to the toxic endpoint for each of these scenarios is given in Exhibit 4-5.

EXHIBIT 4-5
DISTANCES TO TOXIC ENDPOINT - SULFUR DIOXIDE
F Stability, Wind Speed 1.5 Meters per Second

Scenario	Release Rate (lb/min)	Distance to Toxic Endpoint (miles)	
		Rural	Urban
150-lb cylinder	15	0.7	0.3
1-ton cylinder	200	3.1	1.3
17-ton tank trucks	3,400	15	6.0
90-ton railcar	18,000	> 25	15

These are results that you can simply quote when you submit your RMP.

If your facility does not fit into the standard pattern of 150-lb cylinders, one-ton cylinders, or 90-ton railcars, you should use Figure 4-2 or Exhibit 4-6. Identify the sulfur dioxide vessel that contains the largest quantity of any in your facility. Divide that quantity by 10 to obtain the release rate in lb/min and look for that rate, or the rate nearest to it, on Exhibit 4-6. Then read across to the rural or urban distances. Alternatively, use Figure 4-2.

EXHIBIT 4-6
DISTANCES TO TOXIC ENDPOINT FOR SULFUR DIOXIDE
F Stability, Wind Speed 1.5 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
1	0.2	0.1
2	0.2	0.1
5	0.4	0.2
10	0.6	0.2
15	0.7	0.3
20	0.9	0.4
30	1.1	0.5
40	1.3	0.5
50	1.4	0.6
60	1.6	0.7
70	1.8	0.7
80	1.9	0.8
90	2.0	0.8
100	2.1	0.9
150	2.7	1.1
200	3.1	1.3
250	3.6	1.4
300	3.9	1.6
400	4.6	1.9
500	5.2	2.1
600	5.8	2.3
700	6.3	2.5

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
750	6.6	2.6
800	6.8	2.7
900	7.2	2.9
1,000	7.7	3.1
1,500	9.6	3.8
2,000	11	4.5
2,500	13	5.0
3,000	14	5.6
4,000	17	6.5
5,000	19	7.3
6,000	21	8.1
7,000	23	8.8
7,500	24	9.1
8,000	25	9.5
9,000	*	10
10,000	*	11
15,000	*	13
20,000	*	16
25,000	*	18
30,000	*	19
40,000	*	23
50,000	*	*

* More than 25 miles (report distance as 25 miles)

ANHYDROUS AMMONIA

In WWTPs, anhydrous ammonia is generally stored as a liquid under pressure in vessels that are kept outdoors. These vessels are relatively large (e.g., 10,000 gallons or ≈ 56,000 lb). Identify the quantity of ammonia in your storage vessel and divide by 10 to obtain the release rate in lb/min. Look for that release rate, or the release rate nearest to it, on Exhibit 4-7. Then read across to the rural or urban distances. Alternatively, use Figure 4-3.

The 10,000-gallon vessel mentioned above contains 56,000 lb when full. (You may take into account any administrative controls that limit the quantity of the ammonia in the vessel. For example, you will generally require that the vessel never be filled above 85 percent of its total volume to allow for the high coefficient of volumetric expansion of ammonia.) Assuming for the sake of the present example that 56,000 lb is the greatest quantity of ammonia that will ever be in the vessel, the release rate is 5,600 lb/min. The closest release rate on Exhibit 4-7 is 6,000 lb/min. The corresponding rural distance is approximately 4.4 miles and the corresponding urban distance is approximately 2.8 miles.

EXHIBIT 4-7
DISTANCES TO TOXIC ENDPOINT
FOR ANHYDROUS AMMONIA LIQUEFIED UNDER PRESSURE
F Stability, Wind Speed 1.5 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
1	0.1	0.1
2	0.1	0.1
5	0.1	0.1
10	0.2	0.1
15	0.2	0.2
20	0.3	0.2
30	0.3	0.2
40	0.4	0.3
50	0.4	0.3
60	0.5	0.3
70	0.5	0.3
80	0.5	0.4
90	0.6	0.4
100	0.6	0.4
150	0.7	0.5
200	0.8	0.6
250	0.9	0.6
300	1.0	0.7
400	1.2	0.8
500	1.3	0.9
600	1.4	0.9
700	1.5	1.0
750	1.6	1.0
800	1.6	1.1
900	1.7	1.2

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
1,000	1.8	1.2
1,500	2.2	1.5
2,000	2.6	1.7
2,500	2.9	1.9
3,000	3.1	2.0
4,000	3.6	2.3
5,000	4.0	2.6
6,000	4.4	2.8
7,000	4.7	3.1
7,500	4.9	3.2
8,000	5.1	3.3
9,000	5.4	3.4
10,000	5.6	3.6
15,000	6.9	4.4
20,000	8.0	5.0
25,000	8.9	5.6
30,000	9.7	6.1
40,000	11	7.0
50,000	12	7.8
75,000	15	9.5
100,000	18	10
150,000	22	13
200,000	*	15
250,000	*	17
750,000	*	*

* More than 25 miles (report distance as 25 miles)

AQUEOUS AMMONIA

Some WWTPs keep aqueous ammonia in outside storage tanks at atmospheric pressure. The tanks usually stand in a diked area. Commercial grades of aqueous ammonia vary from less than 20 weight percent to about 30 weight percent. For ease of presentation, the ammonia is assumed to be in a 30 weight percent solution. Because this has the highest vapor pressure of any of the commercial grades used in wastewater treatment facilities, its use is conservative if you have aqueous ammonia in a less than 30 weight percent solution.

If there is a catastrophic failure, the aqueous ammonia will spill into the diked area.

You are allowed to consider the dike, which is a passive mitigation feature. However, if you have any reason to believe that the dike will not withstand the event that leads to the spill, or if your tank does not stand in a diked area, then you should assume, as required by the rule, that the spill spreads out until its depth is only 1 cm (0.39 inch). The first step is to calculate the rate of evaporation from the pool.

UNDIKED AREA

For an undiked area, the rate of release of ammonia from the pool (QR) (lb/min) is given by:

$$QR = 0.020QS \tag{1}$$

where QS is the total quantity (lb) of the spill of aqueous ammonia. For example, if there is a spillage of 80,000 lb, the rate of evaporation is 0.02 x 80,000 = 1,600 lb/min. The present guidance assumes that this is the average rate of release over 10 minutes, after which the pool will be more dilute than it was initially and will be evaporating much less rapidly.

DIKED AREA

For a diked area, the rate of evaporation is:

$$QR = 0.036A_p \tag{2}$$

where A_p is the diked area in square feet. For example, if the vessel stands in a diked area that is 40 feet x 40 feet = 1,600 ft^2, the predicted rate of evaporation is 0.036 x 1,600 = 58 lb/min.

The maximum area of the pool that would be formed by the spilled liquid can be estimated as 0.55QS. If you have a diked area that is larger than the maximum area, use Equation 1 for an undiked area to estimate the release rate to air.

Rates of Release at Temperatures Other Than 25 °C

The actual temperature of stored aqueous ammonia varies with the ambient temperature. The rule requires you to consider the release temperature to be the highest daily temperature observed during the last three years, or the operating temperature, whichever is highest. The ratio $R_{vp}(T)$ represents the ratio of the partial pressure of ammonia at temperature T °C to the partial pressure at 25 °C.

Exhibit 4-8 gives values of $R_{vp}(T)$ for 30 percent aqueous ammonia in 1 °C increments from 15 °C to 40 °C (59 °F to 104 °F). The rates of evaporation in Equations 1 and 2 are proportional to the vapor pressure, so to obtain a rate of evaporation for a temperature T °C other than 25 °C, simply multiply the right-hand side of Equation 1 or 2 by the corresponding value of $R_{vp}(T)$. For example, for an undiked release of 80,000 lbs of ammonia at 35 °C, the calculation is (0.020)(80,000)(1.45) = 2,300 lbs/min.

The vapor pressure of ammonia at other temperatures can be obtained from the *Handbook of Chemistry and Physics*, CRC Press, 1998.

Distances to Toxic Endpoint

Take the evaporation rate and look for that rate, or the rate nearest to it, on Exhibit 4-9. Then read across to the rural or urban distances. For example, for the 58 lb/min release rate derived above, the closest release rate on Exhibit 4-9 is 60 lb/min. The predicted rural distance is approximately 0.4 mile and the predicted urban distance is approximately 0.2 mile. Alternatively, use Figure 4-4.

EXHIBIT 4-8
RATIO OF VAPOR PRESSURE OF AMMONIA IN 30% AQUEOUS AMMONIA
(Ratio is Unity at 25 °C)

Temperature T (°C)	Ratio R_{vp} (T)	Temperature T (°C)	Ratio R_{vp} (T)
15	0.67	28	1.12
16	0.70	29	1.16
17	0.73	30	1.21
18	0.76	31	1.25
19	0.79	32	1.30
20	0.82	33	1.35
21	0.86	34	1.40
22	0.89	35	1.45
23	0.93	36	1.50
24	0.96	37	1.55
25	1.00	38	1.61
26	1.04	39	1.66
27	1.08	40	1.72

EXHIBIT 4-9
DISTANCES TO TOXIC ENDPOINT FOR AQUEOUS AMMONIA
F Stability, Wind Speed 1.5 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
1	0.1	0.1
2	0.1	0.1
5	0.1	0.1
10	0.2	0.1
15	0.2	0.1
20	0.3	0.1
30	0.3	0.1
40	0.4	0.1
50	0.4	0.1
60	0.4	0.2
70	0.5	0.2
80	0.5	0.2
90	0.5	0.2
100	0.6	0.2
150	0.7	0.2
200	0.8	0.3
250	0.8	0.3
300	0.9	0.3
400	1.1	0.4
500	1.2	0.4
600	1.3	0.4
700	1.4	0.5
750	1.4	0.5
800	1.5	0.5
900	1.5	0.6

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
1,000	1.6	0.6
1,500	2.0	0.7
2,000	2.2	0.8
2,500	2.5	0.9
3,000	2.7	1.0
4,000	3.1	1.1
5,000	3.4	1.2
6,000	3.7	1.3
7,000	4.0	1.4
7,500	4.1	1.5
8,000	4.2	1.5
9,000	4.5	1.6
10,000	4.7	1.7
15,000	5.6	2.0
20,000	6.5	2.4
25,000	7.2	2.6
30,000	7.8	2.8
40,000	8.9	3.3
50,000	9.8	3.6
75,000	12	4.4
100,000	14	5.0
150,000	16	6.1
200,000	19	7.0
250,000	21	7.8
750,000	*	13

* More than 25 miles (report distance as 25 miles)

METHANE

Methane is present at some wastewater treatment facilities as a component of digester gas. Typical constituents of digester gas are 55 to 70 percent methane by volume, 25 to 30 percent carbon dioxide by volume, and small amounts of nitrogen and hydrogen. Modern facilities may well have processes containing more than 10,000 lb of digester gas at any one time (the entire quantity of the flammable mixture in a process must be compared with the threshold quantity (TQ) of 10,000 lb to determine whether the facility is covered). Proceed as follows:

1. Determine the density ρ_m of the methane in the digester at operating temperature T (°F), assuming that there is X vol percent of methane and 100 - X vol percent of carbon dioxide and other materials. You should determine X by analysis of your digester gas; if you do not know the percentage of methane, you may use 70 percent as a conservative assumption. If X varies over time, you should use the largest value of X that is seen in your facility.

$$\rho_m = 0.22\ X/(460+T) \tag{3}$$

As an example, if X = 65, and the operating temperature is 95 °F, $\rho_m = 0.026$ lb/ft^3.

2. Calculate the total volume V (ft^3) occupied by digester gas in one digester (the largest). Associated pipework can be neglected.

$$V = \pi r^2 H \tag{4}$$

Here, r is the digester radius and H is the maximum digester head space. As an example, if H = 8 ft and r = 40 ft, then $V = \pi r^2 H = (3.14)(40)^2(8) \approx 40{,}200$ ft^3.

3. Calculate the quantity Q of methane contained in V:

$$Q = \rho_m V \tag{5}$$

In the current example, Q = (0.026)(40,200) = 1,045 lb

Note that this quantity of methane itself, as well as the total quantity of digester gas, is less than the 10,000-lb TQ for flammable materials. This is because the total amount of digester gas (i.e., not just methane) in a process is used to determine whether that process is covered by the regulation. It may be the case that no single digester contains more than the TQ of digester gas, but you are covered because there are several digesters in your process. However, you are required to consider only the quantity of methane in a single vessel when calculating the results of a worst-case vapor cloud explosion.

4. Use the TNT-equivalency model to calculate the distance D (miles) to the 1 psi overpressure endpoint:

$$D = 0.0082\ (Q)^{1/3} \qquad (6)$$

Equation 6 has been customized for methane. In the present example, $D = 0.0082(1{,}045)^{1/3} \approx 0.08$ mile. Alternatively, you can use Exhibit 4-10 to estimate the distance to the endpoint for a range of quantities of methane.

EXHIBIT 4-10
DISTANCE TO OVERPRESSURE ENDPOINT OF 1.0 PSI FOR VAPOR CLOUD EXPLOSIONS OF METHANE
Based on TNT Equivalent Method, 10 Percent Yield Factor

Quantity in Cloud (pounds)	Distance to Endpoint (miles)
500	0.07
2,000	0.1
5,000	0.1
10,000	0.2
20,000	0.2

Quantity in Cloud (pounds)	Distance to Endpoint (miles)
50,000	0.3
100,000	0.4
200,000	0.5
500,000	0.7
1,000,000	0.8

Some facilities have an intermediate storage vessel for digester gas, at a pressure that may be typically 45-50 psig. You should use the quantity of methane in such a vessel in Equation 6 or Exhibit 4-10 if it contains the largest quantity of digester gas on site.

PROPANE

If you keep Q lb of propane on site, the distance D (ft) to 1 psi overpressure is given by:

$$D = 0.008(Q)^{1/3} \quad (7)$$

Thus, for 10,000 lb of propane, $D = 0.008\ (10{,}000)^{1/3} = 0.2$ mile

Alternatively, you can use Exhibit 4-11 to estimate the distance to the endpoint from the quantity released for vapor cloud explosions of propane.

EXHIBIT 4-11
DISTANCE TO OVERPRESSURE ENDPOINT OF 1.0 PSI FOR VAPOR CLOUD EXPLOSIONS OF PROPANE
Based on TNT Equivalent Method, 10 Percent Yield Factor

Quantity in Cloud (pounds)	Distance to Endpoint (miles)
500	0.06
2,000	0.1
5,000	0.1
10,000	0.2
20,000	0.2

Quantity in Cloud (pounds)	Distance to Endpoint (miles)
50,000	0.3
100,000	0.4
200,000	0.5
500,000	0.6
1,000,000	0.8

4.2 ALTERNATIVE SCENARIOS

This section provides guidance on how to choose and model alternative scenarios. Information is provided on the general requirements of the regulations, followed by specific sections on chlorine, sulfur dioxide, anhydrous ammonia, aqueous ammonia, methane and propane.

GENERAL REQUIREMENTS

The requirements that differ from those for worst-case scenarios are as follows:

- You can take into account active as well as passive mitigation systems, as long as these systems are expected to withstand the causes of the accident.
- The alternative scenario should reach an endpoint offsite, unless no such scenario exists.
- If you are doing your own modeling, you should use "typical meteorological conditions for the stationary source." You may obtain these data from local weather stations. You can obtain wind speed and temperature data from the National Climatic Data Center at (828) 271-4800. This guidance uses an "average" weather condition of wind speed 3 m/s and D stability class with an ambient temperature of 25 °C.
- The number of alternative scenarios you are required to develop is as follows:
  - At least one scenario for each regulated toxic substance held in Program 2 and Program 3 processes.
  - At least one scenario to represent all flammables held in Program 2 and Program 3 processes.

Thus, if you have anhydrous ammonia, chlorine, sulfur dioxide, digester gas and propane on your site in Program 2 and Program 3 processes, you will need, at a minimum, three alternative toxic scenarios, one each for ammonia, chlorine and sulfur dioxide, but only one alternative flammable scenario, for either digester gas or propane.

CHOICE OF ALTERNATIVE SCENARIOS

Your alternative scenario for a covered process must be one that is more likely to occur than the worst-case scenario and that reaches an endpoint offsite, unless no such scenario exists. You do not need to demonstrate greater likelihood of occurrence or carry out any analysis of probability of occurrence; you only need to use reasonable judgement and knowledge of the process. If, using a combination of reasonable assumptions, modeling of a release of a regulated substance from a process shows that the relevant endpoint is not reached offsite, you can use the modeling results to demonstrate that a scenario does not exist for the process that will give an endpoint offsite. You must report an alternative scenario, however.

Release scenarios you should consider include, but are not limited to, the following, where applicable:

- Transfer hose releases due to splits or sudden uncoupling;
- Process piping releases from failures at flanges, joints, welds, valves and valve seals, and drains or bleeds;
- Process vessel or pump releases due to cracks, seal failure, drain bleed, or plug failure;
- Vessel overfilling and spill, or overpressurization and venting through relief valves or rupture disks; and
- Shipping container mishandling and breakage or puncturing leading to a spill.

For alternative release scenarios, you may consider active mitigation systems, such as interlocks, shutdown systems, pressure relieving devices, flares, emergency isolation systems, and fire water and deluge systems, as well as passive mitigation systems. Mitigation systems considered must be capable of withstanding the event that triggers the release while remaining functional.

You must consider your five-year accident history and failure scenarios identified in your hazard review or process hazards analysis in selecting alternative release scenarios for regulated toxic or flammable substances (e.g., you might choose an actual event from your accident history as the basis of your scenario). You also may consider any other reasonable scenarios.

The alternative scenarios you choose to analyze should be scenarios that you consider possible at your site. Although EPA requires no explanation of your choice of scenario, you should choose a scenario that you think you can explain to emergency responders and the public as a reasonable alternative to the worst-case scenario. For example, you could pick a scenario based on an actual event, or you could choose a scenario that you worry about, because circumstances at your site might make it a possibility. If you believe that there is no reasonable scenario that could lead to offsite consequences, you may use a scenario that has no offsite impacts for your alternative analysis. You should be prepared to explain your choice of such a scenario to the public, should questions arise.

WWTP Scenarios

A number of scenarios other than those listed in the rule may be worth considering for WTTPs. Many WWTPs have single-stage, pass-through chemical scrubbers to neutralize compounds such as sulfur dioxide. Failure of the neutralizing solution's recirculation pump and continued operation of the blower fan could not only allow a release, but also exacerbate it by mechanically evacuating the substance from the room.

Accidents reported to EPA involving chlorine systems have been caused by "rust holes," failure of a diaphragm, leak during hookup to a tank, a packing nut leak, faulty cylinders, removal of a valve in error, faulty valves, leaking gaskets, and a

blown pressure gauge. Similar accidents involving sulfur dioxide systems have been reported. In addition, natural events, such as floods, tornados, earthquakes, and hurricanes could cause several releases to occur simultaneously. You may want to consider these types of scenarios when you select your alternative release scenarios.

CHLORINE

FLASHING LIQUID RELEASES

Many of the potential alternative scenarios could involve the release of liquid chlorine from a small hole. The liquid chlorine flashes immediately to vapor and fine liquid droplets and is carried downwind.

The rate of release of a liquid through an hole is given by Bernoulli's formula for liquid releases (see Appendix 4A). Using chemical-specific data for chlorine, the formula becomes:

$$QR = 3{,}140 \times A_h \tag{8}$$

where:

A_h	=	the area of the hole (in^2 - for example, the area of a hole of diameter 1 inch is 0.785 in^2)
3,140	=	factor applicable to chlorine liquefied under a pressure of 98.5 psig (see Appendix 4A)

Note that this is the formula for the release of a pure liquid and would apply to a breach in the wall of a vessel or to the rupture of a very short pipe. For long pipes, there is a pressure drop between the vessel and the hole, and there will be flashing in the pipe and a reduced rate of release. Therefore, Equation 8 may be conservative.

If there is a small leak from the liquid space of a large storage vessel, the reservoir can essentially be considered as infinite, and the chlorine will be steadily emitted at a constant rate for a relatively long period. Such leaks may occur because of a gasket failure, a pump seal leak, or a corrosion hole, for example. You can use Equation 8 and the estimated area of the hole to calculate the release rate (QR).

To predict the distance to the toxic endpoint, take the calculated value of QR and identify the closest value on Exhibit 4-12 (150 lb/min). Read off the corresponding distance, in this case, 0.6 mile for a rural site and 0.2 mile for an urban site. Alternatively, use Figure 4-5.

Exhibit 4-13 provides release rate estimates for releases of liquid chlorine through holes of diameter 1/16 inch to 5 inches and the distances to the endpoint corresponding to these release rates. You can use this table instead of Equation 8 and Exhibit 4-12 to estimate the distance to the endpoint.

EXHIBIT 4-12
DISTANCES TO TOXIC ENDPOINT FOR CHLORINE
D Stability, Wind Speed 3 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
1	0.1	0.1
2	0.1	
5	0.1	
10	0.2	0.1
15	0.2	0.1
20	0.2	0.1
30	0.3	0.1
40	0.3	0.1
50	0.3	0.1
60	0.4	0.2
70	0.4	0.2
80	0.4	0.2
90	0.4	0.2
100	0.5	0.2
150	0.6	0.2
200	0.6	0.3
250	0.7	0.3
300	0.8	0.3
400	0.8	0.4
500	1.0	0.4
600	1.0	0.4
700	1.1	0.4

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
750	1.2	0.4
800	1.2	0.5
900	1.2	0.5
1,000	1.3	0.5
1,500	1.6	0.6
2,000	1.8	0.6
2,500	2.0	0.7
3,000	2.2	0.8
4,000	2.5	0.8
5,000	2.8	0.9
7,500	3.4	1.2
10,000	3.9	1.3
15,000	4.6	1.6
20,000	5.3	1.8
25,000	5.9	2.0
30,000	6.4	2.1
40,000	7.3	2.4
50,000	8.1	2.7
75,000	9.8	3.2
100,000	11	3.6
150,000	13	4.2
200,000	15	4.8

EXHIBIT 4-13
RELEASE RATES AND DISTANCE TO THE ENDPOINT FOR LIQUID CHLORINE RELEASES
D Stability, Wind Speed 3 Meters per Second

Hole Diameter (inches)	Release Rate (lb/min)	Distance (miles)	
		Rural	Urban
1/16	10	0.2	0.1
3/16	87	0.4	0.2
1/4	150	0.6	0.2
5/16	240	0.7	0.3
1/2	620	1.0	0.4
1	2,500	2.0	0.7
2	9,900	3.9	1.3
3	22,200	5.3	1.8
4	39,500	7.3	2.4
5	61,700	8.1	2.7

TWO-PHASE RELEASES

In case of a release from a long pipe carrying liquid chlorine ($L/d_h >> 1$, where L is the length of the pipe between the reservoir of chlorine and the atmosphere and d_h is the diameter of the pipe), there can be flashing in the discharge pipe, resulting in a two-phase mixture emerging to the atmosphere. In this case, the rate of release in lb/min for chlorine is given by:

$$QR = 1{,}100 \times A_h \times F \qquad (9)$$

where:

1,100 = chemical-specific factor applicable to chlorine at 25 °C (see Appendix 4A)

A_h = hole area (in^2) = area of pipe opening

F = frictional loss factor (dimensionless) with values as follows:

F	L/d_h
1	10
0.85	50
0.75	100
0.65	200
0.55	400

Exhibit 4-14 presents release rates for a range of pipe diameters and length-diameter ratios for two-phase releases of chlorine from a pipe. You can read the release rate

from the exhibit or calculate the release rate from Equation 10, then find the distance to the endpoint corresponding to the release rate by referring to Exhibit 4-12.

EXHIBIT 4-14
RELEASE RATES FOR TWO-PHASE RELEASES FROM PIPES CARRYING LIQUID CHLORINE

Pipe Diameter (inches)	Pipe Length/Diameter (L/d_h)				
	10 (F=1)	50 (F=0.85)	100 (F=0.75)	200 (F=0.65)	400 (F=0.55)
	Chlorine Release Rate (lbs/min)				
1/4	54	46	40	35	30
5/16	84	72	63	55	46
1/2	220	180	160	140	120
3/4	490	410	360	320	270
1	860	730	650	560	480
2	3,500	2,900	2,600	2,200	1,900
3	7,800	6,600	5,800	5,100	4,300

VAPOR RELEASES

For a choked release of vapor (i.e., emerging at the speed of sound from the hole, which will invariably be the case for chlorine at atmospheric temperatures), the release rate for chlorine is given by:

$$QR = 190 \times A_h \tag{10}$$

where:

190 = chemical-specific factor for chlorine at a tank pressure of 113 psia and temperature 25 °C (see Appendix 4A)

A_h = hole area (in^2)

You can use Equation 10 to estimate the release rate of chlorine from a hole in the vapor space of a tank. For example, such a hole could result from shearing off a valve at the top of a tank. The distance to the endpoint can be estimated from the release rate, using Exhibit 4-12 or 4-5.

As an alternative to Equation 10, for releases from holes ranging from 1/16-inch to 5 inches in diameter, you can read the release rate and the corresponding distance from Exhibit 4-15.

EXHIBIT 4-15
RELEASE RATES AND DISTANCE TO THE ENDPOINT FOR CHLORINE VAPOR RELEASES
D Stability, Wind Speed 3 Meters per Second

Hole Diameter (inches)	Release Rate (lbs/min)	Distance (miles)	
		Rural	Urban
1/16	0.6	0.1	0.1
3/16	5	0.1	0.1
1/4	9	0.2	0.1
5/16	15	0.2	0.1
½	37	0.3	0.1
1	150	0.6	0.2
2	600	1.0	0.4
3	1,300	1.6	0.6
4	2,400	2.0	0.7
5	3,700	2.5	0.8

Note that the release rate estimated by the method above is conservative. As the release proceeds, chlorine continuously evaporates from the liquid surface in the cylinder. This causes the liquid to cool, the vapor pressure to decrease, and the rate of release to decline. However, the equations for calculating this effect are rather complex and not included in this guidance.

OTHER CHLORINE SCENARIOS

If you wish to do so, you can simply quote any of the results above, if they are applicable to your site, when you submit your Risk Management Plan. However, you may also choose to develop other scenarios, using Equations 8, 9, or 10, and Exhibit 4-12 or Figure 4-5.

SULFUR DIOXIDE

FLASHING LIQUID RELEASES

Sulfur dioxide is similar to chlorine in the way that it would be released, so Bernoulli's formula is applicable. Using Bernoulli's formula, incorporating chemical-specific data for sulfur dioxide, you can estimate the release rate from a hole in the liquid space of a tank from the following equation:

$$QR = 2{,}020 \times A_h \qquad (11)$$

where:

A_h = the area of the hole (in^2)
2,020 = factor applicable to sulfur dioxide liquefied under a pressure of 43 psig (see Appendix 4A)

After you have estimated the release rate, you can find the predicted distance to the toxic endpoint for sulfur dioxide from Exhibit 4-17 (next page) or Figure 4-6.

Alternatively, you can use Exhibit 4-16. This exhibit gives release rates and distances to the endpoint for flashing liquid releases through holes of diameter 1/16 inch to 5 inches.

EXHIBIT 4-16
RELEASE RATES AND DISTANCE TO THE ENDPOINT FOR LIQUID SULFUR DIOXIDE RELEASES
D Stability, Wind Speed 3 Meters per Second

Hole Diameter (inches)	Release Rate (lb/min)	Distance (miles)	
		Rural	Urban
1/16	6	0.1	0.1
3/16	56	0.4	0.2
1/4	99	0.5	0.2
5/16	160	0.6	0.2
1/2	400	0.9	0.4
1	1,600	1.9	0.6
2	6,300	3.3	1.1
3	14,300	5.6	1.7
4	25,300	7.3	2.1
5	39,600	9.2	2.6

EXHIBIT 4-17
DISTANCES TO TOXIC ENDPOINT FOR SULFUR DIOXIDE
D Stability, Wind Speed 3 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
1	0.1	0.1
2	0.1	
5	0.1	
10	0.2	0.1
15	0.2	0.1
20	0.2	0.1
30	0.2	0.1
40	0.3	0.1
50	0.3	0.1
60	0.4	0.2
70	0.4	0.2
80	0.4	0.2
90	0.4	0.2
100	0.5	0.2
150	0.6	0.2
200	0.6	0.2
250	0.7	0.3
300	0.8	0.3
400	0.9	0.4
500	1.0	0.4
600	1.1	0.4
700	1.2	0.4

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
750	1.3	0.5
800	1.3	0.5
900	1.4	0.5
1,000	1.5	0.5
1,500	1.9	0.6
2,000	2.2	0.7
2,500	2.3	0.8
3,000	2.7	0.8
4,000	3.1	1.0
5,000	3.3	1.1
7,500	4.0	1.3
10,000	4.6	1.4
15,000	5.6	1.7
20,000	6.5	1.9
25,000	7.3	2.1
30,000	8.0	2.3
40,000	9.2	2.6
50,000	10	2.9
75,000	13	3.5
100,000	14	4.0
150,000	18	4.7
200,000	20	5.4

TWO-PHASE RELEASES

A break in a long pipe (whose length is much greater than its diameter) carrying liquid sulfur dioxide can result in the release of a two-phase mixture, as discussed above for chlorine. The release rate can be estimated from the following equation:

$$QR = 252 \times A_h \times F \qquad (12)$$

where:

252	=	chemical-specific factor applicable to sulfur dioxide at 25 °C (see Appendix 4A)
A_h	=	hole area (in^2) = area of pipe opening
F	=	frictional loss factor (dimensionless) with values as shown in the section on chlorine

You can estimate the release rate from Equation 12, then find the distance to the endpoint corresponding to the release rate by referring to Exhibit 4-12. You also can find the release rate for a range of pipe diameters and L/d_h values in Exhibit 4-18.

EXHIBIT 4-18
RELEASE RATES FOR TWO-PHASE RELEASES FROM PIPES CARRYING LIQUID SULFUR DIOXIDE

Pipe Diameter (inches)	Pipe Length/Diameter (L/d_h)				
	10 (F=1)	50 (F=0.85)	100 (F=0.75)	200 (F=0.65)	400 (F=0.55)
	Sulfur Dioxide Release Rate (lbs/min)				
1/4	12	11	9	8	7
5/16	19	16	14	13	11
½	49	42	37	32	27
3/4	110	95	83	72	61
1	200	170	150	130	110
2	800	670	600	520	440
3	1,800	1,500	1,300	1,200	980

VAPOR RELEASES

For a choked release of sulfur dioxide vapor, the release rate is given:

$$QR = 91 \times A_h \tag{13}$$

where:

91	=	chemical-specific factor for sulfur dioxide at a tank pressure of 58 psia and temperature 25 °C (see Appendix 4A)
A_h	=	hole area (in^2)

The distance to the endpoint can be estimated from the release rate, using Exhibit 4-17 or Figure 4-6.

As an alternative to Equation 13 and Exhibit 4-17, for releases from holes ranging from 1/4 inch to 5 inches in diameter, you can read the release rate and the corresponding distance from Exhibit 4-19.

EXHIBIT 4-19
RELEASE RATES AND DISTANCE TO THE ENDPOINT FOR SULFUR DIOXIDE VAPOR RELEASES
D Stability, Wind Speed 3 Meters per Second

Hole Diameter (inches)	Release Rate (lbs/min)	Distance (miles)	
		Rural	Urban
1/4	4	0.1	0.1
5/16	7	0.1	0.1
1/2	18	0.2	0.1
1	71	0.4	0.2
2	280	0.8	0.3
3	640	1.1	0.4
4	1,100	1.5	0.5
5	1,800	2.2	0.7

OTHER SULFUR DIOXIDE SCENARIOS

If you wish to do so, you can simply quote any of the results above, if they are applicable to your site, when you submit your Risk Management Plan. However, you may also choose to develop other scenarios, using Equations 11, 12, or 13, and Exhibit 4-17 or Figure 4-6.

ANHYDROUS AMMONIA

FLASHING LIQUID RELEASES

Like chlorine and sulfur dioxide, ammonia will be liquefied under pressure in its own storage vessel. Bernoulli's equation is applicable for flashing liquid releases (see Appendix 4A). The equation for ammonia liquefied under a pressure of 130 psig is:

$$QR = 2{,}380 \times A_h \tag{14}$$

where:

A_h = hole area (in^2)
2,380 = chemical-specific factor for ammonia liquefied under pressure

After you have estimated the release rate, you can find the predicted distance to the toxic endpoint for ammonia from Exhibit 4-21 (next page) or Figure 4-7.

Alternatively, you can use Exhibit 4-20. This exhibit gives release rates and distances to the endpoint for flashing liquid releases through holes of diameter 1/16 inch to 5 inches.

EXHIBIT 4-20
RELEASE RATES AND DISTANCE TO THE ENDPOINT FOR LIQUID AMMONIA RELEASES
D Stability, Wind Speed 3 Meters per Second

Hole Diameter (inches)	Release Rate (lbs/min)	Distance (miles)	
		Rural	Urban
1/16	7	0.1	0.1
3/16	66	0.2	0.1
1/4	120	0.2	0.1
5/16	180	0.4	0.2
1/2	470	0.4	0.2
1	1,900	0.8	0.3
2	7,500	1.6	0.5
3	16,800	2.2	0.7
4	30,000	3.1	1.0
5	46,800	3.9	1.2

EXHIBIT 4-21
DISTANCES TO TOXIC ENDPOINT FOR ANHYDROUS AMMONIA
D Stability, Wind Speed 3 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
<10	0.1	0.1
10	0.1	
15	0.1	
20	0.1	
30	0.1	
40	0.1	
50	0.1	
60	0.2	0.1
70	0.2	0.1
80	0.2	0.1
90	0.2	0.1
100	0.2	0.1
150	0.2	0.1
200	0.3	0.1
250	0.3	0.1
300	0.3	0.1
400	0.4	0.2
500	0.4	0.2
600	0.5	0.2
700	0.5	0.2
750	0.5	0.2
800	0.5	0.2

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
900	0.6	0.2
1,000	0.6	0.2
1,500	0.7	0.3
2,000	0.8	0.3
2,500	0.9	0.3
3,000	1.0	0.4
4,000	1.2	0.4
5,000	1.3	0.5
7,500	1.6	0.5
10,000	1.8	0.6
15,000	2.2	0.7
20,000	2.5	0.8
25,000	2.8	0.9
30,000	3.1	1.0
40,000	3.5	1.1
50,000	3.9	1.2
75,000	4.8	1.4
100,000	5.4	1.6
150,000	6.6	1.9
200,000	7.6	2.1
250,000	8.4	2.3

AQUEOUS AMMONIA

Alternative scenario spills of aqueous ammonia are going to be similar to worst-case scenario spills in that there will be a leak of some kind and the liquid will either spread across a diked area or spread out until its depth is only 1 cm (0.39 inch). The principal difference will be in the amount spilled.

The calculation of the rate of spillage is again performed using Bernoulli's formula see Appendix A4). The density of 30 percent aqueous ammonia is 57.33 lb/ft^3, so the equation becomes:

$$QR_L = 153 \times A_h \times (h)^{0.5} \quad (15)$$

where:

QR_L	=	rate of spillage of ammonia solution onto the ground (lbs/min), not the rate of evaporation
A_h	=	hole area (in^2)
h	=	static head

For example, for a ½-inch diameter opening with a static head h of 10 ft:

$$QR_L = 153 \times \pi \times (½ \times ½)^2 \times \sqrt{10} = 153 \times 3.142 \times 1/16 \times 3.16 = 95 \text{ lb/min}$$

This is the rate of spillage of the total solution of water plus ammonia as a liquid onto the ground.

If you know, and can document, how long it will take to stop the release, you should estimate the total quantity of solution spilled to the ground (QS) by multiplying the estimated rate of liquid spillage by the estimated duration of the release (in minutes). Then you can estimate the release rate to air (QR) as the evaporation rate of ammonia from the pool. For an undiked area (pool depth 1 cm):

$$QR = 0.025QS \quad (16)$$

For a diked pool (pool depth greater than 1 cm) of area A_p square feet:

$$QR = 0.046A_p \quad (17)$$

The maximum area of the pool that would be formed by the spilled liquid is 0.55QS. If you have a diked area that is larger than the maximum area, use the equation for an undiked area to estimate the release rate to air.

It is possible that you may estimate a rate of evaporation of ammonia from the pool that exceeds the spill rate of the liquid solution, particularly if the liquid spill rate is small and the spill of the liquid may last for a fairly long time. In such a case, under the assumptions used in this estimation method, no pool would be formed. Instead of the evaporation rate, in this case, you should use the liquid spill rate (QR_L) as the release rate to air.

You also can determine how far the pool will spread until the rate of spillage is matched by the rate of evaporation of ammonia. For aqueous ammonia at 77 °F (25 °C), the rate of evaporation is 0.046 A_p (from Equation 17).

The area that will cause the rate of evaporation to exactly balance the rate of spillage is given by:

$$A_p = QR/0.046 = 22QR_L \tag{18}$$

In the example given above, $QR_L = 95$ lb/min, so $A_p = 2{,}100$ ft^2. This value should be compared with the available diked area and the smaller of the two values chosen. Thus, if the diked area happens to be 50 ft x 50 ft = 2,500 ft^2, the area chosen for subsequent calculation is $A_p = 2{,}100$ ft^2 and QR = 95 lb/min. (If the diked area happened to be smaller — say 20 ft x 20 ft = 400 ft^2 — then the spilled ammonia would cover the diked area, and, using Equation 17, the rate of evaporation QR would be (0.046)(400) = 18 lb/min.)

To predict the distance to the toxic endpoint in typical weather conditions, take the value of QR calculated above and identify the closest value on Exhibit 4-22. Read off the corresponding distance. For the 95 lb/min case, the result is 0.2 mile for a rural site and 0.1 mile for an urban site. Alternatively, use Figure 4-8.

EXHIBIT 4-22
DISTANCES TO TOXIC ENDPOINT FOR AQUEOUS AMMONIA
D Stability, Wind Speed 3 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
8	0.1	0.1
10	0.1	
15	0.1	
20	0.1	
30	0.1	
40	0.1	
50	0.2	0.1
60	0.2	0.1
70	0.2	0.1
80	0.2	0.1
90	0.2	0.1
100	0.2	0.1
150	0.3	0.1
200	0.3	0.1
250	0.4	0.2
300	0.4	0.2
400	0.4	0.2
500	0.5	0.2
600	0.6	0.2
700	0.6	0.2
750	0.6	0.2

Release Rate (lbs/min)	Distance to Endpoint (miles)	
	Rural	Urban
800	0.7	0.2
900	0.7	0.3
1,000	0.8	0.3
1,500	1.0	0.4
2,000	1.2	0.4
2,500	1.2	0.4
3,000	1.5	0.5
4,000	1.8	0.6
5,000	2.0	0.7
7,500	2.2	0.7
10,000	2.5	0.8
15,000	3.1	1.0
20,000	3.6	1.2
25,000	4.1	1.3
30,000	4.4	1.4
40,000	5.1	1.6
50,000	5.8	1.8
75,000	7.1	2.2
100,000	8.2	2.5
150,000	10	3.1
200,000	12	3.5

PROPANE

You must select an alternative release scenario that reaches an endpoint offsite unless no such scenario exists. If no scenario reaches an endpoint beyond your fenceline, you must still report an alternative release scenario for flammables unless the process is in Program 1.

The potential alternative scenarios for flammable substances include:

Vapor cloud fires (flash fires) that may result from dispersion of a flammable vapor cloud and subsequent ignition. Such a fire could flash back and present a severe heat radiation hazard to anyone in the vicinity. The endpoint distance for such a fire is the predicted distance to which the vapor cloud travels before falling below its lower flammable limit (LFL).

A pool fire is unlikely to be applicable to propane. In the event of such a fire, the endpoint distance is that at which radiant heat could cause second degree burns over a period of 40 seconds.

A boiling liquid, expanding vapor explosion (BLEVE), leading to a fireball that may produce intense heat, may occur if a vessel containing material such as propane ruptures as a result of exposure to a fire. The radiant heat from such an event is generally considered to be the principal hazard, but in addition, portions of the vessel can be thrown a considerable distance, and there are shock waves generated by the explosive rupture of the vessel. Such an event is unlikely at a wastewater treatment facility unless a propane storage vessel is near a burning building or if there are burning weeds under a tank.

A vapor cloud explosion, such as that considered for the worst-case, but presumably containing a smaller amount of flammable material.

A jet fire from the puncture of a vessel containing a flammable material under pressure.

The *Risk Management Program for Propane Storage Facilities* identifies a scenario in which a driver fails to remove the hoses between the storage tank and the delivery vehicle before driving away. The result is the failure of an unloading hose. The active mitigation devices are assumed to work, limiting the release to the quantity of liquid propane contained in the hose. The volume of the hose is estimated as the cross-sectional area of the hose times the length. For the example in the guidance for propane storage facilities, the hose was assumed to have a diameter of 4 inches (0.33 feet) and a length of 25 feet. This hose would have a volume of $\pi \times (0.33/2)^2 \times 25$, or 2.18 ft^3. The density of liquid propane is 31.4 lbs/ft^3, so the quantity in the hose would be about 69 lb. Assuming a vapor cloud explosion of the released quantity, the distance to the 0.1 psi overpressure endpoint can be estimated from Equation 7. For this example, the distance is calculated as 0.03 mile. Alternatively, distances to the endpoint for vapor cloud explosions of quantities ranging from 50 to 500 pounds are provided in Exhibit 4-23; see Exhibit 4-11 for larger quantities.

EXHIBIT 4-23
DISTANCE TO OVERPRESSURE ENDPOINT OF 1.0 PSI FOR VAPOR CLOUD EXPLOSIONS OF PROPANE
Based on TNT Equivalent Method, 10 Percent Yield Factor

Quantity in Cloud (pounds)	Distance to Endpoint (miles)
50	0.03
60	0.03
70	0.03
80	0.03
90	0.04

Quantity in Cloud (pounds)	Distance to Endpoint (miles)
100	0.04
200	0.05
300	0.05
400	0.06
500	0.06

A vapor cloud fire also may be an alternative scenario for a propane release. The endpoint for this type of event is the lower flammable limit (LFL) (36 mg/L for propane). To estimate the distance to the endpoint, you need to estimate the release rate and then estimate the dispersion distance to the LFL, based on dense gas modeling. For distances to the propane LFL at a rural site:

- All release rates below 2,000 lbs/min give a distance to the endpoint of less than 0.1 mile or 520 ft and
- Release rates from 2,500 to 10,000 lbs/min give a distance to the endpoint of 0.1 mile.

For an urban site:

- All release rates less than 7,500 lbs/min give a distance to the endpoint of less than 0.1 mile; and
- Release rates from 7,500 to 10,000 lbs/min give a distance to the endpoint of 0.1 mile.

If it is possible that your propane tank could be exposed to fire, resulting in a BLEVE, then you can use Exhibit 4-24 to estimate the distance at which exposure to heat from the fireball resulting from the BLEVE could lead to second degree burns.

EXHIBIT 4-24
DISTANCE AT WHICH EXPOSURE TO A PROPANE BLEVE COULD LEAD TO SECOND-DEGREE BURNS*

Quantity in Fireball (lb)	Distance (miles)	Quantity in Fireball (lb)	Distance (miles)
1,000	0.1	75,000	0.4
5,000	0.1	100,000	0.4
10,000	0.1	200,000	0.5
20,000	0.2	300,000	0.6
30,000	0.2	500,000	0.8
50,000	0.3		

METHANE

Consider the case of methane released from a digester. Assuming that the full contents of a digester were released over a few minutes (say 10 minutes), in the example given in Section 4.1, the release rate would be 105 lb/min (total quantity of methane in the digester, 1,053 lb). The LFL for methane is 33 mg/L. Conservatively taking digester gas/methane as a neutrally buoyant gas (it will actually rise from the ground), you need to use Exhibit 4-25 (for a rural site) or Exhibit 4-26 (for an urban site) to estimate the distance to the LFL. From Exhibit 4-25, the predicted distance for a release rate of 105 lb/min is 0.1 mile at a rural site and, from Exhibit 4-26, it is 0.1 mile at an urban site.

It is unlikely that a BLEVE would occur. They are not known to take place in low pressure containment such as that of a digester. A pool fire does not need to be considered, because the methane is not liquefied.

EXHIBIT 4-25
NEUTRALLY BUOYANT PLUME DISTANCES TO LOWER FLAMMABILITY LIMIT (LFL)
Rural Conditions, D Stability, Wind Speed 3.0 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	Release Rate (lbs/min)	Distance to Endpoint (miles)
0 - 1,980	0.1	108,900-128,700	1.0
1,980-7,260	0.2	128,700-148,500	1.1
7,260-17,490	0.3	148,500-171,600	1.2
17,490-28,380	0.4	171,600-191,400	1.3
28,380-42,900	0.5	191,400-224,400	1.4
42,900-56,100	0.6	224,400-270,600	1.6
56,100-72,600	0.7	270,600-320,100	1.8
72,600-89,100	0.8	320,100-363,000	2.0
89,100- 108,900	0.9	363,000-429,000	2.2

EXHIBIT 4-26
NEUTRALLY BUOYANT PLUME DISTANCES TO LOWER FLAMMABILITY LIMIT (LFL)
Urban Conditions, D Stability, Wind Speed 3.0 Meters per Second

Release Rate (lbs/min)	Distance to Endpoint (miles)	Release Rate (lbs/min)	Distance to Endpoint (miles)
0 - 4,950	0.1	240,900-303,600	0.8
4,950-23,430	0.2	303,600-363,000	0.9
23,430-49,500	0.3	363,000-462,000	1.0
49,500-85,800	0.4	462,000-594,000	1.2
85,800-132,000	0.5	594,000-858,000	1.4
132,000-181,500	0.6	858,000-1,023,000	1.6
181,500-240,900	0.7	1,023,000-1,254,000	1.8

4.3 BUILDINGS

In many WWTPs, chlorine and sulfur dioxide cylinders or other vessels are kept indoors. Unless your cylinders are delivered directly into the building (i.e., they are not unloaded outdoors and moved inside later), you should not consider buildings in your worst-case scenario, even though they are passive mitigation systems, because there will be some time when the vessels are outdoors. If your cylinders are delivered indoors or if your largest vessel is indoors, you may want to analyze the mitigating effects of the building when you do your worst-case analysis. You may also want to consider alternative scenarios that consider buildings as mitigation systems. Some buildings are strong, leak-tight buildings that are designed to contain the release of the contents of a one-ton cylinder or other vessel. Some of them contain scrubbers that activate upon release of chlorine or sulfur dioxide; if these scrubbers function as designed, they can ensure that any release to the external atmosphere would be small. (Scrubbers are active mitigation features that cannot be considered to work for a worst-case scenario.) At the other end of the spectrum, some buildings are intended to do no more than keep the rain off.

MITIGATION OF RELEASES OF ANHYDROUS AMMONIA, CHLORINE, OR SULFUR DIOXIDE INTO BUILDINGS

EPA's *RMP Offsite Consequence Analysis Guidance* provides a simple building release-rate-multiplicative factor of 55 percent for toxic gases in both worst-case and alternative scenarios (i.e., the predicted rate of release is 55 percent of that for the same accident if it should occur outdoors).

Example: Assume that there is a liquid chlorine release through a 5/16-inch opening as described in the discussion of chlorine alternative scenarios (see Exhibit 4-13). This release takes place indoors and, per the discussion above, is reduced to 55 percent of the release rate of 240 lb/min, i.e., to ≈ 130 lb/min. From Exhibit 4-12, the predicted distance to the toxic endpoint is ≈ 0.6 mile for a rural site and ≈ 0.2 mile for an urban site, compared to 0.7 mile (rural) and 0.3 mile (urban) for an outdoor release.

The *RMP Offsite Consequence Analysis Guidance* also provides factors for toxic liquids of 10 percent for worst-case scenarios and 5 percent for alternative scenarios. These factors may be used for releases of aqueous ammonia that take place inside buildings.

The following discussion provides a more sophisticated approach for considering effects of building mitigation for worst-case (if appropriate) and alternative scenarios involving release of gases and mixtures of gases and entrained liquid. Analysis of release scenarios inside buildings involves consideration of the structure of the building, liquid rain-out, and release containment issues. The procedure addressing these issues which is recommended for developing release rate estimates for both worst-case (if appropriate) and alternative scenarios is presented in Figure 4-9.

The release into the building is assumed to occur over a 10-minute period. For the worst-case scenario, the quantity released into the building equals the total quantity in the largest vessel or pipeline. For alternative scenarios, you must estimate the total quantity of ammonia, chlorine, or sulfur dioxide released from the equipment over a 10-minute period. This 10-minute assumption is made to keep this guidance simple.

Calculations of the likely rise in pressure show that, for a release distributed over 10 minutes, building failure is unlikely to occur unless you have a very large vessel in a very small room. However, if the ratio of room volume to quantity in the vessel is < 0.1 ft^3/lb for ammonia and < 0.05 ft^3/lb for chlorine or sulfur dioxide, you should look at the possibility that the room will fail by windows blowing out or doors blowing open.

If the release is indoors directed towards a door or window that is potentially open, the release rate to the outside is the total quantity, uniformly distributed over 10 minutes. If the release is indoors and not directed towards a door or window, mitigation of the release by scrubbing, rain-out, or ventilation dilution may occur. If there is a scrubber, the release of material to the environment may be low. If there is no scrubber, the ventilation rate N_v, expressed as room volumes exchanged per hour, is identified, and the room volume per unit quantity of either ammonia, chlorine, or sulfur dioxide vapor released to the room (Θ) and the quantity airborne in the room (Q_a) are calculated for either a vapor or a vapor/liquid release.

For vapor releases, the amount of vapor released into the room is clearly Q, so $\Theta = V/Q$. For a flashing liquid release, ≈ 20 percent of the release typically flashes to vapor, so $\Theta = V/(0.2Q)$. The quantity airborne in the room is the total quantity released from the equipment to the room in 10 minutes for vapor releases and four-tenths of the total quantity released from the equipment to the room in 10 minutes for vapor/liquid releases. The basis for this four-tenths assumption is that, in a room, a flashing liquid jet will encounter obstacles that will cause 60 percent of the release to collect as a relatively slowly evaporating pool on the ground. The release over the initial ten minutes leads to predictions of higher concentrations downwind than does the slowly evaporating pool; therefore, you can consider only the release rate of the airborne material (0.4Q/10) and ignore the evaporating pool in estimating the distance to the toxic endpoint.

Given the values of N_v and Θ, the building mitigation factor (FR_{10}) is identified for 10-minute releases of ammonia in Exhibit 4-27, and for 10-minute releases of either chlorine or sulfur dioxide in Exhibit 4-28, respectively. The release rate to the environment is the total quantity airborne in the room, reduced by the building mitigation factor, distributed uniformly over 10 minutes.

Example: A 25-ton (50,000 lb) chlorine storage vessel is in a room of dimensions 40 feet x 40 feet x 30 feet = 48,000 ft^3. There is a worst-case release, so that the 50,000 lb is released into the building over a period of 10 minutes. The release is not adjacent to a potentially open door or window. Because it is a worst-case scenario, the scrubber (if there is one) is not operating. The ventilation rate $N_v = 4$. The release is a mixture of vapor and liquid droplets, so that $\Theta =$

$V/(0.2Q) = 48{,}000/10{,}000 = 4.8\ ft^3/lb$, and the airborne quantity $Q_a = 0.4Q = 20{,}000$ lb. From Exhibit 4-27, with $N_v = 4$ and $\Theta = 4.8$ (the closest entries on Exhibit 4-27 are $N_v = 5$ and $\Theta = 4.0$), $FR_{10} = 0.46$.

Therefore, the predicted worst-case scenario release rate from the building is:

$$0.46\times((0.4\times50{,}000)/10) = 920 \text{ lb/min}$$

Compare this value with 5,000 lb/min from an open-air release. From Exhibit 4-4, the predicted distance for a 920 lb/min release at a rural site is 6.3 miles and, at an urban site, is 2.9 miles. By comparison, the 5,000 lb/min release would lead to corresponding distances of 15 miles and 7 miles, respectively.

Example: Take a chlorine alternative scenario for a flashing liquid release through a 1/4-inch hole (see Section 4.2). Exhibit 4-13 shows a release rate of 150 lbs/min for this release. Assume this release takes place in a building with no scrubber for 10 minutes at a release rate of 150 lb/min for a total release of 1,500 lb. Assume that the building has dimensions of 50 feet x 25 feet x 20 feet = 25,000 ft^3. The release is a flashing liquid and, therefore, consists of a mixture of vapor and liquid. Q_a, the quantity that becomes airborne, is $(0.4)(1{,}500) = 600$ lb. The quantity of vapor is $(0.2)(1{,}500) = 300$ lb. Then $\Theta = 25{,}000/300 = 83 \approx 80$. You will have to determine N_v from the characteristics of your building. For this example, assume that the building is being ventilated with $N_v = 5$. From Exhibit 4-28, $FR_{10} = 0.32$, so that the rate of release to the external atmosphere is $(0.1)(0.32)(600) = 19$ lb/min. From Exhibit 4-12, the predicted distance to the endpoint is 0.2 mile for a rural site and 0.1 mile for an urban site. For the original release rate of 150 lb/min, the distances to the endpoint are 0.6 mile for a rural site and 0.2 mile for an urban site.

EXHIBIT 4-27
TEN-MINUTE BUILDING RELEASE ATTENUATION FACTORS FOR PROLONGED RELEASES OF ANHYDROUS AMMONIA

θ (m^3/kg)	N_v (hr^{-1})	FR_{10} (dim)
160	0	0.07
	1	0.08
	5	0.32
	10	0.51
	20	0.71
	30	0.80
	40	0.85
80	0	0.13
	1	0.13
	5	0.32
	10	0.51
	20	0.71
	30	0.80
	40	0.85
32	0	0.29
	1	0.29
	5	0.32
	10	0.51
	20	0.71
	30	0.80
	40	0.85
16	0	0.47
	1	0.47
	5	0.47
	10	0.51
	20	0.71
	30	0.80
	40	0.85

θ (m^3/kg)	N_v (hr^{-1})	FR_{10} (dim)
8.0	0	0.67
	1	0.67
	5	0.67
	10	0.67
	20	0.71
	30	0.80
	40	0.85
4.0	0	0.83
	1	0.83
	5	0.83
	10	0.83
	20	0.83
	30	0.83
	40	0.85
0.80	0	0.97
	1	0.97
	5	0.97
	10	0.97
	20	0.97
	30	0.97
	40	0.97
0.32	0	0.99
	1	0.99
	5	0.99
	10	0.99
	20	0.99
	30	0.99
	40	0.99

EXHIBIT 4-28
TEN-MINUTE BUILDING RELEASE ATTENUATION FACTORS FOR PROLONGED RELEASES OF CHLORINE AND SULFUR DIOXIDE

θ (m^3/kg)	N_v (hr^{-1})	FR_{10} (dim)
160	0	0.02
	1	0.08
	5	0.32
	10	0.51
	20	0.71
	30	0.80
	40	0.85
80	0	0.03
	1	0.08
	5	0.32
	10	0.51
	20	0.71
	30	0.80
	40	0.85
32	0	0.08
	1	0.08
	5	0.32
	10	0.51
	20	0.71
	30	0.80
	40	0.85
16	0	0.15
	1	0.15
	5	0.32
	10	0.51
	20	0.71
	30	0.80
	40	0.85

θ (m^3/kg)	N_v (hr^{-1})	FR_{10} (dim)
8.05	0	0.28
	1	0.28
	5	0.32
	10	0.51
	20	0.71
	30	0.80
	40	0.85
4.0	0	0.46
	1	0.46
	5	0.46
	10	0.51
	20	0.71
	30	0.80
	40	0.85
0.80	0	0.85
	1	0.86
	5	0.86
	10	0.86
	20	0.86
	30	0.86
	40	0.86
0.32	0	0.94
	1	0.94
	5	0.94
	10	0.94
	20	0.94
	30	0.94
	40	0.94

4.4 ESTIMATING OFFSITE RECEPTORS

The rule requires that you estimate in the RMP residential populations within the circle defined by the endpoint for your worst-case and alternative release scenarios (i.e., the center of the circle is the point of release and the radius is the distance to the endpoint). In addition, you must report in the RMP whether certain types of public receptors and environmental receptors are within the circles.

RESIDENTIAL POPULATIONS

To estimate residential populations, you may use the most recent Census data or any other source of data that you believe is more accurate. You are not required to update Census data or conduct any surveys to develop your estimates. Census data are available in public libraries and in the LandView system, which is available on CD-ROM (see box below). The rule requires that you estimate populations to two-significant digits. For example, if there are 1,260 people within the circle, you may report 1,300 people. If the number of people is between 10 and 100, estimate to the nearest 10. If the number of people is less than 10, provide the actual number. Census data are presented by Census tract. If your circle covers only a portion of the tract, you should develop an estimate for that portion. The easiest way to do this is to determine the population density per square mile (total population of the Census tract divided by the number of square miles in the tract) and apply that density figure to the number of square miles within your circle. Because there is likely to be considerable variation in actual densities within a Census tract, this number will be approximate. The rule, however, does not require you to correct the number.

OTHER PUBLIC RECEPTORS

Other public receptors must be noted in the RMP (see the discussion of public receptors in Chapter 2). If there are any schools, residences, hospitals, prisons, public recreational areas or arenas, or commercial or industrial areas within the circle, you must report that. You are not required to identify the specific public receptors; you must simply check off the categories of such areas within the circle. Most receptors can be identified from local street maps.

ENVIRONMENTAL RECEPTORS

Environmental receptors are defined as natural areas such as national or state parks, forests, or monuments; officially designated wildlife sanctuaries, preserves, refuges, or areas; and Federal wilderness areas. Only environmental receptors that can be identified on local U.S. Geological Survey (USGS) maps (see box below) need to be considered. You are not required to locate each of these specifically. You are only required to check off in the RMP which specific types of areas are within the circle. If any part of one of these receptors is within your circle, you must note that in the RMP.

Important: The rule does not require you to assess the likelihood, type, or severity of potential impacts on either public or environmental receptors. Identifying them as within the circle simply indicates that they could be adversely affected by the release.

Besides the results you are required to report in the RMP, you may want to consider submitting to EPA or providing your local community with a map showing the distances to the endpoint. Figure 4-10 is one suggested example of how the consequences of worst-case and alternative scenarios might be presented. It is a simplified map that shows the radius to which the vapor cloud might extend, given the worst-case release in worst-case weather conditions (the owner or operator should use a real map of the area surrounding the site). Organizations that have already begun to prepare Risk Management Programs and Plans have used this form of presentation (for example, in the Kanawha Valley or in Tampa Bay).

HOW TO OBTAIN CENSUS DATA AND LANDVIEW®

Census data can be found in publications of the Bureau of the Census, available in public libraries, including *County and City Data Book.*

LandView ®III is a desktop mapping system that includes database extracts from EPA, the Bureau of the Census, the U.S. Geological Survey, the Nuclear Regulatory Commission, the Department of Transportation, and the Federal Emergency Management Agency. These databases are presented in a geographic context on maps that show jurisdictional boundaries, detailed networks of roads, rivers, and railroads, census block group and tract polygons, schools, hospitals, churches, cemeteries, airports, dams, and other landmark features.

CD-ROM for IBM-compatible PCS
CD-TGR95-LV3-KIT $99 per disc (by region) or $549 for 11 disc set

U.S. Department of Commerce
Bureau of the Census
P.O. Box 277943
Atlanta, GA 30384-7943
Phone: 301-457-4100 (Customer Services -- orders)
Fax: (888) 249-7295 (toll-free)
Fax: (301) 457-3842 (local)
Phone: (301) 457-1128 (Geography Staff -- content)
http://www.census.gov/ftp/pub/geo/www/tiger/

Further information on LandView and other sources of Census data is available at the Bureau of the Census web site at www.census.gov.

HOW TO OBTAIN USGS MAPS

The production of digital cartographic data and graphic maps comprises the largest component of the USGS National Mapping Program. The USGS's most familiar product is the 1:24,000-scale Topographic Quadrangle Map. This is the primary scale of data produced, and depicts greater detail for a smaller area than intermediate-scale (1:50,000 and 1:100,000) and small-scale (1:250,000, 1:2,000,000 or smaller) products, which show selectively less detail for larger areas.

U.S. Geological Survey
508 National Center
12201 Sunrise Valley Drive
Reston, VA 20192
www.mapping.usgs.gov/

To order USGS maps by fax, select, print, and complete one of the online forms and fax to 303-202-4693. A list of commercial dealers also is available at www.mapping.usgs.gov/esic/usimage/dealers.html/. For more information or ordering assistance, call 1-800-HELP-MAP, or write:

USGS Information Services
Box 25286
Denver, CO 80225

For additional information, contact any USGS Earth Science Information Center or call 1-800-USA-MAPS.

4.5 DOCUMENTATION

You need to maintain onsite the following records on the offsite consequence analyses:

For the worst-case scenario, a description of the vessel or pipeline selected as worst-case, assumptions and parameters used and the rationale for selection; assumptions include use of any administrative controls and any passive mitigation systems that you assumed to limit the quantity that could be released.

For alternative release scenarios, a description of the scenarios identified, assumptions and parameters used and the rationale for the selection of specific scenarios; assumptions include use of any administrative controls and any mitigation that were assumed to limit the quantity that could be released. Documentation includes the effect of the controls and mitigation on the release quantity and rate. You can reference this guidance if you use any of the "canned" scenarios described herein.

Other data that you should maintain includes:

- Documentation of estimated quantity released, release rate and duration of release.
- Methodology used to determine distance to endpoints (it will be sufficient to reference this guidance if you used it for that purpose).
- Data used to identify potentially affected population and environmental receptors.

4.6 SYMBOLS FOR CHAPTER 4

A_h	area of hole in pipe, in^2
A_p	area of pool or diked area, ft^2
C_p	specific heat of gas at constant pressure, Btu/lb/°F
C_{pl}	specific heat of liquid, Btu/lb/°F
C_v	specific heat of gas at constant volume, Btu/lb/°F
D	distance to toxic or explosive endpoint, mi
d_h	diameter of hole in pipe or tank, ft^2
F	frictional loss factor in equation for calculating the rate of discharge of liquid chlorine, sulfur dioxide, or ammonia from a pipe, dimensionless
g	acceleration due to gravity, $32 ft/s^2$
h	static head in a vessel, ft
h_L	latent heat of vaporization of a liquid, Btu/lb
H	maximum head space in a digester, ft
L	length of pipework, ft
N_v	ventilation rate, room volumes/hr
p_g	gauge pressure, pounds per square inch gauge (psig)
p_a	absolute pressure, pounds per square inch absolute (psia)
Q	mass released, lb
Q_a	mass that remains airborne for the case of a release of chlorine, sulfur dioxide, or anhydrous ammonia into a building, lb
QR	rate of release, lb/min
QS	mass spilled into a pool, lb
r	radius of a digester, ft
$R_{vp}(T)$	ratio of vapor pressure of ammonia over a pool of aqueous ammonia at temperature T to the vapor pressure at 25 °C, dimensionless
T	temperature, °F or °C, depending on context
V	volume of a digester in a room, ft^3
v_{lg}	difference in specific volume between gas and liquid, ft^3/lb
X	percent of methane in digester gas, dimensionless
γ	ratio of specific heats, C_p/C_v, dimensionless
ρ_L	density of liquid, lb/ft^3
ρ_m	density of methane in digester gas, lb/ft^3
ρ_o	density of gas at pressure p_a, lb/ft^3
θ	room volume per unit mass of chlorine, sulfur dioxide, or anhydrous ammonia, ft^3/lb
≈	approximately equal to
~	approximately

Figure 4-1 Worst-Case Scenario--Predicted Distances to Toxic Endpoint For Chlorine @ Atmospheric Stability Class F with Windspeed 1.5 m/s

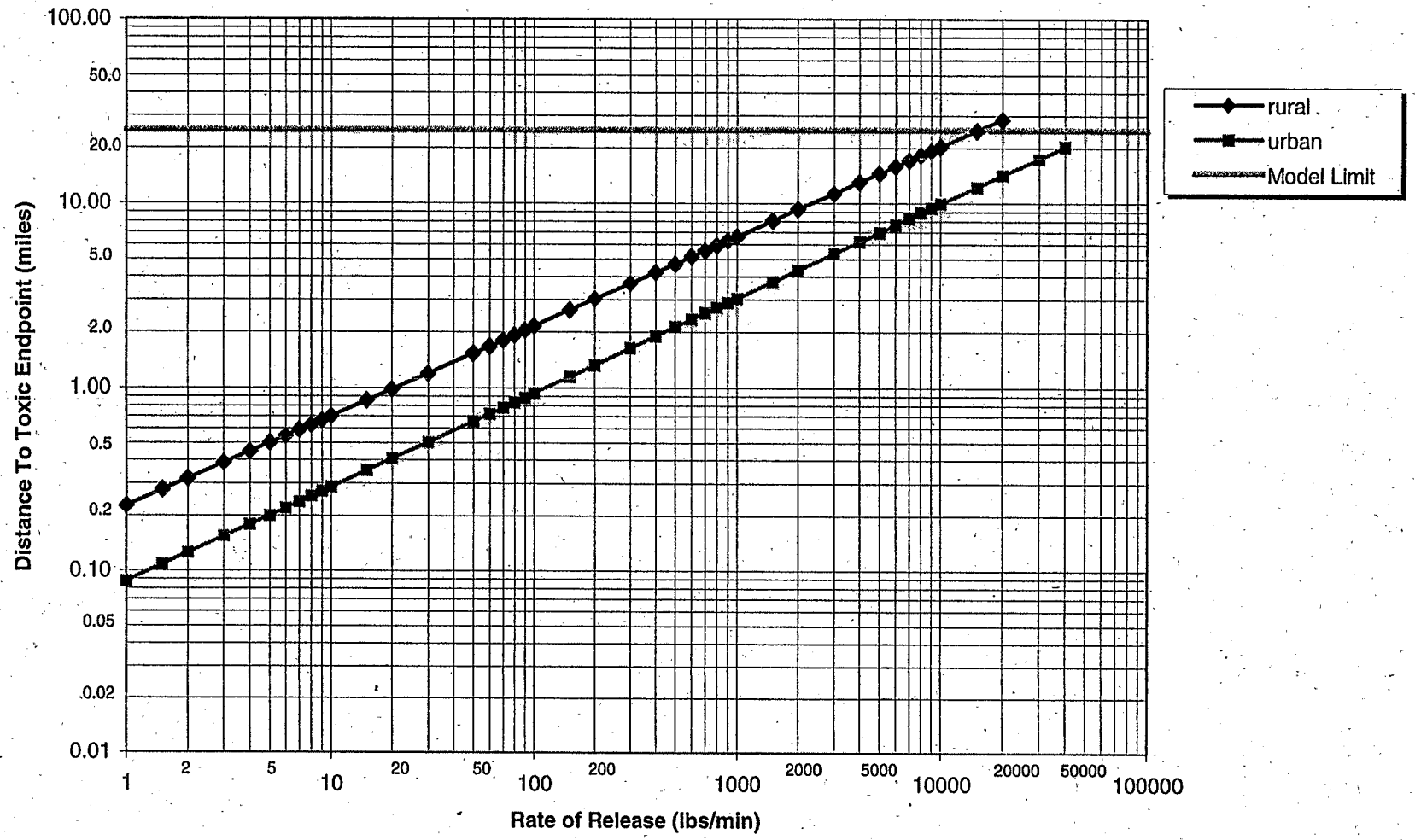


Figure 4-2 Worst-Case Scenario - Predicted Distances to Toxic Endpoint For SO2 @ Atmospheric Sability Class F with Windspeed 1.5 m/s

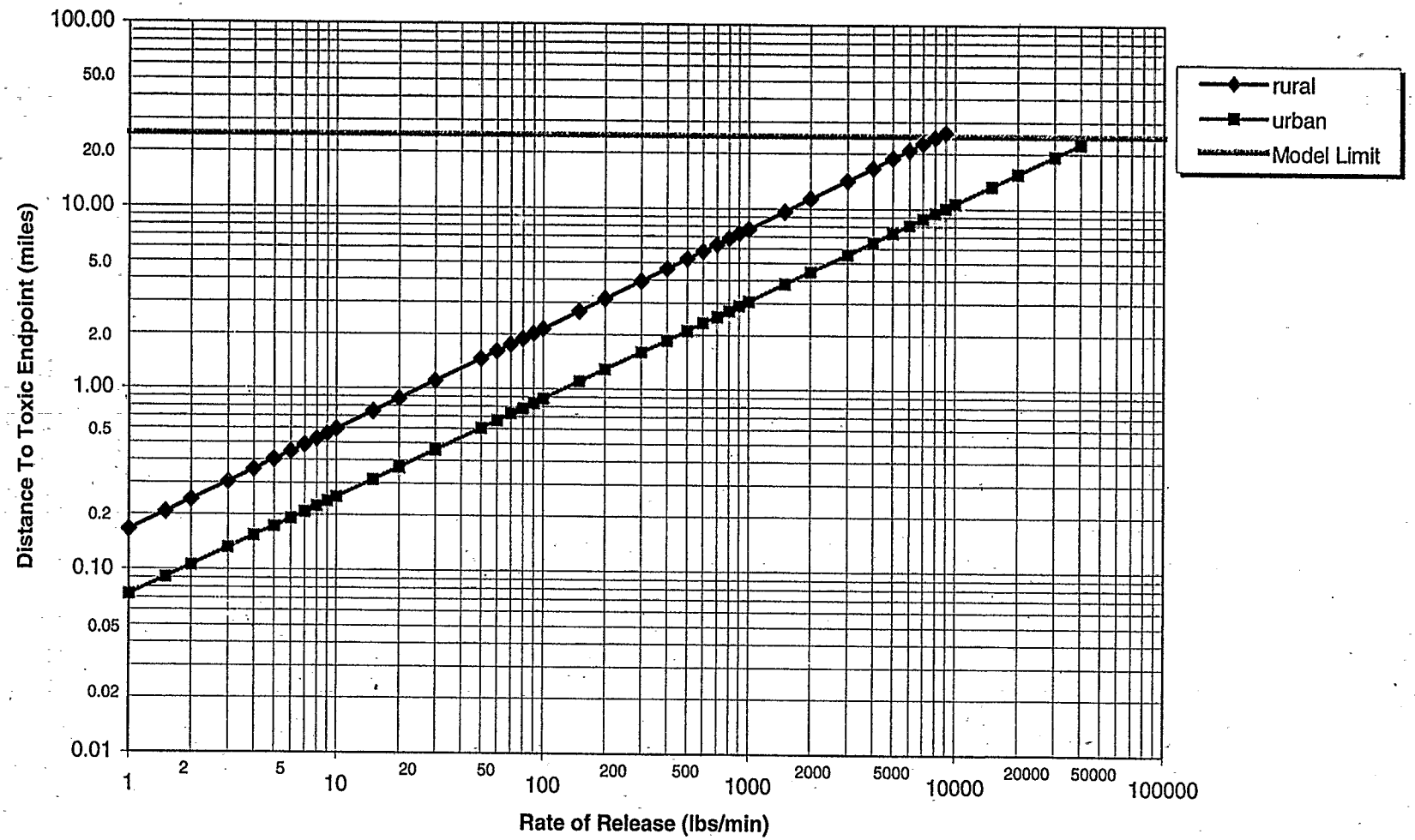


Figure 4-3 Worst-Case Scenario - Predicted Distances to Toxic Endpoint
Anhydrous Ammonia @ Atmospheric Stability Class F with Windspeed 1.5 m/s

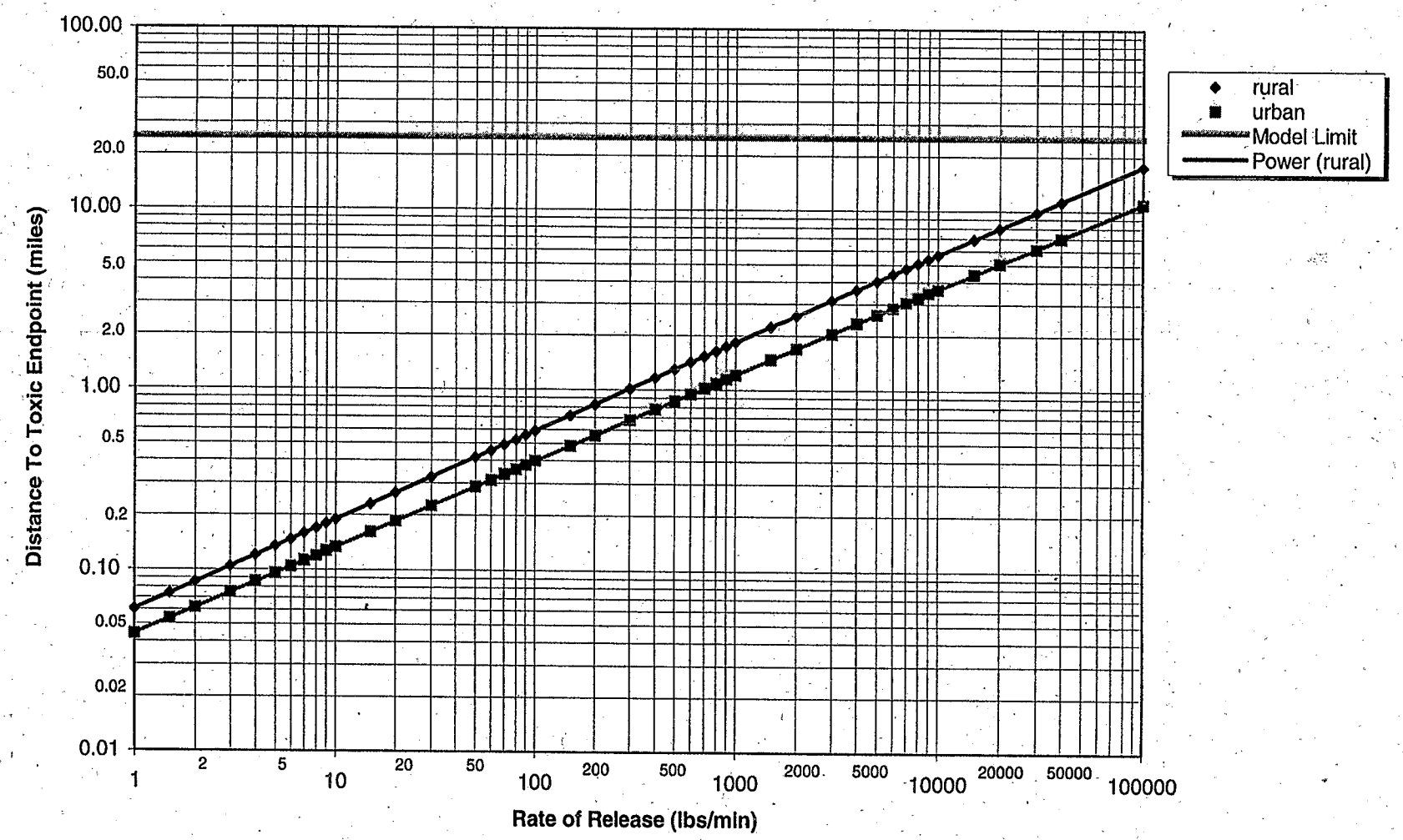


Figure 4-4 Worst-Case Scenario - Predicted Distances To Toxic Endpoint
Aqueous Ammonia @ Atmospheric Stability Class F with Windspeed 1.5 m/s

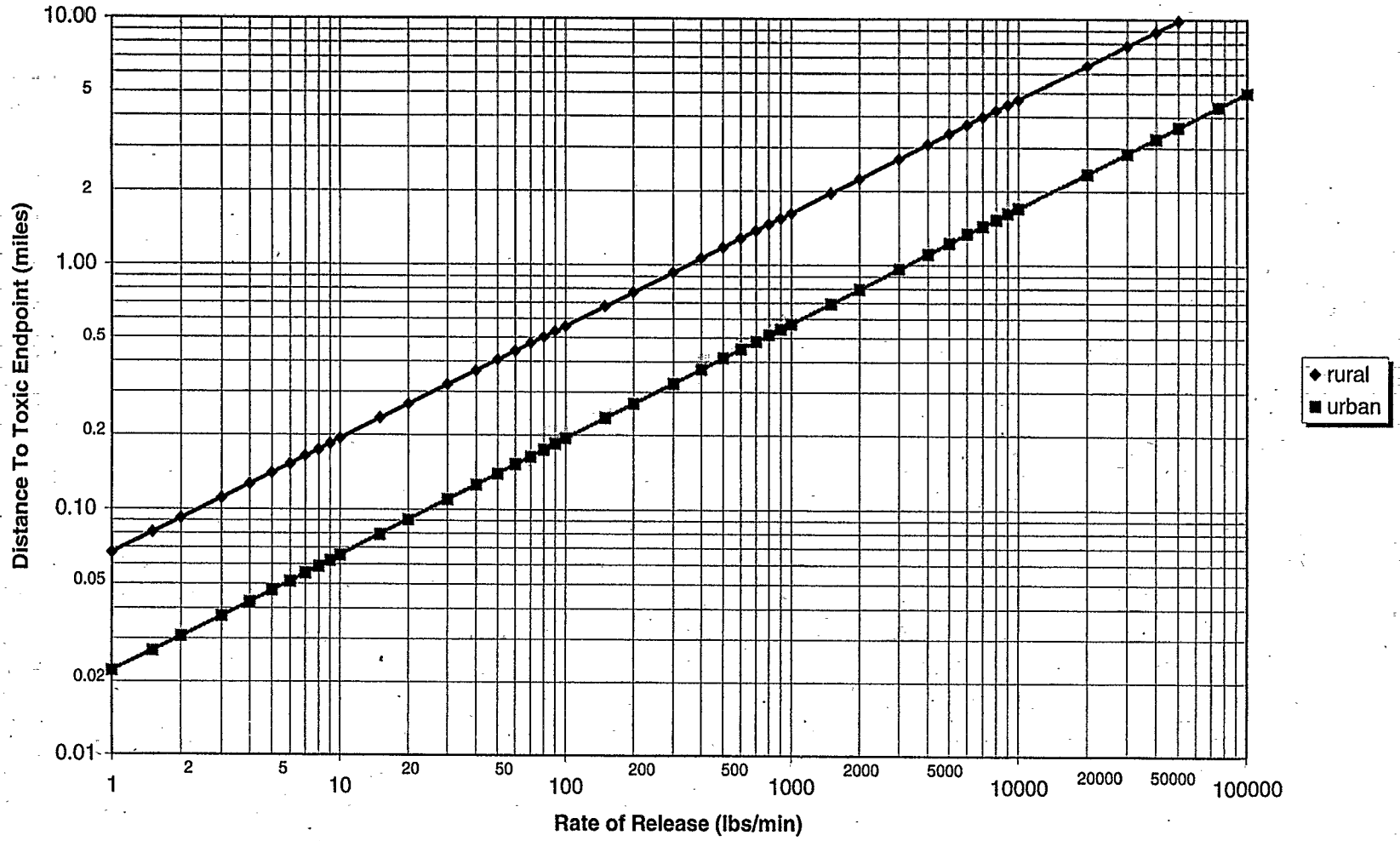


Figure 4-5 Alternative Case Scenario - Predicted Distances To Toxic Endpoint For Chlorine @ Atmospheric Stability Class D with Windspeed 1.5 m/s

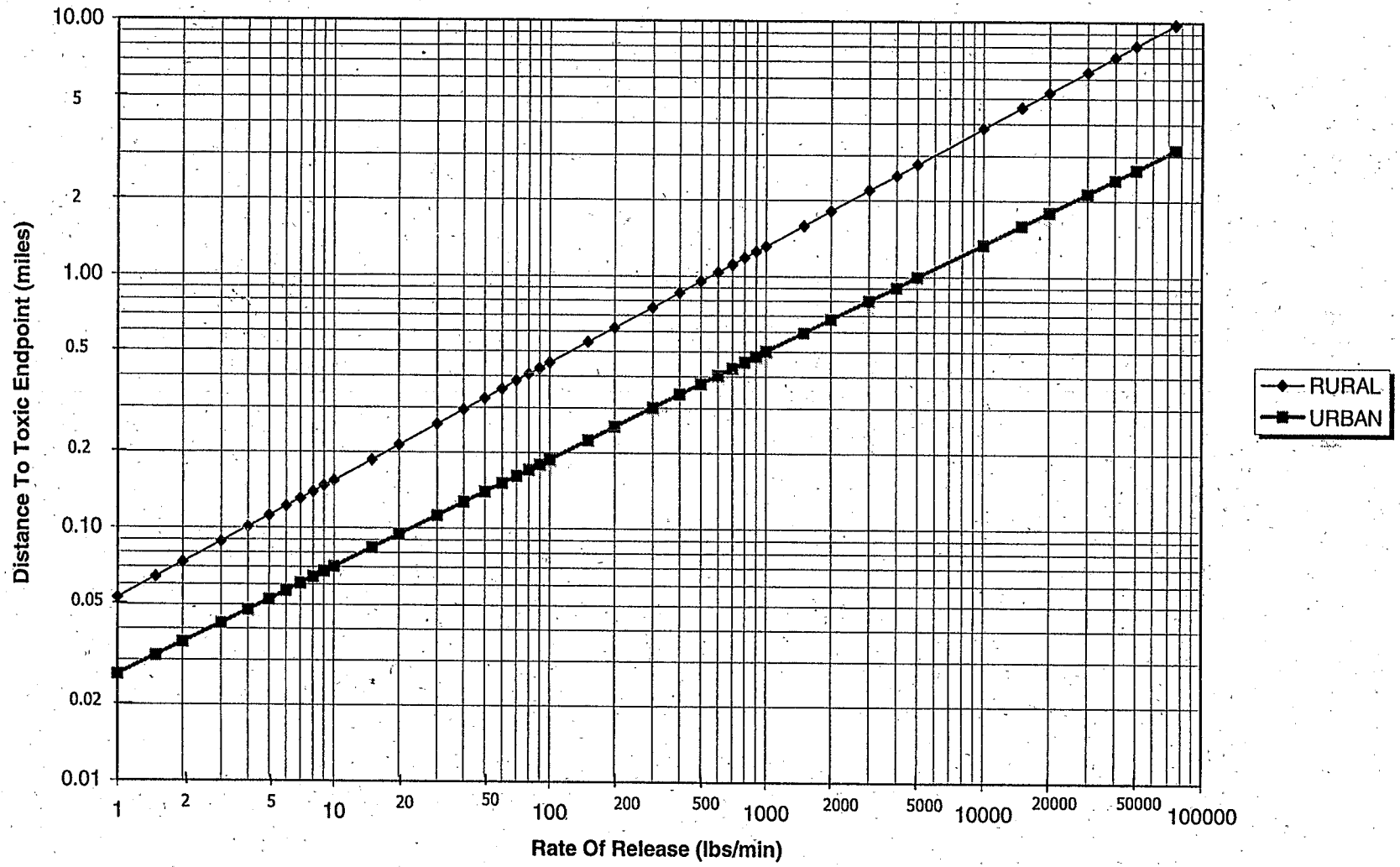


Figure 4-6 Alternative Case Scenario - Predicted Distances To Toxic Endpoint For SO2 @ Atmospheric Stability Class D with Windspeed 1.5 m/s

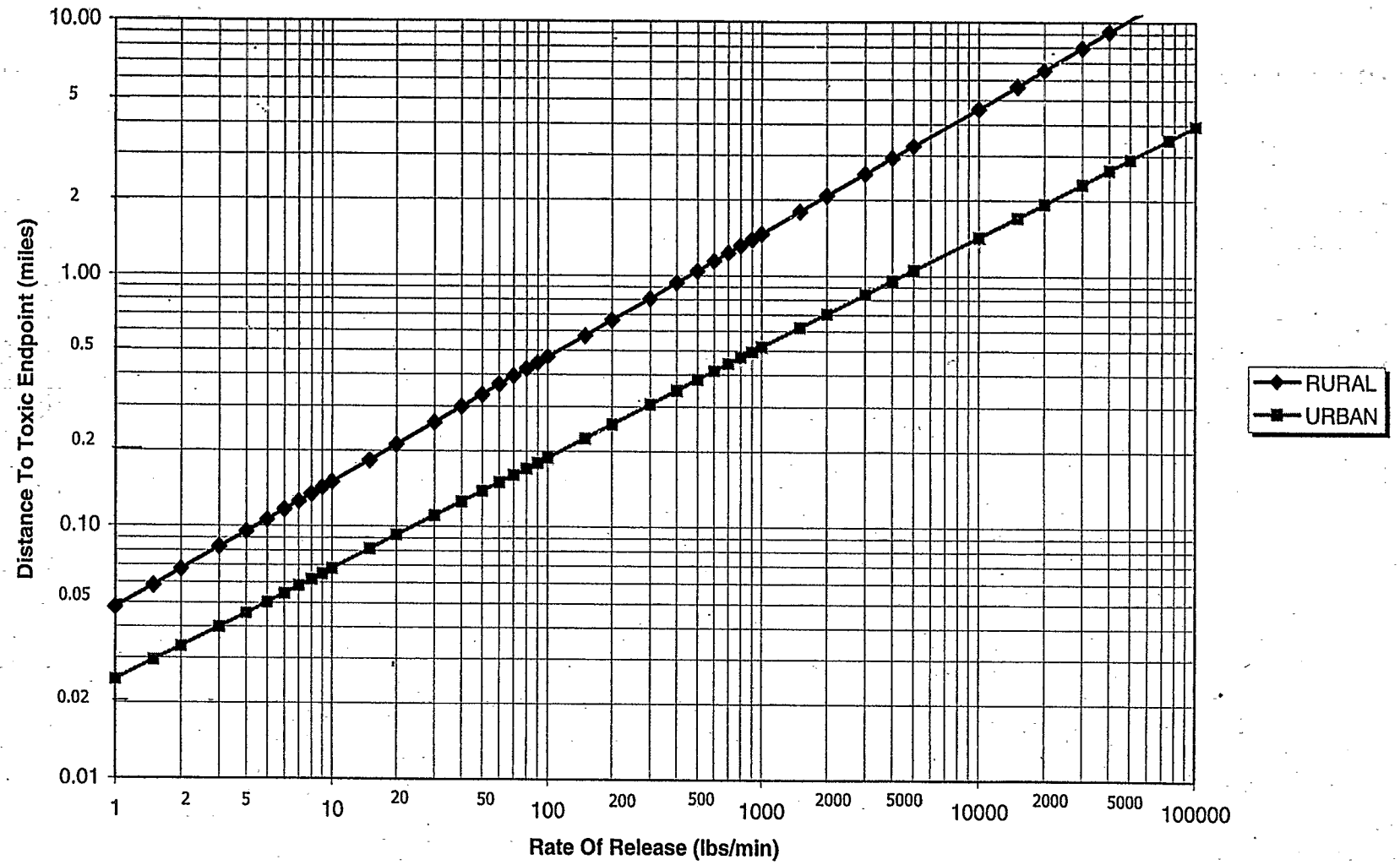


Figure 4-7 Alternative Case Scenario - Predicted Distances To Toxic Endpoint For Anhydrous Ammonia @ Atmospheric Stability Class D with Windspeed 1.5 m/s

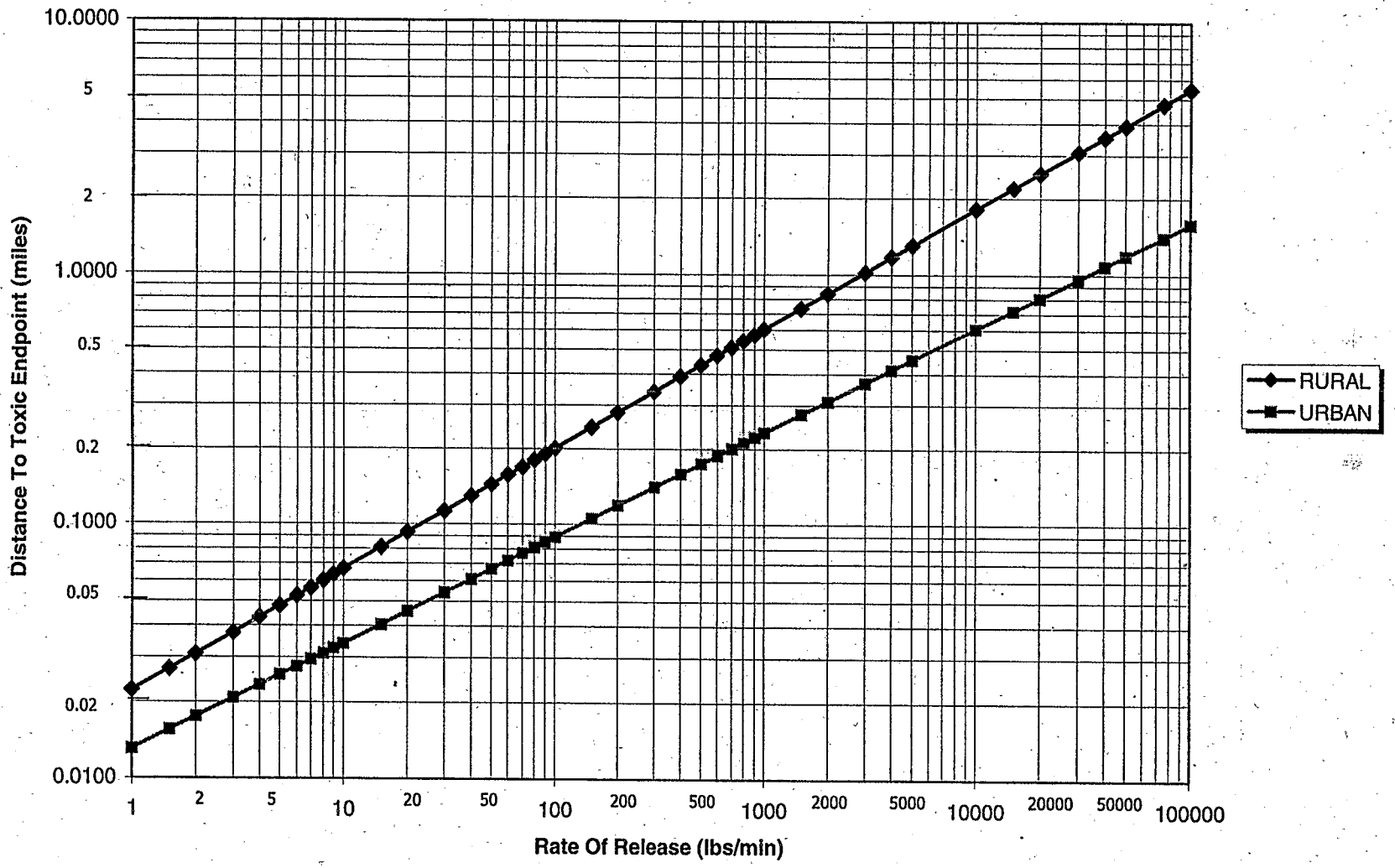
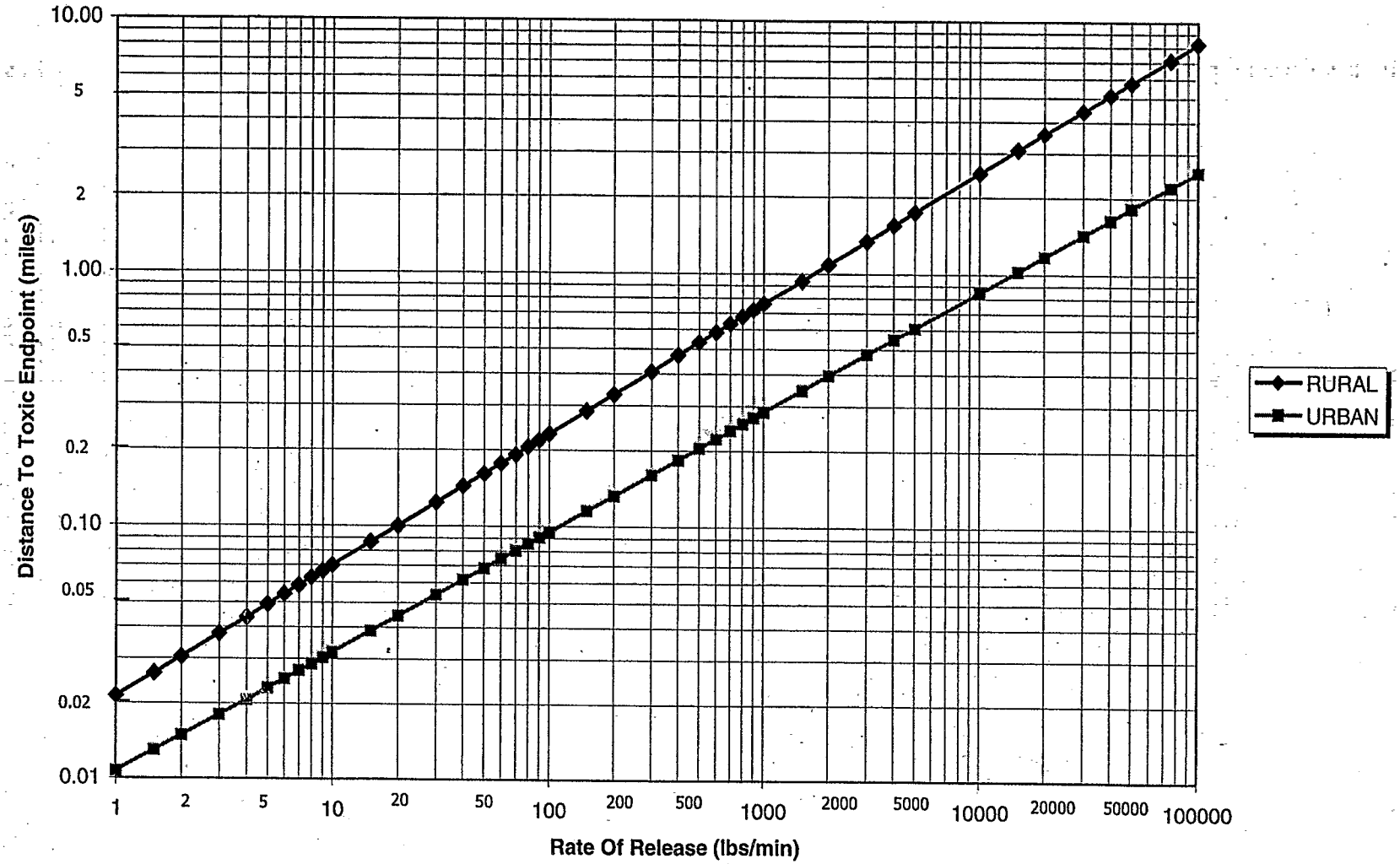


Figure 4-8 Alternative Case Scenario - Predicted Distances To Toxic Endpoint For Aqueous Ammonia @ Atmospheric Stability Class D with Windspeed 1.5 m/s



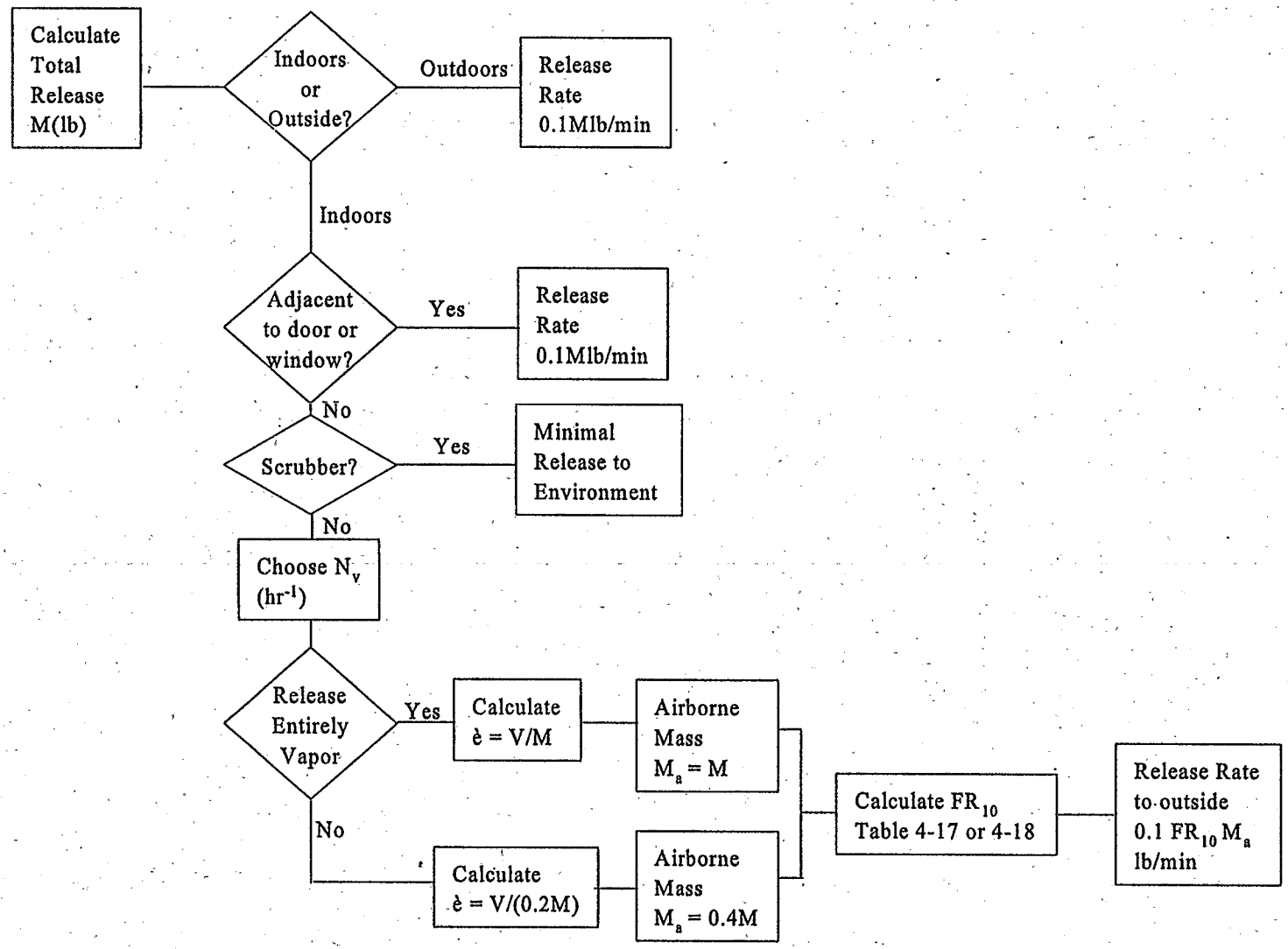
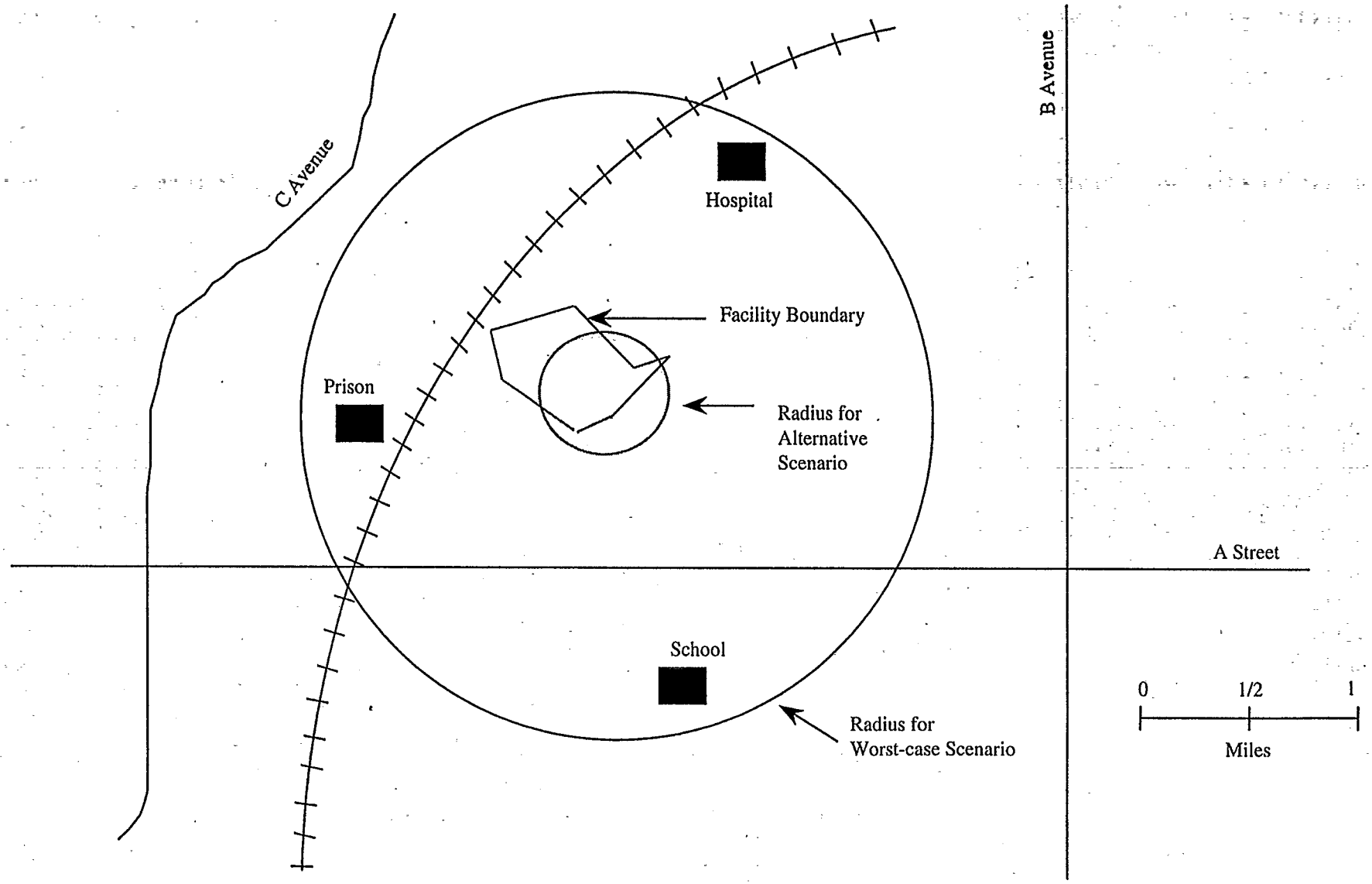


Figure 4-9. Guidance on Effectiveness of Building Mitigation for Alternative Scenarios

Figure 4-10 Simplified Presentation of Worst-Case and Alternative Scenario on a Local Map



APPENDIX 4A
EQUATIONS

AMMONIA PARTIAL PRESSURE

The ratio $R_{vp}(T)$ of the partial pressure of ammonia at temperature T °C to the partial pressure at 25 °C is given by the empirical formula:

$$R_{vp}(T) = \exp[10.438 - 717.4/(T + 273.4) - 2132.5/(T + 240.25)]$$

DENSITY OF METHANE IN DIGESTER

$$\rho_m = (X/100)(0.0409)(537/(460+T)) = 0.22\ X/(460+T)$$

where 0.0409 lb/ft^3 is the density of pure methane at 77 °F (25 °C) and the factor (537/(460+T) represents how the density changes with temperature, assuming that methane obeys the perfect gas law. The effect of the small operating pressure in compressing the gas has been ignored.

ALTERNATIVE RELEASE EQUATIONS

Bernoulli's Formula

The rate of release of a liquid through an hole is given by Bernoulli's formula for predicting the rate of release QR (lb/min) of liquid from a vessel:

$$m = A_h\ C_d(\rho_l[2g\ \rho_l(H_L - H_h) + 2(P_0 - P_a)])^2 \qquad \text{(A-1)}$$

where:

m	=	Discharge rate (kilograms per second)
A_h	=	Opening area (square meters)
C_d	=	Discharge coefficient (unitless)
g	=	Gravitational constant (9.8 meters per second squared)
ρ_l	=	Liquid density (kilograms per cubic meter)
P_0	=	Storage pressure (Pascals)
P_a	=	Ambient pressure (Pascals)
H_L	=	Liquid height above bottom of container (meters)
H_h	=	Height of opening (meters)

To create the equations in the text, this equation was converted to English units.

Gases Liquefied under Pressure

For gases liquefied under high pressure, the term containing the liquid height in Equation A-1 can be neglected. The equation for the release rate for gases liquefied under pressure becomes:

$$QR = 32.07 \times A_h \times \rho_l \times (P_g / \rho_l)^{0.5} \qquad \text{(A-2)}$$

To derive the chemical specific factors presented in the text for gases liquefied under their vapor pressure at 25 °C, the following data were substituted into Equation A-3:

Liquefied Gas	Liquid Density (ρ_L), lbs/ft^3	Tank Vapor Pressure (P_g), psig
Chlorine	97.5	98.5
Sulfur dioxide	91.3	43.3
Ammonia	42.5	130

Liquid at Ambient Pressure

For liquids stored at ambient pressure, the difference between storage pressure and ambient pressure is zero, and the pressure term drops out of Equation A-1 above. The equation can be rewritten and converted to English units as follows:

$$QR = 132.2 \times A_h \times 6.4516 \times 10^{-4} \times (h)^{0.5} \times 0.5521 \times 0.8 \times (2 \times 9.8)^{0.5} \times \rho_L \times 16.018 \qquad \text{(A-3)}$$

where:

QR	=	Release rate (pounds per minute)
132.2	=	Conversion factor for kilograms per second to pounds per minute
A_h	=	Hole area (square inches)
6.4516×10^{-4}	=	Conversion factor for square inches to square meters (*HA*)
0.5521	=	Conversion factor for square root of feet to square root of meters (h)
0.8	=	Discharge coefficient (0.8)
9.8	=	Gravitational constant (meters per second squared)
ρ_L	=	Liquid density (pounds per cubic foot)
16.018	=	Conversion factor for pounds per cubic foot to kilograms per cubic meter

For ammonia solution, the factor presented in the text was derived assuming a density of 57.33 lb/ft^3.

Two-Phase Release

For long pipes ($L/d_h >> 1$, where L is the length of the pipe between the reservoir of chlorine and the atmosphere and d_h is the pipe diameter), there can be flashing in the discharge pipe, and a two-phase mixture emerges to the atmosphere. In this case, the rate of release in lb/min is given by:

$$QR = 9{,}490(A_h)(F)(h_L)/[v_{lg}([T + 460]C_{pl})^{1/2}] \qquad \text{(A-4)}$$

where those symbols not already defined are:

F	a frictional loss factor, which is dimensionless and takes on a value of 1 for $L/d_h \approx 10$, 0.85 for $L/d_h \approx 50$, 0.75 for $L/d_h \approx 100$, 0.65 for $L/d_h \approx 200$, and 0.55 for $L/d_h \approx 400$.
h_L	the latent heat of vaporization (Btu/lb)
v_{lg}	the difference in specific volume between the gas and liquid (lb/ft^3)
T	the reservoir temperature (°F), and
C_{pl}	the liquid heat capacity (Btu/lb/°F)

For chlorine, h_L is 124 Btu/lb, $v_{lg} = 0.68$ lb/ft^3, T = 77 °F (25 °C), and $C_{pl} = 0.222$ Btu/lb/°F.

For sulfur dioxide, $v_{lg} = 1.55$ ft^3/lb, $h_L = 80$ Btu/lb, $c_{pl} = 0.34$ Btu/lb/°F.

Vapor Releases

For a gas release under choked flow conditions (i.e., emerging at the speed of sound from the hole, the maximum flow rate), the following equation can be used to estimate the release rate:

$$m = C_d A_h(\gamma\, p_0\, \rho_0[2/(\gamma+1)]^{(\gamma+1)/(\gamma-1)})^{0.5} \qquad \text{(A-5)}$$

where:	m	=	Discharge rate (kg/s)
	C_d	=	Discharge coefficient
	A_h	=	Opening area (m^2)
	γ	=	Ratio of specific heats
	p_0	=	Tank pressure (Pascals)
	ρ_0	=	Density (kg/m^3)

Density (ρ_0) can be rewritten as a function of pressure and molecular weight, based on the ideal gas law:

$$\rho_0 = (p_0 \times MW)/R\, T_t \qquad \text{(A-6)}$$

where:	MW	=	Molecular weight (kilograms per kilomole)
	R	=	Gas constant (8,314 Joules per degree-kilomole)
	T_t	=	Tank temperature (K)

The choked flow equation can be rewritten and converted to English units as follows:

$$QR = 132.2 \times A_h \times 6.4516 \times 10^{-4} \times P_a \times 6895 \times 0.8(\gamma[2/(\gamma+1)]^{(\gamma+1)/(\gamma-1)})^{0.5} \times (MW/8314 \times T_t)^{0.5} \qquad \text{(A-7)}$$

where:	0.8	=	Discharge coefficient
	132.2	=	Conversion factor for lbs/min to kg/s
	6,895	=	Conversion factor for psi to Pascals (p_0)
	6.4516×10^{-4}	=	Conversion factor for square inches to square meters (A_h)
	P_a	=	Absolute pressure in the reservoir/tank (psia)
	A_h	=	Hole area (inches)

To derive the chemical-specific factors for gas releases presented in the text, the temperature (T) was assumed to be 298 K, and the following chemical-specific data were substituted into Equation A-2:

Gas	Molecular Weight (MW)	Tank Pressure (P_s) (psia)	Ratio of Specific Heats (γ)
Chlorine	70.91	113	1.32
Sulfur dioxide	64.07	58	1.26

LOG-LOG TABLE EQUATIONS

This section presents formulas for estimating the distance to the endpoint from the rate of release for each of the toxic substances addressed in this document. The formulas are given in the form:

$$D = a \quad (QR)^b \qquad \text{(A-9)}$$

where: D = distance to the endpoint (miles)
a and b = chemical-specific factors
QR = release rate (lbs/min)

The formulas for each chemical were developed based on the best straight-line fits to the log-log graphs of release rate versus distance (Figures 4-1 to 4-8). The formulas are easy to use with a scientific calculator and may be used instead of the distance tables or figures. Since the equations are best fits to the curves on Figures 4-1 to 4-8, they may not give exactly the same predictions as appear in the corresponding exhibits.

Chlorine

Worst Case. The guidance on Figure 4-1 is essentially in the form of a straight line on a log-log plot:

$D = 0.2273(QR)^{0.4879}$ for a rural site, and

$D = 0.0878(QR)^{0.5134}$ for an urban site

Alternative. Figure 4-5 is roughly a straight line on a log-log plot:

$D = 0.053(QR)^{0.4647}$ for a rural site, and

$D = 0.026(QR)^{0.4263}$ for an urban site.

Sulfur Dioxide

Worst Case. The guidance on Figure 4-2 is essentially in the form of a straight line on a log-log plot:

$D = 0.165(QR)^{0.5562}$ for a rural site, and

$D = 0.0726(QR)^{0.5419}$ for an urban site.

Alternative. The curves on Figure 4-6 are approximately straight lines on a log-log plot:

$D = 0.047(QR)^{0.4961}$ for a rural site, and

$D = 0.025(QR)^{0.4407}$ for an urban site.

Anhydrous Ammonia

Worst Case. The guidance on Figure 4-3 is essentially in the form of a straight line on a log-log plot:

$D = 0.0607(QR)^{0.4923}$ for a rural site, and

$D = 0.0443(QR)^{0.4782}$ for an urban site.

Alternative. The curves on Figure 4-7 are approximately straight lines on a log-log plot:

$D = 0.0222(QR)^{0.4780}$ at a rural site, and

$D = 0.0130(QR)^{0.4164}$ at an urban site.

Aqueous Ammonia

Worst Case. The guidance on Figure 4-4 is essentially in the form of a straight line on a log-log plot:

$D = 0.0667(QR)^{0.4617}$ for a rural site, and

$D = 0.0221(QR)^{0.4712}$ for an urban site.

Alternative. The curves on Figure 4-8 are roughly straight lines on a log-log plot:

$D = 0.02(QR)^{0.5174}$ for a rural site, and

$D = 0.0107(QR)^{0.4748}$ for an urban site.

APPENDIX 4B
LIMITATIONS OF RESULTS

The guidance in the present document is summarized in the form of various tables and plots giving the predicted distance to the toxic endpoint as a function of the rate of release. There are upper and lower limits on the validity of these tables and plots—the models used are not valid beyond 25 miles, nor at less than 0.06 mile (100 m ~ 300 feet). It should be noted that the guidance presented in this chapter in the form of plots and tables yield predictions that are among many possible. There is, in fact, a wide range of uncertainty, partly due to the still incomplete theoretical understanding of the atmospheric dispersion of large-scale accidental releases of hazardous vapors in the industrial environment, partly due to the need to specify the values of a number of parameters, the values of which may not be well known, and partly because there are relatively few large-scale experimental data sets with which to "tune" the models, especially for the conditions applicable to the worst-case scenario. Therefore, for any given rate of release of a specific material, such as chlorine, there may be a wide variety of predictions by analysts using different models, or using the same model with different input parameters. The potential range of uncertainty is addressed in the Backup Document.

An attempt has been made to develop guidance in the mid-range of possibilities, with the hope that the most extreme conservatisms have been removed, but which is still modestly conservative. As a general (and much simplified) rule, you should not be surprised if, for worst-case scenarios, other analysts and models produce predictions that may be up to a factor of three higher or a factor of three lower than those presented here.

The predictions in the distance tables in the exhibits and all other predictions in this report for regulated toxic chemicals are based upon the methods described in the Backup Document. That method consisted of performing a range of sensitivity studies and then choosing guidance that lies within that range.

There are a number of caveats of which you should be aware.

The results given in the exhibits and figures are not in any absolute sense the "right" or "correct" ones. On the contrary, the Backup Document contains predictions from many sources. The intention there is to establish a range of uncertainties that might be regarded as reasonable by practitioners in the field of atmospheric dispersion modeling, and then to locate a reasonable guidance curve (such as Figure 4-1) within that range of uncertainty. In this way, it is hoped that the following objectives will be achieved:

- The facts that the results are uncertain and that there is no uniquely "right" result are not disguised.
- Nevertheless, there is a reasonable solution that is easy to use, and users of this guidance do not have to understand its derivation.

As noted above, the further downwind, the more likely it is that you are beyond the range of applicability of any atmospheric dispersion model. That is why, for the 90-ton railcar release of chlorine, the result is stated as "> 25 miles." For such a large release of chlorine, it is unlikely that you will find any model that will predict any less than this distance, and some will predict considerably more. There is no way to avoid the conclusion that the distance to the toxic endpoint for a worst-case release from a 90-ton chlorine railcar is very large, even though the current state of the models does not allow us to say exactly how far "large" is. Note that the discussion in this paragraph applies to railcars that are in the open air.

For the 150-lb and one-ton cylinder case, the results are uncertain to within perhaps a factor of 5-10. The Backup Document shows that, under certain modeling assumptions, the predicted distances could be perhaps a factor of three larger than those stated above or a factor of three smaller. You will also almost certainly be able to find a computer model that can be run to produce even smaller predicted distances. If you opt to do that, you will have to produce justification that the modeling is reasonable. [Note, however, that you are not obliged to use the guidance presented here; you can use whatever model you want provided that you have a solid scientific basis for doing so]. The fact that these large uncertainties exist explains why it is so difficult to develop a single guidance curve that everyone accepts. Many different choices for the guidance could fit comfortably within the range of uncertainties.

CHAPTER 5: MANAGEMENT SYSTEM

5.1 GENERAL INFORMATION (§68.15)

If you have at least one Program 2 or Program 3 process (see Chapter 2 for guidance on determining the Program levels of your processes), the management system provision in § 68.15 requires you to:

Develop a management system to oversee the implementation of the risk management program elements;

Designate a qualified person or position with the overall responsibility for the development, implementation, and integration of the risk management program elements; and

Document the names of people or positions and define the lines of authority through an organizational chart or other similar document, if you assign responsibility for implementing individual requirements of the risk management program to people or positions other than the person or position with overall responsibility for the risk management program.

ABOUT THE MANAGEMENT SYSTEM PROVISION

Management commitment to process safety is a critical element of your facility's risk management program. Management commitment should not end when the last word of the risk management plan is composed. For process safety to be a constant priority, your facility must remain committed to every element of the risk management program.

This rule takes an integrated approach to managing risks. Each element must be implemented on an ongoing, daily basis and become a part of the way you operate. Therefore, your commitment and oversight should be continuous.

By satisfying the requirements of this provision, you are ensuring that:

- The risk management program elements are integrated and implemented on an ongoing basis; and
- All groups within a source understand the lines of responsibility and communication.

5.2 HOW TO MEET THE MANAGEMENT SYSTEM REQUIREMENTS

We understand that the sources covered by this rule are diverse and that you are in the best position to decide how to appropriately implement and incorporate the risk management program elements at your facility; therefore, we sought to maximize your flexibility in complying with this program.

WHAT DOES THIS MEAN FOR ME AS A SMALL FACILITY?

As a small facility that must comply with this provision, you most likely have one or two Program 2 or 3 processes. To begin, you may identify either the qualified person or position with overall responsibility for implementing the risk management program elements at your facility. As a small facility, it may make sense and be practical to identify the name of the qualified person, rather than the position. Recognize that the only element of your management system that you must report in the RMP is the name of the qualified person or position with overall responsibility. Further, changes to this data element in your RMP do not require that you update your RMP.

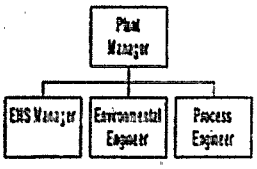
Identification of a qualified individual or position with overall responsibility may be all you need to do if the person or position named directly oversees the employees operating and maintaining the processes. You must define the lines of authority with an organizational chart or similar document only if you choose to assign responsibility for specific elements of the risk management program to persons or positions other than the person with overall responsibility. For a small facility, with few employees, it is likely that you will meet the requirements of this provision by identifying the one person or position with the overall responsibility of implementing the risk management program elements. If this is the case, you need not develop an organizational chart. For this reason, this chapter does not provide an example organizational chart for a small facility.

Even if you meet the requirements of this section by naming a single person or position, it is important to recognize that the person or position assigned the responsibility of overseeing implementation must have the ability and resources to ensure that your facility and employees carry out the risk management program, particularly the prevention elements, on an continuing basis. Key to the effectiveness of the rule is integrated management of the program elements.

WHAT DOES THIS MEAN FOR ME AS A MEDIUM OR LARGE FACILITY?

As a medium or large facility you may have more managerial turnover than smaller sites. For this reason, it may make more sense at your facility to identify a position, rather than the name of the specific person, with overall responsibility for the risk management program elements. Remember that the only element of your management system that you must report in the RMP is the name of the qualified person or position with overall responsibility. Also note that changes to this data element in your RMP do not require you to update your RMP.

Lines of Authority



As a relatively large or complex facility, you will likely choose to identify several people or positions to supervise the implementation of the various elements of the program; therefore, you must define the lines of authority through an organizational chart or similar document. Further, we expect that most facilities your size already have an interest in formalizing internal communication and have likely developed and maintained some type of documentation defining positions and responsibilities. Any internal documents you currently have should be the starting point for defining

the lines of authority at your facility. You may find that you can simply use or update current documents to satisfy this part of the management system provision. Exhibit 5-1 provides a sample of another type of documentation you may use in addition to or as a replacement for an organization chart.

Defining the lines of authority and roles and responsibilities of staff that oversee the risk management program elements will help to:

- Ensure effective communication about process changes between divisions;
- Clarify the roles and responsibilities related to process safety issues at your facility;
- Avoid problems or conflicts among the various people responsible for implementing elements of the risk management program;
- Avoid confusion and allow those responsible for implementation to work together as a team; and
- Ensure that the program elements are integrated into an ongoing approach to identifying hazards and managing risks.

Remember that all of the positions you identify in your documentation will report their progress to the person with overall responsibility for the program. However, nothing in the risk management program rule prohibits you from satisfying the management provision by assigning process safety committees with management responsibility, provided that an organizational chart or similar document identifies the names or positions and lines of authority.

EXHIBIT 5-1
SAMPLE MANAGEMENT DOCUMENTATION

Position	Primary Responsibility	Changes	Responsibility re: Changes
Operations Manager	Developing OPs Oversight of operation On-the-job training On-the-job competency testing Process Safety Information Selecting participants for PHAs, incident investigations Develop management of change and pre-startup procedures	New Equipment New Process Chemistry New Process Parameters New Procedures Change in Process Utilization	Inform head of training Inform head of maintenance Inform lead for PHAs Inform hazmat team as needed Inform contractors
Training Supervisor	Develop, track, oversee operator training program Track competency testing Set up and track operator refresher training Set up training for maintenance Work with contractors	New Equipment New Process Chemistry New Process Parameters New Procedures Change in Process Utilization New regulatory requirements	Revise training and refresher training courses Revise maintenance courses, as needed Inform other leads of need for additional training
Maintenance Supervisor	Develop maintenance schedules Oversee and document maintenance Revise schedules as needed	New Equipment New Process Chemistry New Process Parameters New Procedures Change in Process Utilization	Inform operations manager of potential problem areas Inform training supervisor of any training revisions Inform contractors Revise schedules
Hazmat Team Chief	Develop and exercise ER plan Train responders Test and maintain ER equipment Coordinate with public responders Select participants in accident investigations	New Equipment New Process Chemistry New Process Parameters New Procedures Change in Process Utilization New regulatory requirements	Revise the ER plan as needed Inform operations manager of problems created by changes Work with training supervisor to revise training of team and others

EXHIBIT 5-1
SAMPLE MANAGEMENT DOCUMENTATION

Position	Primary Responsibility	Changes	Responsibility re: Changes
Health and Safety Officer	Oversee implementation of RMP Develop accident investigation procedures Oversee compliance audits Develop employee participation plans Conduct contractor evaluations Track regulations	New Equipment New Process Chemistry New Process Parameters New Procedures Change in Process Utilization New regulatory requirements	Inform all leads of new requirements and assign responsibilities Ensure that everyone is informed of changes and that changes are incorporated in programs as needed.

CHAPTER 6: PREVENTION PROGRAM (PROGRAM 2)

6.1 ABOUT THE PROGRAM 2 PREVENTION PROGRAM

EPA developed the Program 2 prevention program by identifying the basic elements that are the foundation of sound prevention practices — safety information, hazard review, operating procedures, training, maintenance, compliance audits, and accident investigation. By meeting other Federal regulations, state laws, industry codes and standards, and good engineering practices, you probably have already met most of the Program 2 prevention elements requirements.

As important as each of the elements is, you will not gain the full benefit from them unless you integrate them into a risk management system that you implement on an on-going basis. For example, the hazard review must be built on the safety information; the results of the hazard review should be used to revise and update operating and maintenance procedures. Workers must be trained in these procedures and must use them every day.

You will have substantially less documentation and recordkeeping responsibilities for a Program 2 process than you will for a Program 3 process. There are seven elements in the Program 2 prevention program, which is set forth Subpart C of part 68. Exhibit 6-1 sets out each of the seven elements and corresponding section numbers.

You must integrate these seven elements into a risk management program that you and your staff implement on a daily basis. Understanding and managing risks must be part of the way you operate. Doing so will provide benefits beyond accident prevention. Preventive maintenance and routine inspections will reduce the number of equipment failures and down time; well-trained workers, aware of optimum operating parameters, will allow you to gain the most efficient use of your processes and raw materials.

6.2 SAFETY INFORMATION (§ 68.48)

The purpose of this requirement is to ensure that you understand the safety-related aspects of the equipment and processes you have, know what limits they place on your operations, and adopt accepted standards and codes where they apply. Having up-to-date safety information about your process is the foundation of an effective prevention program. Many elements (especially the hazard review) depend on the accuracy and thoroughness of the information this element requires you to provide.

EXHIBIT 6-1
SUMMARY OF PROGRAM 2 PREVENTION PROGRAM

Number	Section Title
§ 68.48	Safety Information
§ 68.50	Hazard Review
§ 68.52	Operating Procedures
§ 68.54	Training
§ 68.56	Maintenance
§ 68.58	Compliance Audits
§ 68.60	Incident Investigation

WHAT DO I NEED TO DO?

You must compile and maintain safety information related to the regulated substances and process equipment for each Program 2 process. You probably have much of this information already as a result of complying with OSHA standards or other rules. EPA has limited the information to what is likely to apply to the processes covered under the Program 2 program. Exhibit 6-2 gives a brief summary of the safety information requirements for Program 2.

HOW DO I START?

MSDSs. If you are subject to this rule, you may also be subject to the requirements to maintain Material Safety Data Sheets under the OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200). POTWs in states with delegated OSHA programs and all private WWTPs are subject to OSHA's HCS.

If you do not have an MSDS for a regulated substance, you should contact your supplier or the manufacturer for a copy. Because methane (CH_4) is generated in your plant, you will have to find an MSDS elsewhere. A local utility supplying natural gas may have one. You may, however, have to add the potential for inclusion of carbon dioxide, hydrogen sulfide, and water in the methane stream. If these are present, then the corrosivity information about that stream will be needed. You may wish to ask assistance from a process engineer.

Because the rule states that you must have an MSDS that meets OSHA requirements, you may want to review the MSDS to ensure that it is, in fact, complete. Besides providing the chemical name, the MSDS for a regulated substance (or a mixture containing the regulated substance) must describe the substance's physical

and chemical characteristics (e.g., flash point, vapor pressure), physical hazards (e.g., flammability, reactivity), health hazards, routes of entry, exposure limits (e.g., the OSHA permissible exposure level), precautions for safe handling, generally applicable control measures, and emergency and first aid procedures. (See 29 CFR 1910.1200(g) for the complete set of requirements for an MSDS.)

EXHIBIT 6-2
SAFETY INFORMATION REQUIREMENTS

You must compile and maintain this safety information:	You must ensure:	You must update the safety information if:
✔Material Safety Data Sheets ✔Maximum intended inventory ✔Safe upper and lower parameters ✔Equipment specifications ✔Codes & standards used to design, build, and operate the process	✔That the process is designed in compliance with recognized codes and standards	✔There is a *major change* at your business that makes the safety information inaccurate

Maximum Inventory. You must document the maximum intended inventory of any vessel in which you store or process a regulated substance above its threshold quantity. The U1A certificates on all vessels constructed under the ASME Boiler and Pressure Vessel Code are kept on file by the National Board (see chapter 1). The nominal nameplate capacity can also be found on the permanently attached nameplate for your storage tank. The nameplate will also have the National Board Number for your vessel, which is the key to retrieving your U1A form from the Board. These nameplates may be located on one of the hemispherical heads, the manway, or the manway cover. The nominal capacity will usually be the water capacity, and you may want to convert it to pounds.

If you use transportation containers (railcars or tank trucks) as storage vessels, you can obtain the capacity from the required DOT nameplate, identification plate, or specification plate or from the owner of the containers. Smaller shipping containers are also marked. If you are not sure of the capacity of the vessel, you can obtain this information from the manufacturer of the vessel or tank.

The Chlorine Institute recommends that chlorine tanks not be filled beyond 95 percent at a maximum temperature of 122°F. OSHA regulations limit liquid volumes of unrefrigerated anhydrous ammonia to the following:

Type of Container	Percent by Weight	Percent by Volume
Aboveground-Uninsulated	56%	82%
Aboveground-Uninsulated*		87.5%
Aboveground-Insulated	57%	83.5%
Underground-Uninsulated	58%	85%

*Aboveground uninsulated containers may be charged to 87.5 percent by volume if the temperature of the anhydrous ammonia being charged is determined to be not lower than 30°F or if the charging container is stopped at the first indication of frost or ice formation on its outside surface and is not resumed until such frost or ice has disappeared. (29 CFR 1910.111(b)(11))

NFPA-58 recommends that propane tanks not exceed 88 percent at 60°F. Aqueous ammonia may be held in various concentrations; your supplier can provide the density and weight. You can use this information, with your tank capacity, to estimate the quantity of ammonia being stored.

The Compressed Gas Association provides the following recommendations for filling sulfur dioxide tanks at varying temperatures (CGA pamphlet G-3):

Temperature of Liquid SO_2 in Tank °F	Maximum Safe Volume Liquid SO_2 in % of Full Volume at 125% Filling Density
30	86
40	87
50	88
60	89
70	90
80	91
90	92
100	93

Storage and Process Limits. You must document the safe upper and lower temperatures and pressures, process flows (if applicable), and compositions (if applicable) for your process.

Every substance has limits on the temperature and pressures at which it can be stored or used; these limits are determined by both the properties of the substance and the vessels it which it is kept. If you do not know these limits, you should contact your vendor, the substance manufacturer, or your trade association. They will be able to provide the data you need. Some of this information (e.g., maximum pressure) may be marked on the nameplate or container. It is important that you know these limits so you can take action to avoid situations where these limits may be exceeded. Many people are aware of the dangers of overheating their vessels, but extreme low temperatures also may pose hazards you should know about.

If you are moving substances through pipes or hoses, you need to define safe temperatures and pressures for that movement; again, these limits will be determined by both the substance and the piping. For example, the substance may tolerate high pressures, but the pipes may have structural limits. To operate safely, you must have this information. The pipe manufacturer will be able to provide these data.

The requirement to compile and maintain information on process flows and compositions will apply to you if you transfer substances through piping or hoses and if you mix or react the substance. It is important in these cases that you understand the safe limits for flow and composition. The pipe or hose vendors will be able to provide you with the maximum flow rates that their products are designed to handle. You must also be aware of any hazards that could be created if your processes are contaminated; for example, if your substance or equipment could be contaminated by water, you must know whether that creates different hazards, such as corrosion. Chlorine and SO_2 become very corrosive if mixed with water. In addition, corrosion can occur in digester gas systems if attention is not paid to the corrosive effects of hydrogen sulfide and water that are found in digester gas.

Equipment Specifications. You must document the specifications of any equipment you use to store or move regulated substances in a covered process. Equipment specifications will usually include information on the materials of construction, actual design, and tolerances. The vendor should be able to provide this information; you may have the specifications in your files from the time of purchase. Some of this information (e.g., wall thickness) may be marked on the nameplate or container. You are not expected to develop engineering drawings of your equipment to meet this requirement, but you must be able to document that your equipment is appropriate for the substances and activities for which it is used, and you must know what the limits of the equipment are.

Specifications are particularly important if your vessels or pipes are not specifically designed for your type of operation. Substances may react with certain metals or corrode them if water is introduced. You should be sure that the vessels you purchase or lease are appropriate for your operations. Understanding equipment specifications will help you when you need to buy replacement parts. Any such parts must be appropriate for your existing equipment and your use of that equipment. It is not sufficient to replace parts with something that "fits" unless the new part meets the specifications; substitution of inappropriate parts may create serious hazards.

Codes and Standards. You must document the codes and standards you used to design and build your facility and that you follow to operate. These codes will probably include the electrical and building codes that you must comply with under state or local laws. Your equipment vendors will be able to provide you with information on the codes they comply with for their products; the information may also be listed on your equipment specifications. Exhibit 6-3 lists some codes that may be relevant to your operation. Note that the National Fire Protection Association (NFPA) codes may have been adopted as state or local codes. NFPA-820 (Standard for Fire Protection in Wastewater Treatment and Collection Facilities) is specific to your industry and provides references to other applicable NFPA codes. The American National Standards Institute (ANSI) is an umbrella standards-setting organization, which imposes a specific process for gaining approval of standards and codes. ANSI codes may include codes and standards also issued by other organizations.

EXHIBIT 6-3
CODES AND STANDARDS

ORGANIZATION	SUBJECT/CODES
American National Standards Institute (ANSI)	Piping, Electrical, Power wiring, Instrumentation, Lighting, Product storage and handling, Insulation and fireproofing, Painting and coating, Ventilation, Noise and Vibration, Fire protection equipment, Safety equipment, Pumps, Compressors, Motors, Refrigeration equipment, Pneumatic conveying; ANSI K61.1 covers storage and handling of anhydrous ammonia
American Society of Mechanical Engineers (ASME)	Power boilers, Pressure vessels, Compressors, Shell and tube exchangers, Vessel components, General design and fabrication codes
American Petroleum Institute (API)	Welded tanks, Rotating equipment, Bulk liquid storage systems
National Fire Protection Association (NFPA)	Wastewater treatment facilities (NFPA-820), Fire pumps, Flammable liquid code (NFPA-30), LPG storage and handling (NFPA-58), Plant equipment and layout, Electrical system design, Shutdown systems, Pressure relief equipment, Venting requirements, Gas turbines and engines, Cooling towers, Storage tanks
American Society for Testing Materials (ASTM)	Inspection and testing, Noise and vibration, Materials of construction, Piping materials and systems, Instrumentation
American Concrete Institute	Construction and inspection of concrete tanks, including wastewater treatment plants

How Do I Document All This?

EPA does not expect you to develop piles of papers to document your safety information. Your MSDS(s) are usually three or four pages long. You only have to keep them on file, as you already do for OSHA if you are subject to the OSHA hazard communication standard (29 CFR 1910.1200). Equipment specifications are usually on a few sheets or in a booklet provided by the vendor; you need only keep these on file. You can probably document the other information on a single sheet that simply lists each of the required items and any codes or standards that apply. See Exhibit 6-4 for a sample. Maintain that sheet in a file and update it whenever any item changes or new equipment is added. Although the rule does not require you to create a process flow diagram, you may want to do this as another way of documenting much of this information.

EXHIBIT 6-4
SAMPLE SAFETY INFORMATION SHEET

Propane Storage	
MSDS Propane	On file (1994)
Maximum Intended Inventory	400,000 pounds
Temperature	Upper: max 110°F Lower: min -15°F
Pressure	Upper: 240 psi @ 110°F Lower: 35 psi @ -15°F
Flow Rate	Loading: 100 GPM (max) Unloading: 265 GPM (max)
Vapor Piping	250 PSIG
Liquid Piping and Compressor Discharge	350 PSIG
Safety Relief Valves	Each relieves 9,250 SCFM/air RV 1 replaced 9/96 RV 2 replaced 6/97 RV 3 replaced 8/98
Excess Flow Valve	3", closes at 225 GPM with 100 PSIG inlet 2", closes at 100 GPM with 100 PSIG inlet 2", closes at 34,500 SCFH with 100 PSIG inlet
Emergency Shutoff Valve	ESV 1 1/4", closes at 26,000 SCFH with 100 PSIG inlet ESV 2", closes at 225 GPM with 100 PSIG inlet
Codes and Standards	Designed under NFPA-58-1985

Piping Design	ASME B31-3
Tank Design	ASME NB# 0012

The equipment specifications and list of standards and codes will probably meet the requirement that you ensure that your process is designed in compliance with recognized and generally good engineering practices. If you have any doubt that you are meeting this requirement, your trade association may be helpful in determining if there are practices or standards that you are not aware of that may be useful in your operation.

After you have documented your safety information, you should double check it to be sure that the files you have reflect the equipment you are currently using. It is important to keep this information up to date. Whenever you replace equipment, be sure that you put the new equipment specifications in the file and consider whether any of your other prevention elements need to be reviewed to reflect the new equipment.

WHERE TO GO FOR MORE INFORMATION

MSDSs. MSDSs are available from a number of websites. The University of California, San Diego Chemistry and Biochemistry Department maintains some MSDSs on its website: http://www-ehs.ucsd.edu/msds.htm. This site also links to other pages with MSDSs, including Vermont Safety and Information Resources on the Internet, http://siri.org. On-line databases also provide MSDSs. EPA has not verified the accuracy or completeness of MSDSs on any of these sites nor does it endorse any particular version of an MSDS. You should review any MSDS you use to ensure that it meets the requirements of OSHA's hazard communication standard (29 CFR 1910.1200).

Guidance and Reports. Although the reports below target the chemical industry, you may find useful information in them:

- Guidelines for Process Safety Documentation, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- Loss Prevention in the Process Industries, Volumes I, II, and III, Frank P. Lees, Butterworths: London 1996.

The Chlorine Institute publishes a number of documents on chlorine handling, including:

- Chlorine Vaporizing Systems, Pamphlet # 9.
- Cylinder and Ton Container Procedures for Chlorine Packaging, Pamphlet # 17.
- Water and Wastewater Operators Chlorine Handbook, Pamphlet # 155.

The Compressed Gas Association publishes:

- *Sulfur Dioxide* on properties, storage, handling, and use of sulfur dioxide (Order # G-3).
- ANSI K61.1 on the storage and handling of anhydrous ammonia (Order # G 2.1).
- *Anhydrous Ammonia* on properties, storage, handling, and use of anhydrous ammonia (Order # G-2).

The Water Environment Federations publishes the following:

- *Operation and Maintenance of Municipal Wastewater Treatment Plants* (MOP-11), Water Environment Federation.

6.3 HAZARD REVIEW (§ 68.50)

For a Program 2 process, you must conduct a hazard review. EPA has streamlined the process hazard analysis (PHA) requirement of OSHA's PSM standard to create a requirement that will detect process hazards for processes in Program 2. The hazard review will help you determine whether you are meeting applicable codes and standards, identify and evaluate the types of potential failures, and focus your emergency response planning efforts.

WHAT DO I NEED TO DO?

The hazard review is key to understanding how to operate safely on a continuous basis. You must identify and review specific hazards and safeguards for your Program 2 processes. EPA lists the types of hazards and safeguards in the rule. Exhibit 6-5 summarizes things you must do for a hazard review.

EXHIBIT 6-5
HAZARD REVIEW REQUIREMENTS

Conduct a review & identify...	Use a guide for conducting the review.	Document results & resolve problems.	Update your hazard review.
✔The hazards associated with the Program 2 process & regulated substances. ✔Opportunities for equipment malfunction or human error that could cause a release. ✔Safeguards that will control the hazards or prevent the malfunction or error. ✔Steps to detect or monitor releases.	✔You may use a checklist. ✔For a process designed to industry standards like NFPA-58 or Federal /state design rules, check the equipment to make sure that it's fabricated, installed, and operated properly.	✔Your hazard review must be documented and you must show that you have addressed problems.	✔You must update your review at least once every five years or whenever there is a major change in the process. ✔You must resolve problems identified in the new review *before* you startup the changed process.

WHAT METHOD SHOULD I USE?

This guidance provides information on three hazard evaluation methods:

- Checklist
- What-If/Checklist
- Hazard and Operability (HAZOP) Review

Checklist. When your facility has been designed and built to comply with a federal or state standard or an industry-specific design code, it may be possible to develop a checklist that, in and of itself, will be sufficient to conduct the hazard review. A particularly appropriate example is propane, which some wastewater treatment facilities store in quantities that exceed the TQ of 10,000 lb (for example, as backup to digester gas for electrical power generation, boilers, and heating). A propane-specific risk management program has already been developed for propane storage facilities. If you have propane above the TQ, you should obtain this manual, which contains a propane facility hazards review checklist that is based upon the National Fire Protection Association's NFPA 58, 1998 Edition. This checklist is reproduced in the appendix to this chapter as Exhibit 6A-6.

Some sample checklists for chemicals at wastewater treatment facilities are provided in the appendix to this chapter as follows:

Exhibit 6A-1 General Conditions, Operation and Maintenance

Exhibit 6A-2	Human Factors
Exhibit 6A-3	Checklists for Chlorine and Sulfur Dioxide
Exhibit 6A-4	Checklist for Anhydrous Ammonia Systems
Exhibit 6A-5	Checklist for Aqueous Ammonia Systems
Exhibit 6A-6	Checklist for Propane Storage

Finally, you may also develop your own checklist or supplement those given in this guidance to make sure they are appropriate for your site. The review must identify the following:

- The hazards of the substance (e.g., toxicity, flammability, corrosivity) and process (e.g., overpressurization, overfilling, inadvertent mixing);
- Possible equipment failures or human errors that could lead to a release;
- Safeguards used to prevent failures or errors; and
- Steps needed to detect or monitor releases.

You should maintain a copy of the checklist you used. The easiest way to document findings is to enter them into the checklist after each item, in the comment section. This approach will give you a simple, concise way of keeping track of findings and recommendations. You may also want to create a separate document of recommendations that require implementation or other resolution. EPA does not require that you implement every recommendation. It is up to you to decide which recommendations are technically feasible and warrant implementation. You may decide that other steps are as effective as the recommended actions or that the risk is too low to merit the expense. You must, however, document your decision on each recommendation.

What-If/Checklist Analysis. The success of the checklist approach depends on the experience of those who fill out the checklist. To ensure that the identification of hazards is as complete as possible, it is often useful to supplement the checklist with a What-If analysis. As the name implies, the What-If/Checklist Analysis technique is a combination of two methods: What-If Analysis and Checklist Analysis. The analysis is usually performed by a team of personnel experienced with the subject process. The team uses the What-If Analysis technique to brainstorm the various types of accidents that can occur within the process. The team then uses one or more checklists to help fill in any gaps they may have missed.

The examples of What-If questions in Exhibit 6A-7 are derived from a variety of sources, including:

- "Guidelines for Hazard Evaluation Procedures - Second Edition with Worked Examples," published by the Center for Chemical Process Safety (CCPS), New York, 1992
- Information collected from various wastewater treatment facilities during the development of this guidance
- Information from industry associations such as the Chlorine Institute and the International Institute of Ammonia Refrigeration (IIAR), and
- The American Water Works Association (AWWA).

Hazard and Operability Analysis. The Hazard and Operability (HAZOP) Analysis technique is based on the principle that several experts with different backgrounds can interact in a creative, systematic fashion and identify more problems when working together than when working separately and combining their results. Although the HAZOP Analysis technique was originally developed for evaluation of a new design or technology, it is applicable to almost all phases of a process' lifetime.

The essence of the HAZOP Analysis approach is to review process drawings and/or procedures in a series of meetings, during which a multi disciplinary team uses a prescribed protocol to methodically evaluate the significance of deviations from the normal design intention.

The primary advantage of the brainstorming associated with HAZOP Analysis is that it stimulates creativity and generates new ideas. This creativity results from the interaction of a team with diverse backgrounds. Consequently, the success of the study requires that all participants freely express their views, but participants should refrain from criticizing each other to avoid stifling the creative process. This creative approach, combined with the use of a systematic protocol for examining hazardous situations, helps improve the thoroughness of the study.

The HAZOP study focuses on specific points of the process or operation called "study nodes," process sections, or operating steps. One at a time, the HAZOP team examines each section or step for potentially hazardous process deviations that are derived from a set of established guide words. One purpose of the guide words is to ensure that all relevant deviations of process parameters are evaluated. Sometimes teams consider a fairly large number of deviations (i.e., up to 10 to 20) for each section or step and identify their potential causes and consequences. Normally, all of the deviations for a given section or step are analyzed by the team before it proceeds further. Exhibit 6A-9 shows how deviations are determined by combining guide words and process parameters.

CAUTION

Whichever approach you use, you should consider reasonably anticipated external events as well as internal failures. If you are in an area subject to earthquakes, hurricanes, or floods, you should examine whether your process would survive these natural events without releasing the substance. In your hazard review, you should consider the potential impacts of lightning strikes and power failures. If your process could be hit by vehicles, you should examine the consequences of that. If you have anything near the process that could burn, ask yourself what would happen if the fire affected the process. For example, if you have a propane tank and an ammonia tank at your facility and they are close to each other, when you look at the ammonia tank you should consider what a fire in the propane tank would do to the ammonia. These considerations may not be part of standard checklists. If you use these checklists, you may have to modify them to address these site-specific

concerns. **Never use someone else's checklist blindly. You must be sure that it addresses all of your potential problems.**

In addition, you may want to check with vendors, trade associations, or professional organizations to determine if there are new standards for safety systems or designs, or if there are detection or mitigation systems that may be applicable to your process that you should consider when you evaluate your existing equipment. If your equipment is designed and built to an earlier version of a standard, you should consider whether upgrades are needed.

Responding to Findings

The person or persons who conduct the review should develop a list of findings and recommendations. You must ensure that problems identified are addressed in a timely manner. EPA does not require that you implement every recommendation. It is up to you to decide which recommendations are necessary and feasible. You may decide that other steps are as effective as the recommended actions or that the risk is too low to merit the expense. You must, however, document your decision on each recommendation. If you are implementing a recommendation, you should document the schedule for implementation. If you are taking other steps to address the problem or decide the problem does not merit action, you should document the basis for your decision.

Updates

You must update the review every five years or whenever a major change in a process occurs. For most Program 2 processes, major changes are likely to occur infrequently. If you install a new tank next to an existing one, you would want to consider whether the closeness of the two creates any new hazards. Replacing a tank with an identical tank would not be considered a change. Replacing a tank with a new type of tank should trigger an update. Changing process composition or safe operating limits is considered a major change. Even if changes prove to be minor, you should examine the process carefully before starting. Combining old and new equipment can sometimes create unexpected hazards. You will operate more safely if you take the time to evaluate the hazards before proceeding.

Where To Go For More Information

Although the reports below target the chemical industry, you may find useful information in them:

- *Guidelines for Hazard Evaluation Procedures, 2nd Ed. with Worked examples*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1992.

- *Evaluating Process Safety in the Chemical Industry*, Chemical Manufacturers Association.

- *Loss Prevention in the Process Industries*, Volumes I, II, and III Frank P. Lees, Butterworths: London 1996.
- *Management of Process Hazards* (R.P. 750), American Petroleum Institute.
- *Risk-Based Decision Making (Publication 16288)*, American Petroleum Institute.

Among the information you will find in *Guidelines for Hazard Evaluation Procedures* are descriptions of other PHA techniques, including Failure Modes and Effects Analysis and Fault Tree Analysis. The regulations allow you to make use of these if you wish to do so.

6.4 OPERATING PROCEDURES (§ 68.52)

Written operating procedures describe in detail what tasks a process operator must perform, set safe process operating parameters that must be maintained, and set safety precautions for operations and maintenance activities. These procedures are the guide for telling your employees how to work safely everyday, giving everyone a quick source of information that can prevent or mitigate the effects of an accident, and providing workers and management with a standard against which to assess performance.

WHAT DO I NEED TO DO?

You must prepare written operating procedures that give workers clear instruction for safely conducting activities involving a covered process. You may use standardized procedures developed by industry groups or provided in industry-specific risk management program guidances as the basis for your operating procedures, but be sure to check that these standard procedures are appropriate for your activities. If necessary, you must update your Program 2 operating procedures whenever there is a major change and before you startup the changed process. Exhibit 6-6 briefly summarizes what your operating procedures must address.

EXHIBIT 6-6
OPERATING PROCEDURES REQUIREMENTS

Steps for each operating phase	Other Procedures
✔Initial startup	✔Consequences of deviating
✔Normal operations	✔Steps to avoid, correct deviations
✔Temporary operations	✔Equipment inspections
✔Emergency shutdown	
✔Emergency operations	
✔Normal shutdown	
✔Startup following a normal or emergency shutdown or a major change	

Your operating procedures must be:

- Appropriate for your equipment and operations;
- Complete;
- Written in language that is easily understood by your operators; and
- Arranged and organized to be easy for operators to use.

The procedures do not have to be long. If you have simple equipment that requires a few basic steps, that is all you have to cover.

HOW DO I START?

If you already have written procedures, you may not have to do anything more. Review the procedures. You may want to watch operators performing the steps to be sure that the procedures are being used and are appropriate. Talk with the operators to identify any problems they have identified and any improvements they may have made. When you are satisfied that they meet the criteria listed above, you are finished. You may want to check them against any recommended procedures provided by equipment manufacturers, trade associations, or standard setting organizations, but you are not required to do so. You are responsible for ensuring that the procedures explain how to operate your equipment and processes safely.

If you do not have written procedures, you may be able to review your standard procedures with your operators and write them down. You also may want to check with equipment manufacturers, trade associations, or standard setting organizations. They may have recommended practices and procedures that you can adapt. Do not accept anyone else's procedures without checking to be sure that they are adequate and appropriate for your particular equipment and uses and are written in language that your operators will understand. You may also want to review any requirements imposed under state or federal rules. For example, if you are subject to federal rules for loading and unloading of hazardous materials, those rules may dictate some procedures. Copies of these rules are sufficient for those operations if your operators can understand and use them.

WHAT DO THESE PROCEDURES MEAN?

The rule lists eight procedures. Not all of them may be applicable to you. The following is a brief description to help you decide whether you need to develop procedures for each item. If a particular element does not apply, do not spend any time on it. We do not expect you to create a document that is meaningless to you. You should spend your time on items that will be useful to you.

Initial Startup. This item applies primarily to facilities that process or use substances and covers all the steps you need to take before you start a process for the

first time. You should include all the steps needed to check out equipment as well as the steps needed to start the process itself.

Normal Operations. These procedures should cover your basic operations. The procedures would include all the steps operators take to check the process and ensure that equipment is functioning properly and substances are flowing or mixing appropriately. These are your core procedures that you expect your operators to follow on a daily basis to run your processes safely.

In a WWTP, it will be especially important to detail, very specifically, the procedures and safeguards for connecting and disconnecting cylinders, tank trucks, or rail cars containing regulated substances. These procedures should also detail the required precautions, e.g., having an emergency respirator readily available. Also, assuring that emergency equipment is functional and readily available should be part of the instructions. For example, an inspection of the air tank on the self-contained breathing apparatus prior to making or breaking connections should be considered.

Temporary Operations. These operations are short-term; they will usually occur either when your regular process is down or when additional capacity is needed for a limited period. The procedures should cover the steps you need to take to ensure that these operations will function safely. The procedures will generally cover pre-startup checks and determinations (e.g., have you determined what the maximum flow rate will be). The actual operating procedures for running the temporary process must be written before the operation is put into place.

Emergency Shutdowns and Operations. These procedures cover the steps you need to take if you must shutdown your process quickly. For most Program 2 facilities, these procedures will be brief because shutting a process down will be little different in an emergency than in ordinary circumstances; you will simply shut off the flow or stop any unloading or loading.

Normal Shutdown. These procedures should provide all the steps needed to stop a process safely. The procedures should set out the time that should be taken and the checks that must be made before proceeding to the next steps.

Startup following a normal or emergency shutdown or a major change. These procedures may be similar to those for initial startup. Startup procedures following normal shutdown may include fewer equipment checks because you may not need to check equipment on a frequent basis. You should include all the steps your workers should take to ensure that the process can operate safely. Startup after an emergency shutdown will generally require more checks to ensure that valves that were closed are open and that they and other equipment are still functioning properly.

Consequences of Deviations. Your operating procedures should tell the workers what will happen if something starts to go wrong. For example, if the pressure or temperature begins to rise or fall unexpectedly or the flow rate from one feed suddenly drops sharply, the operator must know (1) whether this poses a problem that must be addressed, and (2) what steps to take to correct the problem or

otherwise respond to it. Your safety information will have defined the safe operating limits for your substances and processes; the hazard review will have defined the possible consequences and the steps needed to prevent a deviation from causing serious problems. You should include this information in each of the other procedures (startup, normal operations, shutdowns), rather than as separate documents.

If your substance is one that has a distinctive odor, color, or other characteristic that operators will be able to sense, you should include in your procedures information about what to do if they notice leaks. Frequently, people are the most sensitive leak detectors. Take advantage of their abilities to catch leaks before they become serious.

Equipment Inspections. You should include steps for routine inspection of equipment by operators as part of your other procedures. These inspections cover the items that operators should look for on a daily basis to be sure that the equipment is running safely (e.g., vibration checks). These inspections are not the same as those detailed checks that maintenance workers will perform, but rather are the "eyeball," "sound," and "feel" tests that experienced operators do, often without realizing it. Your operators, your vendors, and your trade association can help you define the things that should trigger concern: When is a small leak at a seal normal; when is it a cause of concern? How much vibration is normal? What does a smoothly running motor sound like?

UPDATING PROCEDURES

You must update your procedures whenever you change your process in a way that alters the steps needed to operate safely. If you add new equipment, you will need to expand your procedures or develop a separate set to cover the new items. Whenever you change your safety information you should review your procedures to be sure that they are still appropriate. Anytime you conduct a hazard review, check your operating procedures as you implement changes to address hazards.

WHAT KIND OF DOCUMENTS DO I HAVE TO KEEP?

You must maintain your current set of operating procedures. You are not required to keep old versions; in fact, you should avoid doing so because keeping copies of outdated procedures may cause confusion. You should date all procedures so you will know when they were last updated.

WHERE TO GO FOR MORE INFORMATION

The Chlorine Institute (http://www.cl2.com) publishes information on safe use and handling of chlorine. Its *Water and Wastewater Operators Chlorine Handbook* (Pamphlet # 155) provides general training and procedures.

The Water Environment Federation (601 Wythe Street, Alexandria, VA 22134, (703) 684-2470) provides general procedures as part of its training programs on wastewater treatment operation and maintenance.

Although the reports below target the chemical industry, you may find useful information in them:

- *Guidelines for Process Safety Fundamentals for General Plant Operations*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Guidelines for Safe Process Operations and Maintenance*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995
- *Guidelines for Writing Effective Operating and Maintenance Procedures*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1996.

6.5 TRAINING (§ 68.54)

Training programs often provide immediate benefits because trained workers have fewer accidents, damage less equipment, and improve operational efficiency. Training gives workers the information they need to understand how to operate safely and why safe operations are necessary. A training program, including refresher training, is the key to ensuring that the rest of your prevention program is effective. You may already have some type of training program if you must conduct training to comply with OSHA's Hazard Communication Standard (29 CFR 1910.1200).

WHAT DO I NEED TO DO?

You must train all new workers in your operating procedures developed under the previous prevention program element; if any of your more experienced workers need training on these procedures, you should also train them. Any time the procedures are revised, you must train everyone using the new procedures. At least once every three years, you must provide refresher training on the operating procedures even if they have not changed. The training must cover all parts of the operating procedures, including information on the consequences of deviations and steps needed to address deviations.

You need not provide initial training for workers already operating a process as of June 21, 1999, if you in writing that the employees have the "required knowledge, skills, and abilities to safely carry out the duties and responsibilities as provided in the operating procedures" (§ 68.54(a)). This certification should kept in your files; you do not need to submit it to EPA.

You are not required to provide a specific amount of training or type of training. You should develop a training approach that works for you. For WWTPs, where the number of staff handling regulated substances is generally small, one-on-one training and on-the-job training may work best. You may have senior operators present the training or use trainers provided by vendors or other outside sources. The form and the length of the training will depend on your resources and your processes. If you can teach someone the basics in two hours and move them on to supervised work, that is all right. The important thing is that your workers understand how to operate safely and can carry out their tasks properly. We are interested in the results of the training, not the details of how you achieve them. Find a system that works for you. Exhibit 6-7 lists things that you may find useful in developing your training program.

You are also required to ensure that each worker trained has understood the training and is competent to operate the process safely. You may decide what kind or kinds of competency testing to use. Observation by a senior operator may be appropriate in many cases. If you provided classroom training, you may want to use both testing and demonstration or observation. You are required to report in the RMP on the type(s) of competency testing you use.

For WWTPs, trainig should cover the activities that could lead to releases of the toxic gases and flammables that are used in WWTPs. These activities should be identified in the hazard review and bear particular attention:

- Connecting, and disconnecting, cylinders of Chlorine and Sulfur Dioxide. Training should cover inspection of the fittings and tubing to assure that they are in good condition and inspection (and discard if necessary) of tools used for the job. Training should also include identification of vapor and liquid connections on the cylinders and identification of the operating conditions that will show that the connections are hooked up in reverse.

- Material handling of cylinders. Training should cover inspection of material handling equipment, including hoists, cylinder carriers and hooks, and cylinder chocks. Also, inspection for and removal of combustibles or flammables in storage areas should be a part of training.

EXHIBIT 6-7
TRAINING CHART

✔**Who needs training?**	Clearly identify the employees who need to be trained and the subjects to be covered.
✔**What are the objectives?**	Specify learning objectives, and write them in clear, measurable terms before training begins. Remember that training must address the process operating procedures.
✔**How will you meet the training objectives?**	Tailor the specific training modules or segments to the training objectives. Enhance learning by including hands-on training like using simulators whenever appropriate. Make the training environment as much like the working environment as you can, consistent with safety. Allow your employees to practice their skills and demonstrate what they know.
✔**Is your training program working?**	Evaluate your training program periodically to see if your employees have the skills and know the routines required under your operating procedures. Make sure that language or presentation are not barriers to learning. Decide how you will measure your employees' competence.
✔**How will your program work for new hires and refresher training?**	Make sure all workers – including maintenance and contract employees – receive initial and refresher training. If you make changes to process chemicals, equipment, or technology, make sure that involved workers understand the changes and the effects on their jobs.

HOW DOES THIS TRAINING FIT WITH OTHER REQUIRED TRAINING?

You are required by OSHA to provide training under the Hazard Communication Standard (29 CFR 1910.1200); this training covers the hazards of the chemicals and steps to take to prevent exposures. DOT has required training for loading and unloading of hazardous materials (49 CFR part 172, subpart H). Some of that training will cover items in your operating procedures. You do not need to repeat that training to meet EPA's requirements. You may want to integrate the training programs, but you do not have to do so.

WHAT KIND OF DOCUMENTATION DO I NEED TO KEEP?

In the RMP, you are required to report on the date of the most recent review or revision of your training program. You are also required to report on the type of training required (e.g., classroom or on-the-job) and the type of competency testing used. You should keep on site any current training materials or schedules used. The rule does not require you to keep particular records of your training program. It is enough for you to have on site information that supports what is reported in the RMP and your implementation of the training program overall. You may want to keep an attendance log for any formal training courses and refresher training to ensure that everyone who needs to be trained is trained. Such logs will help you perform a

compliance audit or demonstrate compliance with the rule although you are not required to keep logs for this rule.

WHERE TO GO FOR MORE INFORMATION

The Water Environment Federation provides several training programs including the following:

- *Basic Course for Wastewater Treatment Plant Operators*, Instructor Set Order No. E0100GB, Student Workbook Order No. E0110GB.
- *Intermediate Course for Wastewater Treatment Plant Operators*, Instructor Set Order No. E0295GB, Student Workbook Order No. E0296GB.
- *Chlorination Skill Training Course*, Order No. E0312GB. Self Instruction Course.

In addition, the following may be useful:

- *Operation and Maintenance of Municipal Wastewater Treatment Plants* (MOP-11), Water Environment Federation.
- NFPA-820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities.
- *Guidelines for Process Safety Fundamentals for General Plant Operations*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Guidelines for Technical Planning for On-Site Emergencies*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Federally Mandated Training and Information* (Publication 12000), American Petroleum Institute.

6.6 MAINTENANCE (§ 68.56)

Preventive maintenance, inspection, and testing of equipment is critical to safe operations. Waiting for equipment to fail often means waiting for an accident that could harm people and the environment. Further, a thorough maintenance program will save you money by cutting down-time caused by equipment failures. Your hazard review and safety information will have identified equipment that is critical to safe operations. You should use that information you develop while putting together these documents and reviews to build your maintenance program. Exhibit 6-8 briefly summarizes the elements of a maintenance program that would satisfy EPA's rule.

EXHIBIT 6-8
MAINTENANCE GUIDELINES

Written procedures	Training	Inspection & testing
✔You may use procedures provided by the vendor or trade association, etc., as the basis for your program. If you choose to develop your own, you must write them down.	✔Train process maintenance employees in process hazards and how to avoid or correct an unsafe condition. ✔Make sure this training covers the procedures applicable to safe job performance.	✔Inspect & test process equipment. ✔Use recognized and generally accepted good engineering practices. ✔Follow a schedule that matches the manufacturer's recommendations or that prior operating experience indicates is necessary.

WHAT DO I NEED TO DO?

You must prepare and implement procedures for maintaining the mechanical integrity of process equipment, and train your workers in the maintenance procedures. For most of the equipment in a WWTP, the manufacturer will have supplied maintenance instructions. These can be used to fulfill the requirements for maintenance procedures. Where such instructions are not available, you will need to develop them. In addition to the major pieces of equipment, you will need to develop inspection procedures that consider both repair or replacement requirements for the following items:

- Fittings
- Tubing
- Pressure relief devices
- Gauges, pressure switches, and other instrumentation.
- Rotameters
- Pressure regulators, and pressure gauges
- Leak detectors
- Eductors, vacuum mixers, or other devices used to mix chlorine, sulfur dioxide, and other regulated substances into waste water streams
- Material handing equipment
- Tools
- All other equipment used to handle, transfer, or use the regulated substances.

Where there is the possibility of corrosion, these inspections are especially important. The regulated substances used are normally not corrosive, when they are dry. However, all of them can become highly corrosive if the equipment using them is wet. Attention to this aspect can be vital.

Where methane is recovered, compressed, and stored for use in the plant, steel pipelines and storage vessels should be inspected regularly. If the plant operator is not familiar with preventive inspection and testing, help should be sought. If the storage tank is a pressure vessel, the helping person should be very familiar with the ASME pressure vessel code and with API tank inspection requirements.

In larger plants, where there are storage tanks for chorine, sulfur dioxide or ammonia, the tanks and associated piping should be inspected regularly. Suppliers are likely to be able to provide recommendations for this inspection and preventive maintenance. Propane distributors are likely to be able to supply the same information about propane vessels and equipment, if these are included in your plant.

You should develop a schedule for inspecting and testing your equipment based on manufacturers' recommendations or your own experience if that suggests more frequent inspection or testing is warranted.

HOW DO I START?

Your first step will probably be to determine whether you already meet all these requirements. If you review your existing written procedures and determine that they are appropriate, you do not need to revise or rewrite them. If your workers are already trained in the procedures and carry them out, you may not need to do anything else.

If you do not have written procedures, you will need to develop them. Your equipment vendors may be able to provide procedures and maintenance schedules. Using these as the basis of your program is acceptable unless your use varies from that contemplated by the vendor or manufacturer (see below). Your trade association may also be able to help you with industry-specific checklists. If there are existing industry standards, your trade association can provide you with the references. Copies of these may form the basis for your maintenance program. If there are federal or state regulations that require certain maintenance, you should use these as well.

You need to determine if procedures provided by vendors, manufacturers, trade associations, or others are appropriate for your operation. If your safety information indicates that you are operating in a standard way (e.g., using only parts designed for chlorine service in your chlorination system), you may assume that these other procedures will work for you. If you are using equipment for purposes other than those for which it was designed, you need to decide whether your use changes the kinds of maintenance required.

TRAINING

Once you have written procedures, you must ensure that your maintenance workers are trained in the procedures and in the hazards of the process. As with the training discussed in the previous section, how you provide this training is up to you. We believe that you are in the best position to decide how to train your workers.

Vendors may provide the training or videos; you may already provide training on hazards and how to avoid or correct them as part of Hazard Communication Standard training under OSHA regulations. You do not need to repeat this training to comply with this rule.

If you hire contractors to do your maintenance, you should ensure that they are trained to carry out the procedures. Under the rule, any maintenance contractor is required to ensure that each contract maintenance worker is trained to perform the maintenance procedures developed by the facility. You can help this process by providing training or by developing agreements with the contractor that give you the assurance that only trained workers will be sent to your site. For any outside worker, you must ensure that they are informed of the hazards of your particular process. If you have standard equipment and hire contractors that specialize in servicing your types of processes, you can ensure their knowledge through agreements with the contractor.

Inspection and Testing

You must establish a schedule for inspecting and testing equipment associated with covered processes. The frequency of inspections and tests must be consistent with manufacturer's recommendations, industry standards or codes, good engineering practices, and your prior operating experience. In particular, you should use your own experience as a basis for examining any schedules recommended by others. Many things may affect whether a schedule is appropriate. The manufacturer may assume a constant rate of use (e.g., the amount of substance pumped per hour). If your use varies considerably, the variations may affect the wear on the equipment. Extreme weather conditions may also impact wear on equipment.

Talk with your operators and maintenance personnel as you prepare or adopt these procedures and schedules. If their experience indicates that equipment fails more frequently than the manufacturer expects, you should adjust the inspection schedule to reflect that experience. Your hazard review will have identified these potential problem areas as well and should be used as you develop schedules. For example, if you determine that corrosion is one of the hazards of the process, your schedule must address inspections for corrosion and replacement before failure. Your trade association may also be able to provide advice on these issues.

What Kind of Documentation Must I Keep?

In the RMP, you are required to report on the date of the most recent review or revision of your maintenance procedures and the date of the most recent equipment inspection or test and equipment inspected or tested. You must keep on site your written procedures and schedules as well as any agreements you have with contractors. The rule does not require that you keep particular records of your maintenance program. It is enough for you to have on site information that supports what is reported in the RMP and your implementation of the maintenance program overall. For example, you may want to keep maintenance logs to keep track of when inspections and tests were done.

WHERE TO GO FOR MORE INFORMATION

Codes and Standards: The following groups develop codes and standards that may help you determine the appropriate frequency and methods to use for testing and inspection: National Board Inspection Code, the American Society for Testing and Material, American Petroleum Institute, National Fire Protection Association, American National Standards Institute, American Society of Mechanical Engineers.

Guidance and Reports. The documents listed under Safety Information may be useful for maintenance procedures as well. In addition, the Chlorine Institute publishes pamphlets on chlorine system maintenance, including the following:

- *Maintenance Instructions for Chlorine Institute Standard Safety Valves, Type 1-1/2 JQ* (# 39).
- *Maintenance Instructions for Chlorine Institute Standard Angle Valve* (#40).
- *Maintenance Instructions for Chlorine Institute Standard Safety Valve, Type 4JQ* (#41).
- *Maintenance Instructions for Chlorine Institute Standard Excess Flow Valves* (#42).

Although the reports below target the chemical industry, you may find useful information in them:

- *Guidelines for Equipment Reliability Data with Data Tables*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1989.
- *Guidelines for Process Safety Documentation*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration* (API 510), American Petroleum Institute.
- *Tank Inspection, Repair, Alteration, and Reconstruction (Std 653)*, American Petroleum Institute.

Q & A
MAINTENANCE

Q. I have a propane tank for fuel use. I lease the tank from the propane supplier. The supplier does all the maintenance. My staff never work on the equipment. How I do meet this requirement?

A. As part of your contract with the supplier, you should gain an agreement, in writing, that the supplier will provide maintenance and trained maintenance workers that meet the requirements of 40 CFR 68.56.

6.7 COMPLIANCE AUDITS (§ 68.58)

Any risk management program should be reviewed periodically to ensure that employees and contractors are implementing it properly. A compliance audit is a way for you to evaluate and measure the effectiveness of your risk management program. An audit reviews each of the prevention program elements to ensure that they are up-to-date and are being implemented and will help you identify problem areas and take corrective actions. As a result, you'll be running a safer operation.

WHAT DO I NEED TO DO?

At least every three years, you must certify that you have evaluated compliance with for the prevention program requirements for each covered process. At least one person on your audit team must be knowledgeable about the covered process. You must develop a report of your findings, determine and document an appropriate response to each finding, and document that you have corrected any deficiency.

You must review compliance with each of the required elements of the prevention program. Because Program 2 processes are generally simple, the audit should not take a long time. You may want to develop a simple checklist; Exhibit 6-9 provides a sample format.

Once you have the checklist, you, your chief operator, or some other person who is knowledgeable about your process, singly or as a team, should walk through the facility and check on relevant items, writing down comments and recommendations. For example, you may want to talk with employees to determine if they have been trained and are familiar with the procedures.

You must respond to each of the findings and document what actions, if any, you take to address problems. You should take steps to correct any deficiencies you find.

You may choose to have the audit conducted by a qualified outside party. For example, you may have someone from another part of your company do the audit or hire an expert in your process. If you do either of these, you should have an employee who works with or is responsible for the process accompany the auditor, both to understand the findings and answer questions.

Again, the purpose of the compliance audit is to ensure that you are continuing to implement the risk management program as required. Remember, the risk management program is an on-going process; it is not a set of documents that you develop and put on a shelf in case the government inspects your site. To be in compliance with (and gain the benefits of) the rule, procedures must be followed on a daily basis; documents must be kept up to date. The audit will check compliance with each prevention program element and indicate areas that need to be improved. You may choose to expand the scope to cover your compliance with other parts of the rule and the overall safety of your operation, but you are not required to do so.

EXHIBIT 6-9
SAMPLE AUDIT CHECKLIST
FOR SAFETY INFORMATION AND HAZARD REVIEW

Element	Yes/No/NA	Action/Completion Data
Safety Information		
MSDSs up-to-date?		
Maximum intended inventory determined?		
Determined Safe upper and lower temperature? Safe upper and lower pressures? Safe process flow rates? Compositions?		
Equipment specifications Tanks? Piping? Pressure relief valves? Emergency shutoff valves? Gauges? Pumps? Compressors? Hoses?		
Hazard Review		
Has equipment been inspected to determine if it is designed, manufactured, installed, and operated according to industry standards and codes?		
Are the results of the inspections documented?		
Have inspections been conducted after every major change?		

WHAT KIND OF DOCUMENTATION MUST I KEEP?

You must keep a written record of audit findings and your response to those findings and documents that deficiencies have been corrected. You must keep the two most recent audit reports, but you need not keep a report that is more than five years old. You may also want to keep a record of who conducted the audit, but you are not required to do this.

WHERE TO GO FOR MORE INFORMATION

- Guidelines for Auditing Process Safety Management Systems, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1993.

Q & A
AUDITS

Q. Does the compliance audit requirement cover all of the Part 68 requirements or just the prevention program requirements?

A. The compliance audit requirement applies only to the prevention programs under Subpart C. If you have a Program 2 process, you must certify that you have evaluated compliance with the Program 2 prevention program provisions at least every three years to verify that the procedures and practices developed under the rule are adequate and are being followed. You may want to expand your audit to check other part 68 elements, but you are not required to do so.

6.8 INCIDENT INVESTIGATION (§ 68.60)

Incidents can provide valuable information about site hazards and the steps you need to take to prevent accidental releases. Often, the immediate cause of an incident is the result of a series of other problems that need to be addressed to prevent recurrences. For example, an operator's mistake may be the result of poor training. Equipment failure may result from improper maintenance or misuse. Without a thorough investigation, you may miss the opportunity to identify and solve these problems.

WHAT DO I NEED TO DO?

You must investigate each incident which resulted in, or could have resulted in, a catastrophic release of a regulated substance. A catastrophic release is one that presents an imminent and substantial endangerment to public health and the environment. Exhibit 6-10 briefly summarizes the steps you must take for investigating incidents. You should also consider investigating minor accidents or near misses because they may help you identify problems that could lead to more serious accidents; however, you are not required to do so under part 68.

EXHIBIT 6-10
INCIDENT INVESTIGATION REQUIREMENTS

✔**Initiate an investigation promptly.**	Begin investigating no later than 48 hours following the incident.
✔**Summarize the investigation in a report.**	Among other things, the report must identify the factors contributing to the incident. Remember that identifying the root cause may be more important than identifying the initiating event. The report must also include any recommendations for corrective actions. Remember that the purpose of the report is to help management take corrective action.
✔**Address the report's findings and recommendations.**	Establish a system to address promptly and resolve the incident report findings and recommendations and document resolutions and corrective actions.
✔**Review the report with your staff and contractors.**	You must share the report - its findings and recommendations - with affected workers whose job tasks are relevant to the incident.
✔**Retain the report.**	Keep incident investigation summaries for five years.

HOW DO I START?

You should start with a simple set of procedures that you will use to begin an investigation. You may want to assign someone to be responsible for compiling the initial incident data and putting together the investigation team. If you have a small facility, your "team" may be one person who works with the local responders, if they were involved.

The purpose of the investigation is to find out what went wrong and why, so you can prevent it from happening again. Do not stop at the obvious failure or "initiating event" (e.g., the hose was clogged, the operator forgot to check the connection); try to determine why the failure occurred. In many cases, the underlying cause will be what matters (e.g., the operator did not check the connection because the operating procedures and training did not include this step). If the accident occurred because of operator error, you should determine if the operator made the mistake because he or she had been trained inadequately or trained in the wrong procedures or because design flaws made mistakes likely. If you write off the accident as operator error alone, you miss the chance to take the steps needed to prevent such errors the next time. Similarly, if equipment fails, you should try to decide whether it had been used or maintained improperly.

Remember, your goals are to prevent accidents, not to blame someone, and correct any problems in your prevention program. In this way, you can prevent recurrences.

In some cases, an investigation will not take long. In other cases, if you have a complex facility, equipment has been severely damaged, or the workers seriously hurt, an investigation may take several days. You should talk with the operators who were in the area at the time and check records on maintenance (another reason for keeping logs). If equipment has failed in an unusual way, you may need to talk to the manufacturer and your trade association to determine if similar equipment has suffered similar failures.

You must develop a summary of the accident and its causes and make recommendations to prevent recurrences. You must address each recommendation and document the resolution and any actions taken. Finally, you must review the findings with operators affected by the findings.

WHAT KIND OF DOCUMENTATION MUST I KEEP?

You must maintain the summary of the accident investigation and recommendations and document resolutions and corrective actions. A sample format is shown in Exhibit 6-11 that combines all of these in a single form. Note that the form also includes accident data that you will need for the five-year accident history. These data are not necessarily part of the incident investigation report, but including them will create a record you can use later to create the accident history.

WHERE TO GO FOR MORE INFORMATION

Although the reports below target the chemical industry, you may find useful information in them:

- *Guidelines for Investigating Chemical Process Incidents*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1992.
- *Guide for Fire and Explosion Investigations* (NFPA 921), National Fire Protection Association.

EXHIBIT 6-11
SAMPLE INCIDENT INVESTIGATION FORMAT

Ammonia Tank Release		
Date: May 15, 1998; 3 pm	Substance: Ammonia	Quantity: 2 tons
Duration: 2 hours	Weather: 82 F, 8 mph winds	Date Investigation Started: May 16, 1998
Description:	Unloading hose split open and spilled substance; operator was in the main building and failed to notice spill for several minutes	
Findings	**Recommendations**	**Actions**
Hose split because the pressure rating was too low; design pressure requirement was overlooked	Replace hose with correctly rated pressure hose; compare all pressure ratings to actual, including deadhead pump pressure, and make any needed upgrades	Replaced hose as recommended; checked all pressure ratings
Operator failed to stay at the tank during loading	Conduct refresher training to stress necessity of remaining at the tank during loading	Refresher training provided; safety meetings added and held on a monthly basis to review safety issues
Tank required manual shutoff	Determine if automatic shutoff valve is feasible	Automatic shutoff valve installed

6.9 CONCLUSION

Many of you will need to do little that's new to comply with the Program 2 prevention program, because complying with other Federal rules, state requirements, and industry-specific codes and standards results in compliance with many Program 2 elements. And if you've voluntarily implemented OSHA's PSM standard for your Program 2 process, you'll meet the lesser Program 2 prevention program requirements. No matter what choices you make in complying with the Program 2 prevention program, keep these things in mind:

- Integrate the elements of your prevention program. For Program 2 owners and operators, a major change in any single element of your program should lead to a review of other elements to identify any effect caused by the change.

- Make accident prevention an institution at your site. Like the entire risk management program, a prevention program is more than a collection of written documents. It is a way to make safe operations and accident prevention the way you do business everyday.

- Check your operations on a continuing basis and ask if you can improve them to make them safer as well as more efficient.

APPENDIX 6A

HAZARD REVIEW CHECKLISTS, WHAT IF QUESTIONS, AND HAZOP PROCEDURES

EXHIBIT 6A-1
GENERAL CONDITIONS, OPERATION AND MAINTENANCE
(FOR ANY WWTP)

General Conditions, Operation and Maintenance	Yes/No/NA	Comments
Are work areas clean?		
Are adequate warning signs posted?		
Is ambient temperature normally comfortable?		
Is lighting sufficient for all operations?		
Are the right tools provided and used?		
Is personal protective equipment (PPE) provided and adequate?		
Are containers and tanks protected from vehicular traffic?		
Are all flammable and combustible materials kept away from containers, tanks, and feed lines?		
Are containers, tanks, and feed line areas kept free of any objects that can fall on them (e.g., ladders, shelves?)		
Are leak detectors with local and remote audible and visible alarms present, operable, and tested?		
Are windsocks provided in a visible location?		
Are emergency repair kits available for each type of supply present?		
Are appropriate emergency supplies and equipment present, including PPE and self-contained breathing apparatus (SCBA)?		
Are emergency numbers posted in an appropriate spot?		
Are equipment, containers, and railcars inspected daily?		
Are written operating procedures available to the operators?		
Are preventative maintenance, inspections, and testing performed as recommended by the manufacturer and industry groups and documented?		

EXHIBIT 6A-2
HUMAN FACTORS
(GENERAL)

Human Factors	Yes/No/NA	Comments
Have operators been trained on the written operating procedures and the use of PPE in normal operations (or for operators on the job before June 21, 1999, have you certified that they have the required knowledge, skills, and ability to do their duties safely)?		
Do the operators follow the written operating procedures?		
Do the operators understand the applicable operating limits on temperature, pressure, flow, and level?		
Do the operators understand the consequences of deviations above or below applicable operating limits?		
Have operators been trained on the correct response to alarms and conditions that exceed the operating limits of the system?		
Are operators provided with enough information to diagnose alarms?		
Are controls accessible and easily understood?		
Are labels adequate on instruments and controls?		
Are all major components, valves, and piping clearly and unambiguously labeled?		
Are all components mentioned in the procedures adequately labeled?		
Are safe work practices, such as lockout/tagout, hot work, and line opening procedures followed?		
Are personnel trained in the emergency response plan and the use of emergency kits, PPE, and SCBAs?		
Are contractors used at the facility?		
Are contractors trained to work as safely as your own employees?		
Do you have programs to monitor that contractors are working safely?		

EXHIBIT 6A-3
CHECKLISTS FOR CHLORINE AND SULFUR DIOXIDE

	Yes/No/NA	Comments
Chlorine and Sulfur Dioxide - Siting		
Are storage, use, and transfer areas not located uphill from adjacent operations?		
Are storage, use, and transfer areas located away from sewer openings and other underground structures?		
Do storage, use, and transfer areas have easy access for emergency response?		
Are storage, use, and transfer areas free of combustible or incompatible materials and isolated from hydrocarbons in accordance with NFPA Standard No. 49, Hazardous Chemicals Data?		
Are storage, use and transfer areas downwind of or separated from most operations and support areas and ventilation intakes based on prevailing wind direction?		
Are storage, use, and transfer areas isolated from sources of corrosion, fire, and explosion and protected from vehicle impact?		
Are storage, use, and transfer areas located away from residences and facility boundaries?		
If cylinders are stored outside, are they protected from impact by vehicular traffic?		
Chlorine and Sulfur Dioxide - Hazard Recognition		
Are material safety data sheets (MSDSs) readily available to those operating and maintaining the system?		
Do employees understand that there are certain materials with which Cl_2 (SO_2) must not be mixed?		
Do employees understand the toxicity, mobility, and ability of Cl_2 (SO_2) to sustain combustion?		
Do employees understand the consequences of confining liquid Cl_2 (SO_2) without a thermal expansion device?		
Do employees understand the effect of moisture on the corrosive potential of Cl_2 (SO_2)?		

	Yes/No/NA	Comments
Do employees understand the effects of fire and elevated temperature on the pressure of confined chlorine (SO_2) and the potential for release?		
Chlorine and Sulfur Dioxide - Container Shipment Unloading		
Is the truck inspected for wheel chocks, proper position, and condition of crane?		
Are adequate warning signs posted? Are there "stops"?		
Is the shipment inspected for leakage, general condition, currency of hydrostatic test, and valve protective housing before accepting?		
Are containers placed in the 6 o'clock/12 o'clock position for storage to reduce the chance of a liquid leak through the valve?		
Chlorine and Sulfur Dioxide - Bulk Shipment Unloading		
Do procedures call for hand brakes to be set and wheels chocked before unloading?		
Do procedures call for safety systems to be inspected prior to making connections for unloading or between storage tanks and transfer or distribution systems?		
For railcars, are derails to protect the open end located at least 50 feet from the car being protected?		
Are railcars staged at dead-end tracks and guarded against damage from other railcars and motor vehicles?		
Are caution signs placed at each derail and as appropriate in the vicinity of Cl_2 (SO_2) storage, use, and transfer areas?		
Does the transfer operation incorporate an emergency shutoff system?		
Is a suitable operating platform provided at the transfer station for easy access and rapid escape?		
Is padding air for railcars from a dedicated, flow-limited, dry (to -40 °F or below), and oil-free source?		
Is tank car attended as long as the car is connected, in accordance with DOT regulations?		
Building and Housing Cl_2 (SO_2) Systems	**Yes/No/NA**	**Comments**
Does the building conform with local building and fire codes and NFPA-820?		

	Yes/No/NA	Comments
Is the building constructed of non-combustible materials?		
If flammable materials are stored or used in the same building, are they separated from the Cl_2 (SO_2) areas by a fire wall?		
Is continuous leak detection, using area Cl_2 (SO_2) monitors, provided in storage and process areas?		
Are two or more exits provided from each Cl_2 (SO_2) storage and process area and building?		
Is the ventilation system appropriately designed for indoor operations (and scrubbing, if required) by local codes in effect at the time of construction or major modification?		
Are the exhaust ducts near floor level and the intake elevated?		
Can the exhaust fan be remotely started and stopped?		
If Cl_2 and SO2 are stored in the same building, are storage rooms separated as required?		
Chlorine and Sulfur Dioxide - Piping and Appurtenances		
Do piping specifications meet Cl_2 (SO_2) requirements for the service?		
Do you require suppliers to provide documentation that all piping and appurtenances are certified "for chlorine service" or "for sulfur dioxide service" by the manufacturer?		
Are piping systems properly supported, adequately sloped to allow drainage, and with a minimum of low spots?		
Is all piping protected from all risks of excessive fire or heat?		
Is an appropriate liquid expansion device or vapor pressure relief provided on every line segment or device that can be isolated?		
Chlorine and Sulfur Dioxide - Design Stage Review of New/Modified Process		
Is the system designed to operate at lowest practical temperatures and pressures?		
If Cl_2 (SO_2) demand is low enough, is the system designed to feed gaseous chlorine (SO_2) from the storage container, rather than liquid?		
Have the lengths of liquid Cl_2 (SO_2) lines been minimized (reduces quantity of chlorine in lines available for release)?		

	Yes/No/NA	Comments
Are low-pressure alarms and automatic shutoff valves provided on Cl_2 (SO_2) feed lines?		
Are vent-controlled spill collection sumps provided and floors sloped toward sumps for stationary tanks and railcars?		
Are vaporizers provided with automatic gas line shutoff valve, downstream pressure reducing valve, gas flow control valve, temperature control system and interlocks to shut down gas flow on low vaporizer temperature, and appropriate alarms in a continuously manned control room?		
Do vaporizers have a limited heat input capacity?		
Are curbs, sumps, and diking that minimize the surface of potential spills provided for stationary tanks and railcars?		

EXHIBIT 6A-4
CHECKLIST FOR ANHYDROUS AMMONIA SYSTEMS

	Yes/No/NA	Comments
Anhydrous Ammonia - Basic Rules		
Does the storage tank have a permanently attached nameplate?		
Are container(s) at least 50 feet from wells or other sources of potable water supply?		
Are container(s) painted white or other light reflecting colors and maintained in good condition?		
Is the area free of readily ignitable materials?		
Are all main operating valves on tanks identified to show liquid or vapor service?		
Anhydrous Ammonia - Appurtenances		
Are all appurtenances designed for maximum working pressure and suitable for ammonia service?		
Do all connections to containers have shut-off valves as close to container as practicable (except safety relief devices and gauging devices)?		
Are the excess flow and/or back pressure check valves located inside of the container or at a point outside as close as practicable to where line enters container?		
Are excess flow valves plainly and permanently marked with name of manufacturer, catalog number, and rated capacity?		
Anhydrous Ammonia - Piping		
Are piping and tubing suitable for ammonia service?		
Are provisions made for expansion, contraction, jarring, vibration and settling?		
Is all exposed piping protected from physical damage from vehicles and other undue strain (2,000 lb. pull)?		
Anhydrous Ammonia - Hoses		
Does the hose conform to TFI-RMA specifications for anhydrous ammonia?		
Is it 350 psig working, 1750 psig - burst?		

	Yes/No/NA	Comments
Is it marked every 5 feet with "Anhydrous Ammonia, xxx psig (maximum working pressure), manufacturer's name or trademark, year of manufacture?		
Anhydrous Ammonia - Safety Relief Devices		
Are safety relief valves installed?		
Are they vented upward and unobstructed to the atmosphere?		
Do they have a Rain/Dust Cap?		
Are shut-off valves not installed between safety relief valve and container?		
Are safety relief valves marked with "NH3" or "AA", psig valve is set to start-to-discharge, CFM flow at full open, manufacturer's name, and catalog number?		
Is flow capacity restricted on upstream or downstream side?		
Are hydrostatic relief valve installed between each pair of valves in liquid piping or hose?		
Anhydrous Ammonia - Safety		
Are there two suitable full face masks with ammonia canisters as approved by the Bureau of Mines? Are self-contained breathing air apparatus required in concentrated atmospheres?		
Is an easily accessible shower or a 50 gallon drum of water available?		
Anhydrous Ammonia - Transfer of Liquid		
Are pump(s) designed for ammonia service and at least 250 psig working pressure?		
Does P.D. pump have relief valve installed?		
Is a 0-400 psi pressure gauge installed on pump discharge?		
Are loading/unloading lines fitted with back flow check or excess flow valves?		
Are caution sign(s) posted when rail car(s) are loading/unloading?		
Are containers equipped with an approved liquid level gauging device (except those filed by weight)?		
Are containers fitted with a fixed tube liquid level gauge at 85% of water capacity?		

	Yes/No/NA	Comments
Anhydrous Ammonia - Stationary Tank		
Are non-refrigerated container(s) designed for a minimum 250 (265 psig in CA) psig pressure?		
Are all liquid and vapor connections to container(s) except safety relief valves, liquid gauging and pressure gauge connections fitted with orifices not larger than No. 54 drill size equipped with excess-flow valves?		
Are storage containers fitted with a 0-400 psi ammonia gauge?		
Are they equipped with vapor return valves(s)?		
Are containers marked on at least two sides with "Anhydrous Ammonia" or "Caution - Ammonia" in contrasting colors and minimum 4 inch high letters?		
Is a sign displayed stating name, address and phone number of nearest representative, agent or owner?		
Are containers installed on substantial concrete, masonry or structural steel supports?		
Are ammonia systems protected from possible damage by moving vehicles?		

EXHIBIT 6A-5
CHECKLIST FOR AQUEOUS AMMONIA SYSTEMS

	Aqueous Ammonia	Yes/No/NA	Comments
1.	Are storage tank(s) painted white or other light reflecting colors and maintained in good order?		
2.	Is storage area free of readily ignitable materials?		
3.	Are storage tank(s) kept away from wells or other sources of potable water supply?		
4.	Are storage tank(s) located with ample working space all around?		
5.	Are storage tank(s) properly vented and away from areas where operators are likely to be?		
6.	Does receiving system include a vapor return?		
7.	Is storage capacity adequate to receive full volume of delivery vehicle?		
8.	Are storage tank(s) secured against overturn by wind, earthquake and/or floatation?		
9.	Are tank bottom(s) protected from external corrosion?		
10.	Is aqua ammonia system protected from possible damage from moving vehicles?		
11.	Are storage tank(s) labeled as to content?		
12.	Are all appurtenances suitable for aqua ammonia service?		
13.	Are all storage tank(s) fitted with liquid level gauges?		
14.	Are liquid level gauge(s) adequately protected from physical damage?		
15.	If tubing is used, is it fitted with a fail closed valve?		
16.	Are all storage tank(s) fitted with overfill fittings or high level alarms?		
17.	Are tank(s) fitted with pressure/vacuum valves?		
18.	Is an ammonia gas scrubber system used?		
19.	Are piping and hose materials suitable for aqua ammonia service?		

	Aqueous Ammonia	Yes/No/NA	Comments
20.	Is piping free of strain and provision made for expansion, contraction, jarring, vibration and settling?		
21.	Is all exposed piping protected from physical damage from moving vehicles and other undue strain?		
22.	Are hoses securely clamped to hose barbs?		
23.	Are hoses inspected and renewed periodically to avoid breakage?		
24.	Are pump(s) designed for aqua ammonia service?		
25.	Are pump(s) fitted with splash guard around seals?		
26.	Are pump(s) fitted with coupling guard(s)?		
27.	Do pump(s) have local start/stop stations?		
28.	Are two (2) suitable full face masks with ammonia canisters as approved by the Bureau of Mines available? Self-contained breathing air apparatus required in concentrated atmospheres.		
29.	Is an easily accessible quick acting shower with bubble fountain or 250-gallon drum of clean water available?		
30.	Is an extra pair of chemical splash proof goggles and/or full face shields available?		
31.	Is an extra set of ammonia resistant gloves, boots, coat and apron available?		
32.	Are fire extinguishers and a first aid kit available?		
33.	Are handlers/operators wearing their goggles and gloves when working with aqua ammonia?		
34.	Are safety and first aid information posted?		
35.	Are emergency phone numbers and individuals to contact posted?		

EXHIBIT 6A-6
PROPANE STORAGE
HAZARD REVIEW CHECKLIST[1,2]

Answer the questions below by indicating "Yes", "No", or "N/A" (for not applicable). "No" responses require further comment and a projected completion date for correcting the deficiency. Comments can be recorded on a separate sheet that you reference in the comments section of this table.

	Yes/No/NA	Comments
Propane - Siting		
1. Does the arrangement of your fixed storage tanks conform with the minimum distances allowed in Table 3-2.2.2 of NFPA 58, 1998 Edition?		
2. Are your fixed storage tanks separated from any oxygen or hydrogen storage by the minimum distances given in Table 3-2.2.7(f) of NFPA 58, 1998 Edition?		
3. Are your transfer points separated from the exposure points by the minimum distances given in Table 3-2.3.3 of NFPA 58, 1998 Edition?		
Propane - Piping, Equipment and Container Appurtenances		
1. Is your storage facility designed according to ASME code for pressure vessels? Fixed Storage Tanks ASME? Vaporizers ASME?		

[1]Completing the Propane Storage Hazard Review Checklist does not guarantee that your facility is in complete compliance with NFPA 58, 1995 Edition.

[2]The Propane Storage Hazard Review Checklist is based on NFPA 58, 1995 Edition. There may be differences due to retroactivity between this version and the version adopted by your local authority at the time your facility was constructed. Changes in NFPA 58 have been made to reduce the possibility of a propane release. You should carefully review these changes and institute appropriate measures to ensure the safety of your facility. The differences between the version of NFPA 58 that you used as the basis for constructing your facility and the current version must be reconciled to the satisfaction of your implementing agency.

	Yes/No/NA	Comments
2. Is the pressure rating of your storage tanks appropriate for the product in service? Storage Tanks? Vaporizers?		
3. Is the stored product properly identified?		
4. On installation with multiple tanks, are the elevations of your storage tanks arranged to prevent unintentional overfilling of the lowest container?		
5. On installations with stairways or ladders, are they well anchored, supported and of slip-proof construction?		
6. On installations with stairways or ladders, are railings provided and in good condition?		
7. On installations with stairways or ladders, are catwalks provided so personnel need not walk on any portion of the container?		
8. Is your piping designed in accordance with NFPA 58, 1998 Section 3-2.10? Are your pump and compressor discharge and liquid transfer lines suitable for a working pressure of 350 psi? Is your vapor piping suitable for a working pressure of 250 psi? On installations with vaporizers, are your vaporizers designed according to 2-5.4.2 or 2-5.4.3 or 2-5.4.4 and 2-5.4.5 or 2-5.4.6 or 2-5.4.7 of NFPA 58, 1998 Edition?		
9. Is the relief capacity of your pressure relief devices designed as specified in 2-3.2 and 3-2.5 of NFPA 58, 1995 Edition?		
10. Is the capacity of your pressure relief devices: For fixed storage tanks, designed according to Sections 2-3.2 and 3-2.5 or 3-2.6 of NFPA 58, 1998 Edition? On installation with vaporizers, are your vaporizers designed according to 2-5.4.5 or 2-5.4.6 or 2-5.4.7 of NFPA 58, 1998 Edition?		
11. Do you have appropriate level gauges, temperature indicators and pressure gauges installed on your fixed ASME storage tanks as specified in 2-3.3.2(b), 2-3.3.3, 2.3.4, 2.3.5 of NFPA 58, 1998 Edition?		

	Yes/No/NA	Comments
12. Do you have the appropriate hydrostatic relief valves installed between every section of liquid piping which can be blocked by manual or automatic valves according to 2-4.7 and 3-2.11 of NFPA 58, 1998 Edition?		
13. Do you have the appropriate corrosion protection required by 3-2.14 of NFPA 58, 1998 Edition?		
14. On installations with pumps, are they installed according to 3-2.15.1 of NFPA 58, 1998 Edition? On installations with automatic bypass valves, are they installed on the discharge of your pump according to 3.2.15(b)1 and 2-5.2 of NFPA 58, 1998 Edition?		
15. On installations with compressors, are they installed according to 2-5.3 and 3-2.15.2 of NFPA 58, 1998 Edition? On installations with compressors, are there either an integral means of preventing liquid from entering the compressor or a liquid suction protection trap according to 3-2.15.2(b) of NFPA 58, 1998 Edition?		
16. Do your compressor and pump motors conform with 2-5.1.4 of NFPA 58, 1998 Edition?		
17. On installations with liquid strainers, are they installed on the suction of your pump or meter according to 3-2.15.2 and 2-5.5 of NFPA 58, 1998 Edition, and capable of being cleaned?		
18. On installations with flexible connections on pumps, compressors, or loading and unloading bulkheads, are they installed as specified by 2-4.6 of NFPA 58, 1998 Edition?		
19. Do you have either excess flow valves, backflow check valves, or internal valves as specified by 2-3.3.3 and 3-3.3.7 of NFPA 58, 1998 Edition?		
20. Do you have container appurtenance protection as specified in 2-3.7 of NFPA 58, 1998 Edition?		
21. Do you have manual valves and emergency shutoff valves as required by 2-4.5.4, 3-2.8.10, 3-3.3.7 and 3-3.3.8 of NFPA 58, 1998 Edition?		
22. On installations with vaporizing equipment, is it installed according to 2-5.4 and 3-6 of NFPA 58, 1998 Edition? Have the liquid traps, temperature controls, and interlocks been tested per the manufacturer's guidelines?		

	Yes/No/NA	Comments
23. On installations with regulators, are they installed according to 2-5.7 and 3-2.7 of NFPA 58, 1998 Edition?		
24. Do you have a breakaway stanchion as required by 3-9.4.2 of NFPA 58, 1998 Edition?		
25. On installations with swivel-type piping, are they installed as required by 3-2.10.11(a) of NFPA 58, 1998 Edition?		
26. Are all above ground lines securely fastened to structural members of adequate strength and supported at proper intervals?		
27. Are pressure gauges located so that they will not be exposed to physical damage?		
28. Are there sufficient lines for all purposes, without improper dual use or make-shift connections being used for some operations?		
29. Are hoses the correct type for each use?		
30. Are hose couplings of the correct type and properly attached (fully seated on the hose)?		
31. Is adequate transfer hose storage provided?		
32. Are the written transfer, loading and unloading instructions available?		

Propane - Human Factors	**Yes/No/NA**	**Comments**
1. Have your operators been trained on the written operating instructions for this propane distribution facility?		
2. For operators on the job on or before June 20, 1996, do they have the required knowledge, skills and ability to perform their duties safely?		
3. Do operators whose job duties require the use of the above listed equipment understand the operating limits of the system in regards to: Capacity? Pressure? Temperature? Adverse Weather or Natural Conditions?		
4. Have your operators been trained in the correct response to conditions which exceed the operating limits of the system?		

	Yes/No/NA	Comments
5. Have your operators been trained in their duties under emergency conditions? Fire? LP Gas Release? Severe Weather or Natural Conditions?		
6. Are the written operating instructions available?		
7. Do the written operating instructions reflect current operation of the facility?		
8. Have major modifications to your propane distribution facility taken place?		
9. Are contractors used at the facility?		
10. Are safe work practices, such as lock/tag, hot work and line opening followed at the facility?		
11. Is there a written emergency response plan? Is it current? Have your operators been trained? Do you provide emergency response equipment? Has it been checked?		
Propane - General Hazards		
1. Does your propane distribution facility have protection against tampering required under 3-3.6 of NFPA 58, 1998 Edition?		
2. Does your propane distribution facility have lighting as specified in 3-3.7 of NFPA 58, 1998 Edition?		
3. Is the area around your containers and transfer piping free of all combustible material?		
4. Has a fire safety analysis been performed for your propane distribution facility as suggested by 3-10.2.2 and 3-10.2.3 of NFPA 58, 1998 Edition?		

	Yes/No/NA	Comments
5. Has your fire safety analysis been reviewed by your local fire authority?		
6. Has your facility been required by your local fire authority to provide special protection? Fixed Water Sprays/Monitor Nozzles? Insulating Coatings? Mounding/Burial? Other types?		
7. Has a federal, state, or local agency or fire authority required: Local Gas Detection Monitors? Perimeter Gas Monitors and Public Alarms?		

EXHIBIT 6A-7
SAMPLE WHAT-IF ANALYSIS PROCEDURE AND QUESTIONS

Analysis Procedure. The steps in a What-If/Checklist analysis are as follows:

1. Select the team (personnel experienced in the process)
2. Assemble information (piping and instrumentation drawings (P&IDs), process flow diagrams (PFDs), operating procedures, equipment drawings, etc.)
3. Develop a list of What-If questions (use the ones in Exhibit 6A-7 if you want)
4. Assemble your team in a room where each team member can view the information.
5. Ask each What-If question in turn and determine:
   - ✦ What can cause the deviation from design intent that is expressed by the question?
   - ✦ What adverse consequences might follow ?
   - ✦ What are the existing design and procedural safeguards?
   - ✦ Are these safeguards adequate?
   - ✦ If these safeguards are not adequate, what additional safeguards does the team recommend?
6. As the discussion proceeds, record the answers to these questions in tabular format. Exhibit 6A-8 provides an example.
7. Do not restrict yourself to the list of questions that you developed before the project started. The team is free to ask additional questions at any time.
8. When you have finished the What-If questions, proceed to examine the checklist. The purpose of this checklist is to ensure that the team has not forgotten anything. While you are reviewing the checklist, other What-If questions may occur to you.
9. Make sure that you follow up all recommendations and action items that arise from the hazards evaluation.

A. What -If Questions for Chlorine and Sulfur Dioxide Systems

Movement of 1-Ton Cl_2 (SO_2) Cylinders

What if the cylinder is dropped from the lifting apparatus?

What if the truck rolls forward or backward?

What if a cylinder rolls and drops from the truck?

What if the cylinder swings while being lifted?

What if the Cl_2 (SO_2) container is not empty when removed from service?

What if the automatic container switchover system fails?

What if a Cl_2 (SO_2) cylinder is delivered instead of SO_2 (Cl_2)

What if the cylinder is not in good condition?

Ton Cylinders on Trunnion, including pigtails, (subheader lines) to Main Header Lines

What if pigtails rupture while connected on-line?

What if pigtail connections open or leak when pressure is applied?

What if something is dropped onto cylinder or connection?

What if cracks develop in the ton cylinder flexible connection?

What if liquid Cl_2 (SO_2) is withdrawn through the vapor lines from the ton cylinder?

What if the cylinder valve cannot be closed during an emergency?

What if there are pinholes or small leaks at the fusible plugs?

What if ton cylinder ends change shape from concave to convex?

What if liquid is trapped between two closed valves and the temperature rises?

What if there is a fire near the cylinders?

What if the operator leaves the valve open and disconnects the pigtail?

What if water enters the system?

Cl_2 (SO_2) Headers in the Chlorination (Sulfonation) Room

What if the pressure relief valve sticks open?

What if a valve leaks?

What if there is inadequate flow in the gas line (e.g., filter clogged)?

Evaporators

What if there is overpressure in the evaporator?

What if there is high temperature in the evaporator?

What if there is low temperature in the evaporator?

What if rupture disks leak?

What if the vacuum regulator valve fails?

What if there is a gas pressure gauge leak?

What if the vacuum regulator check unit fails?

What if there is liquid Cl_2 (SO_2) carryover to the vacuum regulating valve downstream of the evaporator?

Chlorination (Sulfonation) and Pipes to Injectors

What if there are leaks in the chlorinator (sulfinator) unit?

What if there is rupture of the pipe from the chlorinator to the injector?

What if there is backflow of water into the Cl_2 (SO_2) line?

What if the water pump is not working?

General

What if there is a power failure?

What if Cl_2 (SO_2) is released during maintenance?

What if a Cl_2 (SO_2) leak is not detected?

What if there is moisture in the Cl_2 (SO_2) system?

Scrubbers

What if the system loses scrubber draft?

What if the system loses scrubber solution?

What if the manual vent to the scrubber is opened during operation?

What if the leak tightness of the building is compromised during emergency operation of the scrubbers?

Tank Trucks

What if the liquid hose leaks or ruptures?

What if the vapor return hose leaks or ruptures?

What if the truck moves?

What if the mass of Cl_2 (SO_2) in the truck exceeds the capacity of the tank?

What if the Cl_2 tank truck is connected to an SO_2 vessel (or vice versa)?

What if there is something other than Cl_2 (or SO_2) in the truck?

What if there is a fire under or near the truck?

What if the truck collides with pipework or a building housing Cl_2 (SO_2) storage vessels?

Railcars

What if the liquid hose leaks or ruptures?

What if the padding air is moist?

What if the padding air hose ruptures?

What if the railcar moves?

What if the relief valve lifts below the set pressure?

What if there is a fire under or near the truck?

What if there is a fire on or near the railcar?

B. What-If Questions for Ammonia Systems

Storage Vessel

What if the vessel is overfilled?

What if there is fire under or near the vessel?

What if the relief valve fails to lift on demand?

What if the relief valve opens below its set pressure?

What if the deluge system fails to work on demand?

Tank Truck Unloading

What if the liquid unloading hose partially ruptures?

What if the liquid unloading hose completely ruptures?

What if the tank truck moves?

What if the tank truck drives away before the hose is disconnected?

What if the vapor return hose partially or completely ruptures?

What if valves are not completely closed before disconnecting the hoses?

What if the tank truck contains something other than ammonia?

What if the ammonia in the tank truck contains excess oxygen?

C. What-If Questions for Digester Systems

What if something falls onto a digester cover?

What if relief valves on a digester open?

What if an intermediate digester gas storage vessel fails?

What if air is introduced into the gas collection system?

What if the flare fails to operate?

What if the gas collection header leaks or ruptures or becomes blocked?

What if a digester gas compressor fails catastrophically?

What if there is a digester gas leak into a building (digester building, compressor room, boiler room)?

What if the digester gas pressure exceeds the cover pressure rating?

What if the floating digester gas cover jams or tilts?

D. General Questions

What if the ambient temperature is abnormally high?

What if the ambient temperature is abnormally low?

What if there is a hurricane?

What if there is a tornado?

What if there is flooding?

What if there is a heavy snowfall?

What if there is an earthquake?

What if there is a tidal wave?

What if there is a failure of electric power?

Exhibit 6A-8
EXAMPLE WHAT-IF/CHECKLIST LOG SHEET

Company: Sheet Name:
Facility: Reference:
PHA Date: Unit:
Leader/Secretary: Drawing Number:
Process: Print Date/Time:
Team Members: Description:

Item	Equipment/Activity	Questions	Causes	Consequence/Hazards	Safeguards	Safeguards adequate?	Recommendations
4.1	Generic Pressure Vessel	What if the set pressure of the equipment SRV is more than the design pressure of the equipment?	Incorrectly set valve purchased or returned after maintenance at contractor's shop	Potential for rupture and release of contents of vessel	Manufacturer or repair shop's QA	Y	None
4.2	Generic Pressure Vessel	What if the SRV is incorrectly sized?	Design basis for SRV incorrectly chosen or SRV sized for vapor flow when two-phase or liquid flow is possible	SRV cannot relieve pressure, potential rupture	Valves purchased for specific service	Y	None
4.3	Generic Pressure Vessel	What if the SRV opens below its set-pressure?	Vibration, incorrect design, weakened SRV spring, failure due to inadequate PM program	Release of vapor at relatively low pressure	PM program	N	Develop PM program for SRVs
4.4	Generic Pressure Vessel	What if there is a fire near or under the vessel?	Spillage of flammable liquid from nearby vessel	High pressure in vessel, potential rupture. Potential BLEVE if vessel contains propane.	SRVs: Deluge system: Separation distances: Keep flammables away from vessel	Y	None

EXHIBIT 6A-9
HAZOP ANALYSIS GUIDE WORDS AND MEANINGS

In the approach, each guide word is combined with relevant process parameters and applied at each point (study node, process section, or operating step) in the process that is being examined.

Guide Words	Meaning
No	Negation of the Design Intent
Less	Quantitative Decrease
More	Quantitative Increase
Part Of	Other Material Present by Intent
As Well As	Other Materials Present unintentionally
Reverse	Logical Opposite of the Intent
Other Than	Complete Substitution

COMMON HAZOP ANALYSIS PROCESS PARAMETERS

Flow	Time	Frequency	Mixing
Pressure	Composition	Viscosity	Addition
Temperature	pH	Voltage	Separation
Level	Speed	Information	Reaction

The following is an example of creating deviations using guide words and process parameters:

Guide Words		Parameter		Deviation
NO	+	FLOW	=	NO FLOW
MORE	+	PRESSURE	=	HIGH PRESSURE
AS WELL AS	+	ONE PHASE	=	TWO PHASE
OTHER THAN	+	OPERATION	=	MAINTENANCE
MORE	+	LEVEL	=	HIGH LEVEL

Guide words are applied to both the more general parameters (e.g., react, mix) and the more specific

parameters (e.g., pressure, temperature). With the general parameters, it is not unusual to have more than one deviation from the application of one guide word. For example, "more reaction" could mean either that a reaction takes place at a faster rate, or that a greater quantity of product results. On the other hand, some combinations of guide words and parameters will yield no sensible deviation (e.g., "as well as" with "pressure").

How to Perform a Hazard and Operability (HAZOP) Review

1. Select the team.
2. Assemble information (P&IDs, PFDs, operating procedures, equipment drawings, etc.).
3. Assemble your team in a room where each team member can view P&IDs.
4. Divide the system you are reviewing into nodes (you can preset the nodes, or the team can choose them as you go along).
5. Apply appropriate deviations to each node. For each deviation, address the following questions:

   - ✦ What can cause the deviation from design intent?
   - ✦ What adverse consequences might follow ?
   - ✦ What are the existing design and procedural safeguards?
   - ✦ Are these safeguards adequate?
   - ✦ If these safeguards are not adequate, what does the team recommend?

6. As the discussion proceeds, record the answers to these questions in tabular format as shown below.

EXAMPLES OF LINE-BY-LINE TABLES USE IN A HAZOP

Node No:	**1**
From:	**Tanker Truck**
To:	**Ammonia Storage Vessel**
Drawing No:	
Line ID:	
Date:	
Node Description:	**Liquid loading line from tanker truck to ammonia vessel.**

Keyword	Deviation	Causes	Consequences	Safeguard	Adequate?	Recom-mendation
Flow	High	None identified	None	N/A		N
Flow	Low	Malfunction of truck equipment, blockage in line, excess pressure in tank or check valve failure	Operational problems	N/A		N
Flow	No	Malfunction on truck, or vapor line excess flow valve snaps shut	Operational problems	N/A		N
		Hose Rupture	Ammonia Leak	Emergency shutdown features	N	Y[3]
Flow	Reverse	Check valve and excess flow valve failure with hose rupture	Vapor release from vessel	Check valve, excess flow value and hose inspections	Y	N
		Block valves not closed when hose disconnected	Vapor release from vessel	Operator training	Y	N

[3]Arbitrary example of recommendation: Currently, the truck must park so far away from the tank that it is necessary to connect two lengths of hose. Investigate the ways in which truck unloading can be accomplished using only one length of hose.

Flow	Wrong Type	Delivery of wrong material	Unknown	Operational safeguards	Y	N
Flow	In addition	Water, oxygen, oil	Contamination, corrosion	Manufacturer's quality control	Y	N
Pressure	High	Valve closed, blockage, overfill vessel	Ammonia overflow or rupture	Relief valves, level gauges	Y	N

EXAMPLES OF LINE-BY-LINE TABLES (CONTINUED)

Node No:	**2**
From:	**Ammonia Storage Vessel**
To:	
Drawing No:	
Line ID:	
Date:	
Node Description:	**Ammonia storage vessel's design pressure is 265 psig at 250 degrees F. Working capacity is 15,000 gallons. Maximum level allowed in the tank is 85%, but normal operating procedure is 75%.**

Keyword	Deviation	Causes	Consequences	Safeguard	Adequate?	Recom-mendation
Pressure	High	Fire	Relief valve opens	Deluge system	Y	N
Pressure	Low	Vaporizer malfunction	None	N/A	N/A	N
Temp	High	See High Pressure			N/A	N
Temp	Low	See Low Pressure			N/A	N
Level	High	Overfilling	Relieve valve opens	Procedural	Y	N
Level	Low	Failure to order	None	N/A	N/A	N

CHAPTER 7: PREVENTION PROGRAM (PROGRAM 3)

Many of you will need to do little that is new to comply with the Program 3 prevention program, because you already have the OSHA PSM program in place. Whether you're building on the PSM standard or creating a new program, keep these things in mind.

- EPA and OSHA have different legal authority — EPA for offsite consequences, OSHA for on-site consequences. If you are already complying with the PSM standard, your process hazard analysis (PHA) team may have to assess new hazards that could affect the public or the environment offsite. Protection measures that are suitable for workers (e.g., venting releases to the outdoors) may be the very kind of thing that could expose the public to toxic substances.

- Integrate the elements of your prevention program. You must ensure that a change in any single element of your program leads to a review of other elements to identify any effect caused by the change.

- Most importantly, make accident prevention an institution at your site. Like the entire risk management program, a prevention program is more than a collection of written documents. It is a way to make safe operations and accident prevention the way you do business everyday.

7.1 PROGRAM 3 PREVENTION PROGRAM AND OSHA PSM

The Program 3 prevention program includes the requirements of the OSHA PSM standard. Whenever we could, EPA used OSHA's language verbatim. However, there were a few terms that EPA had to change to reflect the differences between its authority and OSHA's. For example, OSHA regulates to protect workers; EPA's responsibility is to protect public health and safety and the environment. Therefore, an "owner or operator" subject to EPA's rule must investigate catastrophic releases "that present(s) (an) imminent and substantial endangerment to public health and the environment," but an OSHA "employer" would focus its concerns on the workplace. To clarify these distinctions, we deleted specific references to workplace impacts and "safety and health" contained in OSHA's PSM standards. We also used different schedule dates and references where appropriate. Exhibit 7-1 compares terms in EPA's rule with their counterparts in the OSHA PSM standard.

EXHIBIT 7-1
COMPARABLE EPA AND OSHA TERMS

OSHA TERM	EPA TERM
Highly hazardous substance	Regulated substance
Employer	Owner or operator
Facility	Stationary source
Standard	Rule or part

There are twelve elements in the Program 3 prevention program. Each element corresponds with a section of subpart D of part 68. Exhibit 7-2 sets out each of the twelve elements, the corresponding section numbers, and OSHA references. Two OSHA elements are not included. Emergency response is dealt with separately in part 68; the OSHA trade secrets requirement (provision of trade secret information to employees) is beyond EPA's statutory authority.

EXHIBIT 7-2
SUMMARY OF PROGRAM 3 PREVENTION PROGRAM
(40 CFR PART 68, SUBPART D)

SECTION	TITLE	OSHA PSM REFERENCE
§ 68.65	Process Safety Information	PSM standard § 1910.119(d).
§ 68.67	Process Hazard Analysis (PHA)	PSM standard § 1910.119(e).
§ 68.69	Operating Procedures	PSM standard § 1910.119(f).
§ 68.71	Training	PSM standard § 1910.119(g).
§ 68.73	Mechanical Integrity	PSM standard § 1910.119(j).
§ 68.75	Management of Change	PSM standard § 1910.119(l).
§ 68.77	Pre-Startup Review	PSM standard § 1910.119(I).
§ 68.79	Compliance Audits	PSM standard § 1910.119(o).
§ 68.81	Incident Investigation	PSM standard § 1910.119(m)
§ 68.83	Employee Participation	PSM standard § 1910.119(c).
§ 68.85	Hot Work Permit	PSM standard § 1910.119(k).
§ 68.87	Contractors	PSM standard § 1910.119(h).

OSHA provided guidance on PSM in non-mandatory appendix C to the standard. OSHA has reprinted this appendix as PSM Guidelines for Compliance (OSHA 3133). The OSHA guidance is reproduced, reordered to track part 68, in Appendix

F. The remainder of this chapter briefly outlines the major requirements and provides a discussion of any differences between EPA and OSHA. In some cases, further guidance specific to WWTPs is provided. For more detailed guidance, you should refer to the OSHA guidance in Appendix F.

QS &AS
IMPLEMENTATION AND PROGRAM LEVEL

Q. My process is a series of storage and process vessels, connected by piping, containing several regulated substances, with a few co-located tanks of other substances. Do I have to implement one prevention program to cover all aspects of the process even if different operators, different process chemistry, and different hazards are involved in various parts of the process?

A. You should implement the program in the way that makes sense to you. For a complex process such as yours, you may need to divide the process into sections (e.g., production units for particular products, storage units) for the PHA and compliance audits, to keep the analyses manageable. Operating and maintenance procedures (and the training in these procedures) should be developed for operating units; combining procedures for different types of units into a single document may make them harder to use; training operators in procedures they do not need would waste time and perhaps confuse operators. You may want to collect and store process safety information by individual units to make it easier to use. Other parts of the program (contractors, employee participation, procedures for pre-startup, management of change, and hot work) are likely to be common to all parts of the process.

Q. I have a tank with more than 10,000 pounds of propane. I use the propane to heat the offices, but not as a fuel for my covered process, so it is not subject to OSHA PSM and would be Program 2 for EPA. The tank, however, is close to equipment that has chlorine above the applicable threshold and is subject to OSHA PSM and Program 3. Is the tank considered part of the process? Does this affect the program level?

A. If a fire or explosion in the propane tank could cause a release of chlorine or other regulated substances or interfere with mitigation of such a release, the tank is considered part of a single process and consequently is subject to both OSHA PSM and Program 3.

7.2 PROCESS SAFETY INFORMATION (§68.65)

Exhibit 7-3 briefly summarizes the process safety information requirements.

MSDSs will provide information on chemicals, except for inadvertent mixing with other chemicals. Information on the hazardous effects of inadvertent mixing can come from the PHA checklist (see the following section on process hazard analyses.) MSDSs are available from your supplier of chemicals. But, because methane (CH_4) is generated in your plant, you will have to find an MSDS for methane elsewhere. A local utility supplying natural gas may have one. You may, however, have to add the potential for inclusion of carbon dioxide, hydrogen sulfide, and water in the

methane stream. If these are present, then corrosivity information about that stream will be needed. You may wish to ask for assistance from a process engineer.

The information listed in the second column of Exhibit 7-3 is needed for that part of your plant where the regulated substances are used. It should be available from the engineering firm that designed the plant. If not, you will have to develop it to meet this rule. The last item, consequences of deviation, means that you need to know what will happen if the process (including any safety controls) does not work the way it was designed to. If you do not have this information, or it cannot be obtained from the engineering firm that designed the plant, it can be developed during the process hazard analysis.

EXHIBIT 7-3
PROCESS SAFETY INFORMATION REQUIREMENTS

For chemicals, you must complete information on:	For process technology, you must provide:	For equipment in the process, you must include information on:
✔Toxicity ✔Permissible exposure limits ✔Physical data ✔Reactivity ✔Corrosivity ✔Thermal & chemical stability ✔Hazardous effects of inadvertent mixing of materials that could foreseeably occur	✔A block flow diagram or simplified process flow diagram ✔Information on process chemistry ✔Maximum intended inventory of the EPA-regulated chemical ✔Safe upper & lower limits for such items as temperature, pressure, flows, or composition ✔An evaluation of the consequences of deviation	✔Materials of construction ✔Piping & instrument diagrams (P&IDs) ✔Electrical classification ✔Relief system design & design basis ✔Ventilation system design ✔Design codes & standards employed ✔Safety systems ✔Material and energy balances for processes built after June 21, 1999

You must maintain equipment information for your plant. Such information is ordinarily supplied with the construction of the plant, and with major replacements and revisions to the plant. Generally, equipment information is found in operations and maintenance (O&M) manuals or equipment submittals. The rule only requires that you have information for that part of your plant that handles, or could cause a release of, the regulated substances you have.

WHERE TO GO FOR MORE INFORMATION

Diagrams. You may find it useful to consult Appendix B of OSHA's PSM final rule, computer software programs that do P&IDs, or other diagrams.

Guidance and Reports. Various engineering societies issue technical reports relating to process design. Other sources you may find useful include:

- *Guidelines for Process Safety Documentation*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Emergency Relief System Design Using DIERS Technology*, American Institute of Chemical Engineers, 1992.
- *Emergency Relief Systems for Runaway Chemical Reactions and Storage Vessels: A Summary of Multiphase Flow Methods*, American Institute of Chemical Engineers, 1986.
- *Guidelines for Pressure Relief and Emergency Handling Systems*, Center for Chemical Process Safety of the American Institute of Chemical Engineers, 1998.
- *Loss Prevention in the Process Industries*, Volumes I, II, and III, Frank P. Lees, Butterworths: London 1996.

The Chlorine Institute publishes a number of documents on chlorine handling including:

- Chlorine Vaporizing Systems, Pamphlet # 9.
- Cylinder and Ton Container Procedures for Chlorine Packaging, Pamphlet # 17.
- Water and Wastewater Operators Chlorine Handbook, Pamphlet # 155.

The Compressed Gas Association publishes:

- *Sulfur Dioxide* on properties, storage, handling, and use of sulfur dioxide (Order # G-3).
- ANSI K61.1 on the storage and handling of anhydrous ammonia (Order # G 2.1).
- *Anhydrous Ammonia* on properties, storage, handling, and use of anhydrous ammonia (Order # G-2).

NFPA-820 (Standard for Fire Protection in Wastewater Treatment and Collection Facilities) provides guidance on design issues.

MSDSs. MSDSs are available from a number of websites. The University of California San Diego, Chemistry and Biochemistry Department, maintains some MSDSs on its website: http://www-ehs.ucsd.edu/msds.htm. This site also links to other pages with MSDSs, including Vermont Safety and Information Resources on the Internet, http://siri.org. On-line databases also provide MSDSs. EPA has not verified the accuracy or completeness of MSDSs on any of these sites nor does it endorse any particular version of an MSDS. You should review any MSDS you use

to ensure that it meets the requirements of the hazard communication standard (29 CFR 1910.1200).

QS & AS
PROCESS SAFETY INFORMATION

Q. What does "materials of construction" apply to and how do I find this information?

A. You must document the materials of construction for all process equipment in a covered process. For example, you need to know the materials of construction for process vessels, storage vessels, piping, hoses, valves, and flanges. Equipment specifications should provide this information.

Q. What does "electrical classification" mean?

A. Equipment and wiring for locations where fire and explosion hazards may exist must meet requirements based on the hazards. Each room, section, or area must be considered separately. Equipment should be marked to show Class, Group, and operating temperature or temperature range. You must determine the appropriate classification for each area and ensure that the equipment used is suitable for that classification. The equipment covered includes transformers, capacitors, motors, instruments, relays, wiring, switches, fuses, generators; lighting, alarms, remote controls, communication, and grounding. Electrical classification will be included in equipment specifications.

Q. What does "relief system design basis" mean?

A. Relief systems include, but are not limited to, relief valves, relief headers, relief drums, and rupture disks. Design basis means documenting how the loads and sizes of the relief system, as well as inlet and outlet sizes, were determined. This includes a description of overpressure scenarios considered, the scenario that creates the largest load to be relieved, the assumptions used, and if the device meets a certain code. Relief devices on pressure vessels must conform to ASME codes. Industry codes (e.g., API RP 520) also provide guidance on scenarios that should be considered and on equations for sizing of devices. Scenarios you may need to consider include fire, blocked flow, control valve failure, overheating, power outage, tube rupture, and cooling water failure. For two-phase flow, you should review AIChE publications from the Design Institute for Emergency Relief Systems (DIERS).

Q. What do I have to do for material and energy balances?

A. For new processes, you must document both material and energy inputs and outputs of a process. For example, you would document the quantity of a regulated substance added to the process, the quantity consumed during the process, and the quantity that remains in the output. This requirement will not generally apply to storage processes.

7.3 PROCESS HAZARD ANALYSIS (§68.67)

Exhibit 7-4 provides a summary of the requirements for process hazard analyses (PHAs).

EXHIBIT 7-4
PROCESS HAZARD ANALYSIS REQUIREMENTS

The PHA must cover::	Techniques must be one or more of:	Other requirements:
✔Hazards of the process ✔Identification of previous, potentially catastrophic incidents ✔Engineering and administrative controls applicable to the hazards ✔Consequence of failure of controls ✔Siting ✔Human factors ✔Qualitative evaluation of health and safety impacts of control failure	✔What If ✔Checklist ✔What If/Checklist ✔Hazard and Operability Study (HAZOP) ✔Failure Mode and Effects Analysis (FMEA) ✔Fault Tree Analysis ✔Appropriate equivalent methodology	✔Analysis must be done by a team, one member of which has experience in the process, one member of which is knowledgeable in the PHA technique ✔A system must be developed for addressing the team's recommendations and documenting resolution and corrective actions taken ✔The PHA must be updated at least once every five years ✔PHAs and documentation of actions must be kept for th life of the process

EPA/OSHA DIFFERENCES

You can use a PHA conducted under the OSHA PSM standard as your initial process hazard analysis. All OSHA PHAs must have been completed by May 1997. Therefore, the only "new" PHAs will be for non-OSHA Program 3 processes. If the process is subject to OSHA PSM, you can update and revalidate your PHA on OSHA's schedule.

Offsite impacts. You should consider offsite impacts when you conduct a PHA under EPA's rule (except for an initial PHA where are using the PHA conducted for OSHA PSM). If you are in the Program 3 prevention program because you must comply with the PSM standard, you may not have fully considered offsite consequence because the focus of PSM is worker protection. Practically speaking, however, there should be few instances where the scenarios considered for OSHA fail to address offsite impacts. A well-done PHA should identify all failure scenarios that could lead to significant exposure of workers, the public, or the environment. The only issue that may require further consideration for part 68 processes is whether any protection measures that were adequate for worker safety are inadequate for public and environmental safety.

Consider two circumstances — one where OSHA's PSM standard and EPA's risk management program rule lead to the same result, and another where protecting workers could mean endangering the public and the environment. For flammables, any scenario that could affect the public almost certainly would have the potential to affect workers; measures taken to protect your employees likely will protect the public and the environment. For toxics under PSM, however, you may plan to address a loss of containment by venting toxic vapors to the outside air. In each circumstance, a PHA should define how the loss of containment could occur. However, for EPA, the PHA team should reassess venting as an appropriate mitigation measure.

Updating and revalidating your PHA. For EPA, you must complete the initial PHA for each Program 3 process not later than June 21, 1999, and update it at least once every five years. You may complete an initial PHA before that date. You may use an OSHA PHA as your initial PHA, and update and revalidate it every five years on the OSHA schedule. A PHA completed after August 19, 1996 (the effective date of part 68) should consider offsite impacts.

METHODS

Unless your WWTP is uncommonly complex, the checklist method is likely to be sufficient to meet the need in smaller plants. Operators might find it practical to add what-if questions to supplement the checklist, or use the what-if/checklist method. See the guidance provided in Program 2, section 6-3 and Appendix A to Chapter 6, for examples of checklists and what-if questions. Guidance on how to use these methods, or HAZOPs, is included in that chapter.

If the chlorine, sulfur dioxide, or ammonia receiving and storage facilities are designed to receive tank truck or rail car quantities, then the Hazard and Operability (HAZOP) method is likely to be best. It also would be well to use HAZOP for methane systems where the gas is compressed and stored for use as a fuel. If you do not have anyone on staff who has taken part in a HAZOP or taken HAZOP training, you may want to engage a skilled study leader.

REJECTING TEAM RECOMMENDATIONS

You may not always agree with your PHA team's recommendations and may wish to reject a recommendation. OSHA's compliance directive CPL 2-2.45A-revised states that you may decline a team recommendation if you can document one of the following: (1) the analysis upon which the recommendation is based contains factual errors; (2) the recommendation is not necessary to protect the health of employees or contractors; (3) an alternative measure would provide a sufficient level of protection; or (4) the recommendation is infeasible. For part 68, you should also consider whether recommendations are not necessary to protect public health and the environment.

UPDATING YOUR PHA

You should update or revalidate your PHA whenever there is a new hazard or risk created by changes to your process. Such changes might include introducing a new process, process equipment, or regulated substance; altering process chemistry that results in any change to safe operating limits; or other alteration that introduces a new hazard. You might, for example, introduce a new hazard if you installed a gas pipeline next to a storage tank containing a regulated substance. Other candidates could be making changes in process constituents that increase the possibility of runaway reactions or polymerization. EPA recommends that you consider revalidating your PHA whenever adjoining processes create a hazard. Remember that you have a general duty to prevent accidents and ensure safety at your source, which may require you to take steps beyond those specified in the risk management program rule.

QS & AS
OFFSITE CONSEQUENCES

Q. What does EPA mean by "consider offsite consequences"? Do we have to do an environmental impact assessment (EIA)?

A. EPA does not expect you to do an EIA. Potential consequences to the public and the environment are already analyzed in the offsite consequence analysis. In the PHA, EPA only expects you to identify any failure scenarios that could lead to public exposures and to examine whether your strategies are adequate to reduce the risk of such exposures.

Q. If I need to revise a PHA to consider offsite consequences, when do I have to do that?

A. In general, for a PHA completed to meet the requirements of OSHA PSM, you should revise the PHA to consider offsite consequences when you update that PHA. Any PHA for a covered process completed or updated for OSHA PSM after August 19, 1996, when part 68 was effective, should examine offsite consequences. For example, if you completed an initial PHA for OSHA PSM in May 1993, OSHA requires that you update that PHA by May 1998. In that update, you should consider offsite consequences. If you complete your initial PHA for OSHA in May 1995, you must update it by May 2000; PHAs conducted for part 68 must include consideration of offsite consequences at that time.

WHERE TO GO FOR MORE INFORMATION

Appendix 7-A of this chapter provides a summary of each of the techniques, a description of the types of processes for which they may be appropriate, and estimates about the time and staff required for each.

Part 68 and OSHA PSM require that whichever technique or techniques you use, you must have at least one person on the PHA team who is trained in the use of the technique. Training on such techniques is available from a number of professional organizations as well as private companies. You may have staff members who are capable of providing this training as well. Many trade associations publish detailed guidance on methods for conducting a process hazard analysis. You might find the following documents useful.

- *Guidelines for Hazard Evaluation Procedures, 2nd Ed. with Worked examples,* Center for Chemical Process Safety of the American Institute of Chemical Engineers 1992.
- *Evaluating Process Safety in the Chemical Industry*, Chemical Manufacturers Association.
- *Loss Prevention in the Process Industries, Volumes I, II, and III*, Frank P. Lees, Butterworths: London 1996.
- *Management of Process Hazards (RP 750)*, American Petroleum Institute.
- *Risk-Based Decision Making (Publication 16288)*, American Petroleum Institute.

7.4 OPERATING PROCEDURES (§68.69)

Exhibit 7-5 summarizes what your operating procedures must address. Operating procedures must be readily accessible to workers who operate or maintain the process. You must review operating procedures as often as necessary to assure that they reflect current practices and any changes to the process or facility. You must certify annually that the operating procedures are current and accurate.

In a WWTP, it will be especially important to detail, very specifically, the procedures and safeguards for connecting and disconnecting cylinders, tank trucks or rail cars of regulated substances. These procedures should also detail the required precautions, e.g., having an emergency respirator readily available. Also, assuring that emergency equipment is functional and readily available should be part of the instructions. For example, an inspection of the air tank on self-contained breathing apparatus prior to making or breaking connections should be considered.

In WWTPs, it is likely that regular operating procedures will include startup, normal operations, and normal shutdown. Provision for emergency shutdown and startup following a turnaround or emergency shutdown need to be included only to the extent that they differ from your regular procedures. These procedures should also detail what to do in the event of an emergency. In particular, they must include the shutdown actions operators should take, without reference to supervisors, to avoid more serious consequences and the conditions requiring them.

The *operating limits* section should detail what would happen if the actual operating parameters (pressure, flow, temperature) were higher or lower than intended. Then the procedures should tell operators what to do to correct them.

The *safety system* section should explain all about your safety systems. These are alarms, shutdown devices, relief systems, remote telephone alerting systems, and the like. The procedures should show:

- What the system or device is.
- What it is supposed to do.
- How it works.
- How to operate it, if operators must initiate action.

EXHIBIT 7-5
OPERATING PROCEDURES REQUIREMENTS

Steps for each operating phase	Operating limits	Safety & health considerations	Safety systems & their functions
✔Initial startup ✔Normal operations ✔Temporary operations ✔Emergency shutdown ✔Emergency operations ✔ Normal shutdown ✔Startup following a turnaround or emergency shutdown ✔Lockout/tagout ✔Confined space entry ✔Opening process equipment or piping ✔Entrance into the facility	✔Consequences of deviations ✔Steps to avoid, correct deviations	✔Chemical properties & hazards ✔Precautions for preventing chemical exposure ✔Control measures for exposure ✔QC for raw materials and chemical inventory ✔Special or unique hazards	✔Address whatever is applicable

Operating procedures, especially for plants that run unattended overnight or on weekends, should include provisions to prevent vandalism or sabotage by use of locks, fences, police patrol, or other secure means.

WHERE TO GO FOR MORE INFORMATION

Chapter 6 of this document provides descriptions of each operating phase and when these phases may not apply to certain operations.

The Chlorine Institute (http://www.cl2.com) publishes information on safe use and handling of chlorine. Its *Water and Wastewater Operators Chlorine Handbook* (Pamphlet # 155) provides general training and procedures.

The Water Environment Federation (601 Wythe Street, Alexandria, VA 22134, (703) 684-2470) provides general procedures as part of its training programs for wastewater treatment.

Although the reports below target the chemical industry, you may find useful information in them:

- *Guidelines for Process Safety Fundamentals for General Plant Operations*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Guidelines for Safe Process Operations and Maintenance*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Guidelines for Writing Effective Operating and Maintenance Procedures*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1996.

7.5 TRAINING (§68.71)

You are required to train new operators on the operating procedures and cover health and safety hazards, emergency operations, and safe work practices applicable to the employee's tasks. For workers involved in operating the process before June 21, 1999, you may certify in writing that they are competent to operate the process safely, in accordance with the operating procedures. At least every three years you must provide refresher training (you must consult with employees involved in operating the process to determine the appropriate frequency). Finally, you are required to determine that each operator has received and understood the training and keep a record for each employee with the date of the training and the method used to verify that the employee understood the training.

For WWTPs, training should cover the activities that could lead to releases of the toxic gases and flammables that are used in WWTPs. These activities should be identified in the process hazard analysis and bear particular attention:

- Connecting, and disconnecting, cylinders of Chlorine and Sulfur Dioxide. Training should cover inspection of the fittings and tubing to assure that they are in good condition and inspection (and discard if necessary) of tools used for the job. Training should also include identification of vapor and liquid connections on the cylinders and identification of the operating conditions that will show that the connections are hooked up in reverse.

- Material handling of cylinders. Training should cover inspection of material handling equipment, including hoists, cylinder carriers and hooks, and cylinder chocks. Also, inspection for and removal of combustibles or flammables in storage areas should be a part of training.

WHERE TO GO FOR MORE INFORMATION

The Water Environment Federation provides several training programs including the following:

- *Basic Course for Wastewater Treatment Plant Operators*, Instructor Set Order No. E0100GB, Student Workbook Order No. E0110GB.
- *Intermediate Course for Wastewater Treatment Plant Operators*, Instructor Set Order No. E0295GB, Student Workbook Order No. E0296GB.
- *Chlorination Skill Training Course*, Order No. E0312GB. Self Instruction Course.

In addition, the following may be useful.

- *Guidelines for Process Safety Fundamentals for General Plant Operations*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Guidelines for Technical Planning for On-Site Emergencies*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Federally Mandated Training and Information (Publication 12000)*, American Petroleum Institute.

7.6 MECHANICAL INTEGRITY (§68.73)

You must have a mechanical integrity program for pressure vessels and storage tanks, piping systems, relief and vent systems and devices, emergency shutdown systems, controls, and pumps. Exhibit 7-6 briefly summarizes the other requirements for your mechanical integrity program. The mechanic integrity requirement is similar to the maintenance requirement under Program 2, but covers additional areas, such as quality assurance.

For most of the equipment in a WWTP, the manufacturer will have supplied maintenance instructions.. These can be used to fulfill the requirements for maintenance procedures. Where such instructions are not available, you will need to develop them. In addition to the major pieces of equipment, you will need to develop inspection procedures that consider both repair or replacement requirements for the following items:

EXHIBIT 7-6
MECHANICAL INTEGRITY CHART

Written procedures	Training	Inspection & testing	Equipment deficiencies	Quality assurance
✔Establish & implement written procedures to maintain the integrity of process equipment.	✔Train process maintenance employees in an overview of the process and its hazards. ✔Make sure this training covers the procedures applicable to safe job performance.	✔Inspect & test process equipment. ✔Use recognized and generally accepted good engineering practices. ✔Follow a schedule that matches the manufacturer's recommendations or more frequently if prior operating experience indicates is necessary. ✔Document each inspection & test with: Date, inspector name, equipment identifier, test or inspection performed, results.	✔Correct equipment deficiencies before further use of process equipment or whenever necessary to ensure safety.	✔Establish a QA program for new construction & equipment, newly installed equipment, maintenance materials, and spare parts & equipment.

- Fittings
- Tubing
- Pressure relief devices
- Gauges, pressure switches, and other instrumentation.
- Rotameters
- Pressure regulators, and pressure gauges
- Leak detectors
- Eductors, vacuum mixers, or other devices used to mix chlorine, sulfur dioxide, and other regulated substances into waste water streams
- Material handing equipment
- Tools
- All other equipment used to handle, transfer, or use the regulated substances.

Where there is the possibility of corrosion, these inspections are especially important. The regulated substances used are normally not corrosive, when they are dry. However, all of them can become highly corrosive if the equipment using them is wet. Attention to this aspect can be vital.

Where methane is recovered, compressed, and stored for use in the plant, steel pipelines and storage vessels should be inspected regularly. If the plant operator is not familiar with preventive inspection and testing, help should be sought. If the storage tank is a pressure vessel, the helping person should be very familiar with the ASME pressure vessel code and with API tank inspection requirements.

In larger plants, where there are storage tanks for chorine, sulfur dioxide or ammonia, the tanks and associated piping should be inspected regularly. Suppliers are likely to be able to provide recommendations for this inspection and preventive maintenance. Propane distributors are likely to be able to supply the same information about propane vessels and equipment, if these are included in your plant.

You may need to cover a number of the maintenance procedures. The value in these procedures comes from the use of permits as a communication device. They are intended to communicate the hazards, and needed precautions, to the workers performing work under the permits. Also, the provision of the permit to operators will inform them of the nature of the work in progress, so that they can govern their activity so as not to interfere with or provide additional hazard to the job in progress.

The maintenance procedures you need are the following:

- Confined space entry. For guidance see the OSHA standard, 29 CFR 1910.146
- Lockout-tagout. For guidance, see the OSHA standard 29 CFR 1910.146.
- Pipeline breaking. Operators should prepare their own procedure that:
  - Provide a means to communicate the hazards that might be presented to those who will encounter them.
  - Provide a list the precautions needed to safely control these hazards.
  - Provide a means to communicate these precautions, and insure that they are understood by those who must take the precautions.
  - Provide a requirement that these precautions are effectively taken and remain in place until the work is complete.
- Control of entry into hazardous areas. Operators should provide a procedure that controls the access of individuals to places where regulated materials are stored, handled or used. There are three objectives to this control:

- Limit potential exposure to hazardous materials to only the essential requirements.
- Insure that only properly trained or informed persons have access to hazardous material locations.
- Ensure that the hazardous areas are secure.

Operators are expected to provide spare parts store where needed. Spare parts kept on hand, are an important part of Mechanical Integrity. There is some plant equipment, like cylinder connection tubing and connecting devices, that must not be used when they are worn. Prompt replacement is a valuable preventive action. The operator must assure that critical parts are readily available. As part of the Quality Assurance (see column 5 of Exhibit 7-6) needs, operators are expected to assure that these are the right spare parts. Substitution of parts of the wrong specification can lead to a catastrophic release of these hazardous materials.

WHERE TO GO FOR MORE INFORMATION

Guidance and Reports. The documents listed under Process Safety Information may be useful for maintenance procedures as well. In addition, the Chlorine Institute publishes pamphlets on chlorine system maintenance, including the following:

- *Maintenance Instructions for Chlorine Institute Standard Safety Valves, Type 1-1/2 JQ* (# 39).
- *Maintenance Instructions for Chlorine Institute Standard Angle Valve* (#40).
- *Maintenance Instructions for Chlorine Institute Standard Safety Valve, Type 4JQ* (#41).
- *Maintenance Instructions for Chlorine Institute Standard Excess Flow Valves* (#42).

Other sources of guidance and reports you may find useful include:

- *Guidelines for Process Equipment Reliability Data with Data Tables*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1989.
- *Guidelines for Process Safety Documentation*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1995.
- *Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration (API 510)*, American Petroleum Institute.

- *Tank Inspection, Repair, Alteration, and Reconstruction (Std 653)*, American Petroleum Institute.

7.7 MANAGEMENT OF CHANGE (§68.75)

Exhibits 7-7 briefly summarizes EPA's MOC requirements.

EXHIBIT 7-7
MANAGEMENT OF CHANGE REQUIREMENTS

MOC procedures must address:	Employees affected by the change must:	Update process safety information if:	Update operating procedures if:
✔Technical basis for the change ✔Impact on safety and health ✔Modifications to operating procedures ✔Necessary time period for the change ✔ Authorization requirements for proposed change	✔Be informed of the change before startup ✔Trained in the change before startup	✔A change covered by MOC procedures results in a change in any PSI required under EPA's rule (see § 67.65)	✔A change covered by MOC procedures results in a change in any operating procedure required under EPA's rule (see § 67.69)

The purpose of this element of the RMP rule, and the next element, pre-startup review, is to make sure that, if you make a change to your covered process or your facility in a way that affects a covered process, that you do so safely.

The management of change provision will apply when you make a change that can affect a regulated substance, (for example, by adding chorine directly to the contactor instead of dissolving it in water first). Or it will apply if you add a regulated substance (for example, by adding a new digester that runs your total mass of digester gas over the 10,000 pound threshold). Or you may change tubing from steel to plastic. Or you may build a new chemical storage building that houses Cl_2 and SO_2 in the same place, where you had separate buildings previously.

Any change that affects the regulated substances, whether in storage, use, or processing, is subject to Management of Change. It does ***not*** apply to repairs or

maintenance or in-kind replacements. Also, it does not apply when you make a change in processing conditions that are within the normal bounds of operation, like a change in Cl_2 addition rate.

Method of review. The first column of Exhibit 7-7 calls for understanding the impact of the change on safety and health. This usually means that some study is needed. If the change is a major one (e.g., a new chlorine storage building for bulk chlorine), you might choose to run a full-blown Hazard and Operability study (HAZOP). Your engineering firm, or engineer, is likely to organize it. For a small change (e.g., a not-in-kind replacement of a chlorine eductor), the checklist questions (see Chapter 6) that apply to the equipment being changed are likely to be sufficient. Or your supplier could possibly refer you to other WWTPs that use it, and you could check with them to see if any problems have come up that are worth further check or study.

The objective is to be very sure that after the change has been made, the process or plant is safe to operate before you start to use it. Take the time to analyze the change and check the system carefully.

WHERE TO GO FOR MORE INFORMATION

- *Management of Change in Chemical Plants: Learning from Case Histories*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1993.
- *Plant Guidelines for Technical Management of Chemical Process Safety*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1992.
- *Management of Process Hazards (RP 750)*, American Petroleum Institute.
- *Guidelines for Engineering Design for Process Safety*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1993.

7.8 PRE-STARTUP REVIEW (§68.77)

You must conduct your pre-startup safety review for new stationary sources or modified stationary sources when the modification is significant enough to require a change in safety information under the management of change element. You must conduct your pre-startup review before you introduce a regulated substance to a process, and you must address the items listed in Exhibit 7-8.

EXHIBIT 7-8
PRE-STARTUP REVIEW REQUIREMENTS

Design Specifications	Adequate Procedures	PHA/MOC	Training
✔Confirm that new or modified construction and equipment meet design specifications.	✔Ensure that procedures for safety, operating, maintenance, and emergencies are adequate and in place.	Perform a PHA and resolve or implement any recommendations for new process. Meet management of change requirements for modified process.	✔Confirm that each employee involved in the process has been trained completely.

Like Management of Change, in the preceding section, this element of the RMP rule is to make sure that changes you intend to make are safe tooperate before you put them into operation. It places the responsibility squarely on the operator to check that persons making the change (e.g., the maintenance people, or the engineering firm) have properly completed the job before start up. If it is not properly completed, it is not acceptable to start the process.

If you do not have the expertise to do conduct a pre-startup review, you will need to arrange for someone with the necessary expertise to conduct it. Pre-startup safety review is an intended redundancy to the Management of Change requirements. Again, the principle is take the time to analyze the change and check the system carefully before operating it.

7.9 COMPLIANCE AUDITS (§68.79)

You must conduct an audit of the process to evaluate compliance with the prevention program requirements at least once every three years. At least one person involved in the audit must be knowledgeable in the process. You must develop a report of the findings and document appropriate responses to each finding and document that deficiencies have been addressed. The two most recent audit reports must be kept on-site.

The OSHA compliance guideline, CPL 2-2.34a, is a good starting point for an audit of the prevention program for a WWTP. Operators should apply the questions to that portion of their facility that uses or handles the regulated substances present on the plant. It is critical that you resolve any questions raised by, or findings of, the audit. These are likely to describe flaws in the management of process safety that could lead to a release of highly toxic or flammable gases. Continued operation with such flaws should not be permitted.

WHERE TO GO FOR MORE INFORMATION

- *Guidelines for Auditing Process Safety Management Systems*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1993.

7.10 INCIDENT INVESTIGATION (§68.81)

Exhibit 7-9 briefly summarizes the steps you must take for investigating incidents.

EXHIBIT 7-9
INCIDENT INVESTIGATION REQUIREMENTS

✔Initiate an investigation promptly.	Begin investigating no later than 48 hours following the incident.
✔Establish a knowledgeable investigation team.	Establish an investigation team to gather the facts, analyze the event, and develop the how and why of what went wrong. At least one team member must have knowledge of the process involved. Consider adding other workers in the process area where the incident occurred. Their knowledge will be significant and should give you the fullest insight into the incident.
✔Summarize the investigation in a report.	Among other things, the report must identify the factors contributing to the incident. Remember that identifying the root cause may be more important than identifying the initiating event. The report must also include any recommendations for corrective actions. Remember that the purpose of the report is to help management take corrective action.
✔Address the team's findings and recommendations.	Establish a system to address promptly and resolve the incident report findings and recommendations; document resolutions and corrective actions.
✔Review the report with your staff and contractors.	You must share the report - its findings and recommendations - with affected workers whose job tasks are relevant to the incident.
✔Retain the report.	Keep incident investigation reports for five years.

You must investigate each incident which resulted in, or could have resulted in, a "catastrophic release of a regulated substance." A catastrophic release is one that "presents an imminent and substantial endangerment to public health and the environment." Although the rule requires you to investigate only those incidents which resulted in, or could reasonably have resulted in a catastrophic release, EPA encourages you to investigate all accidental releases. Investigating minor accidents

or near misses can help you identify problems that could result in major releases if left unaddressed.

WHERE TO GO FOR MORE INFORMATION

- *Guidelines for Investigating Chemical Process Incidents*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1992.
- *Guide for Fire and Explosion Investigations (NFPA 921)*, National Fire Protection Association.

7.11 EMPLOYEE PARTICIPATION (§68.83)

Exhibit 7-10 briefly summarizes what you must do.

EXHIBIT 7-10
EMPLOYEE PARTICIPATION REQUIREMENTS

✔Write a plan.	Develop a written plan of action regarding how you will implement employee participation.
✔Consult with employees.	Consult your employees and their representatives regarding conducting and developing PHAs and other elements of process safety management in the risk management program rule.
✔Provide access to information.	Ensure that your employees and their representatives have access to PHAs and all other information required to be developed under the rule.

7.12 HOT WORK PERMITS (§68.85)

Exhibit 7-11 briefly summarizes how to meet the hot work permit requirement.

EXHIBIT 7-11
HOT WORK PERMITS REQUIREMENTS

✔Issue a hot work permit.	You must issue this permit for hot work conducted on or near a covered process.
✔Implement fire prevention and protection.	You must ensure that the fire prevention and protection requirements in 29 CFR 1910.252(a) are implemented before the hot work begins. The permit must document this.
✔Indicate the appropriate dates.	The permit should indicate the dates authorized for hot work.
✔Identify the work.	The permit must identify the object on which hot work is to be performed.
✔Maintain the permit on file.	You must keep the permit on file until workers have completed the hot work operations.

Welding, cutting, brazing, grinding, sandblasting, and other spark-producing work is subject to this element of the standard. Because there is likely to be flammable gas present, you should consider that fire or explosion hazards exist.

The value in hot work procedures comes from the use of permits as a communication device. They are intended to communicate the hazards, and needed precautions, to the workers performing work under the permits. Also, the provision of the permit to operators will inform them of the nature of the work in progress, so that they can govern their activity so as not to interfere with or provide additional hazard to the job in progress.

WHERE TO GO FOR MORE INFORMATION

- *Standard for Fire Prevention in Use of Cutting and Welding Processes (NFPA 518)*, National Fire Protection Association.
- *Standard for Welding*, Cutting and Brazing, 29 CFR 1910 Subpart Q.

7.13 CONTRACTORS (§68.87)

Exhibit 7-12 summarizes both yours and the contractors' responsibilities where contractors perform maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process.

EXHIBIT 7-12
CONTRACTORS CHART

You must...	Your contractor must...
✔**Check safety performance.** When selecting a contractor, you must obtain and evaluate information regarding the safety performance of the contractor. ✔**Provide safety and hazards information.** You must inform the contractor of potential fire, explosion, or toxic release hazards; and of your emergency response activities as they relate to the contractor's work and the process. ✔**Ensure safe practices.** You must ensure that you have safe work practices to control the entrance, presence, and exit of contract employees in covered process areas. ✔**Verify that the contractor acts responsibly.** You must verify that the contractor is fulfilling its responsibilities.	✔**Ensure training for its employees.** The contractor must train its employees to ensure that they perform their jobs safely and in accordance with your source's safety procedures. ✔**Ensure its employees know process hazards and applicable emergency actions.** The contractor must assure that contract employees are aware of hazards and emergency procedures relating to the employees' work. ✔**Document training.** The contractor must prepare a record documenting and verifying adequate employee training. ✔**Ensure its employees are following your safety procedures.** ✔**Inform you of hazards.** The contractor must tell you of any unique hazards presented by its work or of any hazards it finds during performance.

EPA/OSHA Differences

EPA has no authority to require that you maintain an occupational injury and illness log for contract employees. Be aware, however, that OSHA does have this authority, and that the PSM standard does set this requirement. (See 29 CFR 1910.119(h)(2)(vi)).

Where To Go For More Information

- *Contractor and Client Relations to Assure Process Safety*, Center for Chemical Process Safety of the American Institute of Chemical Engineers 1996.
- *API/CMA Managers Guide to Implementing a Contractor Safety Program (RP 2221)*, American Petroleum Institute.
- *Improving Owner and Contractor Safety Performance (RP 2220)*, American Petroleum Institute.

APPENDIX 7-A
PHA TECHNIQUES

This appendix provides descriptions of each of the PHA techniques listed in the OSHA PSM standard and § 68.67. These descriptions include information on what each technique is, which types of processes they may be appropriate for, what their limitations are, and what level of effort is typically associated with each. This information is based on *Guidelines for Hazard Evaluation Procedures*, 2nd Ed., published by AIChE/CCPS. If you are interested in more detailed discussion and worked examples, you should refer to the AIChE/CCPS volume.

Neither the information below nor the full AIChE/CCPS volume will provide you with enough information to conduct a PHA. The rule requires that your PHA team include at least one person trained in the technique you use. Training in PHA techniques is available from a number of organizations. If you must conduct multiple PHAs, you are likely to need to update your PHAs frequently, or you have a complex process that will take several weeks to analyze, you may want to consider training one or more of your employees. If you have a single process that is unlikely to change more than once every five years, you may find it more cost-effective to hire a trained PHA leader.

DESCRIPTIONS OF TECHNIQUES

CHECKLISTS

Checklists are primarily used for processes that are covered by standards, codes, and industry practices — for example, storage tanks designed to ASME standards, ammonia handling covered by OSHA (29 CFR 1910.111), propane facilities subject to NFPA-58. Checklists are easy to use and can help familiarize new staff with the process equipment. AIChE/CCPS states that checklists are a highly cost-effective way to identify customarily recognized hazards. Checklists are dependent on the experience of the people who develop them; if the checklist is not complete, the analysis may not identify hazardous situations.

Checklists are created by taking the applicable standards and practices and using them to generate a list of questions that seek to identify any differences or deficiencies. If a checklist for a process does not exist, an experienced person must develop one based on standards, practices, and facility or equipment experience. A completed checklist usually provides "yes," "no," "not applicable," and "need more information" answers to each item. A checklist analysis involves touring the process area and comparing equipment to the list.

AIChE/CCPS estimates that for a small or simple system a checklist will take 2 to 4 hours to prepare, 4 to 8 hours to evaluate the process, and 4 to 8 hours to document the results. For larger or more complex processes, a checklist will take 1 to 3 days to prepare, 3 to 5 days to evaluate, and 2 to 4 days to document.

Examples of checklists are given in Chapter 6, Appendix 6-A.

WHAT-IF

A What-If is a brainstorming approach in which a group of people familiar with the process ask questions about possible deviations or failures. These questions may be framed as What-If, as in "What if the pump fails?" or may be expressions of more general concern, as in "I worry about contamination during unloading." A scribe or recorder takes down all of the questions on flip charts or a computer. The questions are then divided into specific areas of investigation, usually related to consequences of interest. Each area is then addressed by one or more team members.

What-If analyses are intended to identify hazards, hazardous situations, or accident scenarios. The team of experienced people identifies accident scenarios, consequences, and existing safeguards, then suggest possible risk reduction alternatives. The method can be used to examine deviations from design, construction, modification, or operating intent. It requires a basic understanding of the process and an ability to combine possible deviations from design intent with outcomes. AIChE describes this as a powerful procedure if the staff are experienced; "otherwise, the results are likely to be incomplete."

A What-If usually reviews the entire process, from the introduction of the chemicals to the end. The analysis may focus on particular consequences of concern. AIChE provides the following example of a What-If question: "What if the raw material is the wrong concentration?" The team would then try to determine how the process would respond: "If the concentration of acid were doubled, the reaction could not be controlled and a rapid exotherm would result." The team might then recommend steps to prevent feeding wrong concentrations or to stop the feed if the reaction could not be controlled.

A What-If of simple systems can be done by one or two people; a more complex process requires a larger team and longer meetings. AIChE/CCPS estimates that for a small or simple system a What-If analysis will take 4 to 8 hours to prepare, 1 to 3 days to evaluate the process, and 1 to 2 days to document the results. For larger or more complex processes, a What-If will take 1 to 3 days to prepare, 4 to 7 days to evaluate, and 4 to 7 days to document.

Examples of What If questions are given in Chapter 6, Appendix 6-A.

WHAT-IF/CHECKLIST

A What-If/Checklist combines the creative, brainstorming aspects of the What-If with the systematic approach of the Checklist. The combination of techniques can compensate for the weaknesses of each. The What-If part of the process can help the team identify hazards and accident scenarios that are beyond the experience of the team members. The checklist provides a more detailed systematic approach that can fill in gaps in the brainstorming process. The technique is generally used to identify the most common hazards that exist in a process. AIChE states that it is often the first PHA conducted on a process, with subsequent analyses using more detailed approaches.

The purpose of a What-If/Checklist is to identify hazards and the general types of accidents that could occur, evaluate qualitatively the effects of the effects, and determine whether safeguards are adequate. Usually the What-If brainstorming precedes the use of the checklist, although the order can be reversed.

The technique usually is performed by a team experienced in the design, operation, and maintenance of the process. The number of people required depends on the complexity of the process.

AIChE/CCPS estimates that for a small or simple system a What-If/Checklist analysis will take 6 to 12 hours to prepare, 6 to 12 hours to evaluate the process, and 4 to 8 hours to document the results. For larger or more complex processes, a What-If/Checklist will take 1 to 3 days to prepare, 4 to 7 days to evaluate, and 1 to 3 weeks to document.

See Chapter 6 for a further discussion of What If/Checklists.

HAZOP

The Hazard and Operability Analysis (HAZOP) was originally developed to identify both hazards and operability problems at chemical process plants, particularly for processes using technologies with which the plant was not familiar. The technique has been found to be useful for existing processes as well. A HAZOP requires an interdisciplinary team and an experienced team leader.

The purpose of a HAZOP is to review a process or operation systematically to identify whether process deviations could lead to undesirable consequences. AIChE states that the technique can be used for continuous or batch processes and can be adapted to evaluate written procedures. It can be used at any stage in the life of a process.

HAZOPs usually require a series of meetings in which, using process drawings, the team systematically evaluates the impact of deviations. The team leader uses a fixed set of guide words and applies them to process parameters at each point in the process. Guide words include "No," "More," "Less," "Part of," "As well as," Reverse," and "Other than." Process parameters considered include flow, pressure, temperature, level, composition, pH, frequency, and voltage. As the team applies the guide words to each process step, they record the deviation, with its causes, consequences, safeguards, and actions needed, or the need for more information to evaluate the deviation.

HAZOPs require more resources than simpler techniques. AIChE states that a simple process or a review with a narrow scope may be done by as few as three or four people, if they have the technical skills and experience. A large or complex process usually requires a team of five to seven people. AIChE/CCPS estimates that for a small or simple system a HAZOP analysis will take 8 to 12 hours to prepare, 1 to 3 days to evaluate the process, and 2 to 6 days to document the results. For larger or more complex processes, a HAZOP will take 2 to 4 days to prepare, 1 to 3 weeks to evaluate, and 2 to 6 weeks to document.

See Chapter 6 for a further discussion of HAZOPs.

FAILURE MODE AND EFFECTS ANALYSIS (FMEA)

A Failure Mode and Effects Analysis (FMEA) evaluates the ways in which equipment fails and the system's response to the failure. The focus of the FMEA is on single equipment failures and system failures. An FMEA usually generates recommendations for increasing equipment reliability. FMEA does not examine human errors directly, but will consider the impact on equipment of human error. AIChE states that FMEA is "not efficient for identifying an exhaustive list of combinations of equipment failures that lead to accidents."

An FMEA produces a qualitative, systematic list of equipment, failure modes, and effects. The analysis can easily be updated for design or systems changes. The FMEA usually produces a table that,

for each item of equipment, includes a description, a list of failure modes, the effects of each failure, safeguards that exist, and actions recommended to address the failure. For example, for pump operating normal, the failure modes would include fails to stop when required, stops when required to run, seal leaks or ruptures, and pump case leaks or ruptures. The effects would detail both the immediate effect and the impact on other equipment. Generally, when analyzing impacts, analysts assume that existing safeguards do not work.

An FMEA requires an equipment list or P&ID, knowledge of the equipment, knowledge of the system, and responses to equipment failure. AIChE states that on average, an hour is sufficient to analyze two to four pieces of equipment. AIChE/CCPS estimates that for a small or simple system an FMEA will take 2 to 6 hours to prepare, 1 to 3 days to evaluate the process, and 1 to 3 days to document the results. For larger or more complex processes, an FMEA will take 1 to 3 days to prepare, 1 to 3 weeks to evaluate, and 2 to 4 weeks to document.

FAULT TREE ANALYSIS (FTA)

A Fault Tree Analysis (FTA) is a deductive technique that focuses on a particular accident or main system failure and provides a method for determining causes of the event. The fault tree is a graphic that displays the combinations of equipment failures and human errors that can result in the accident. The FTA starts with the accident and identifies the immediate causes. Each immediate cause is examined to determine its causes until the basic causes of each are identified. AIChE states that the strength of FTA is its ability to identify combinations of basic equipment and human failures that can lead to an accident, allowing the analyst to focus preventive measures on significant basic causes.

AIChE states that FTA is well suited for analyses of highly redundant systems. For systems vulnerable to single failures that can lead to accidents, FMEA or HAZOP are better techniques to use. FTA is often used when another technique has identified an accident that requires more detailed analysis. The FTA looks at component failures (malfunctions that require that the component be repaired) and faults (malfunctions that will remedy themselves once the conditions change). Failures and faults are divided into three groups: primary failures and faults occur when the equipment is operating in the environment for which it was intended; secondary failures and faults occur when the system is operating outside of intended environment; and command faults and failures are malfunctions where the equipment performed as designed but the system that commanded it malfunctioned.

An FTA requires a detailed knowledge of how the plant or system works, detailed process drawings and procedures, and knowledge of component failure modes and effects. AIChE states that FTAs need well trained and experienced analysts. Although a single analyst can develop a fault tree, input and review from others is needed

AIChE/CCPS estimates that for a small or simple system an FTA will take 1 to 3 days to prepare, 3 to 6 days for model construction, 2 to 4 days to evaluate the process, and 3 to 5 days to document the results. For larger or more complex processes, an FTA will take 4 to 6 days to prepare, 2 to 3 weeks for model constructions, 1 to 4 weeks to evaluate, and 3 to 5 weeks to document.

Other Techniques

The rule allows you to use other techniques if they are functionally equivalent. The AIChE Guidelines includes descriptions of a number of other techniques including Preliminary Hazard Review,

Cause-Consequence Analysis, Event Tree Analysis, and Human Reliability Analysis. You may also develop a hybrid technique that combines features of several techniques or apply more than one technique.

Selecting a Technique

Exhibit 7A-1 is adapted from the AIChE Guidelines and indicates which techniques are appropriate for particular phases in a process's design and operation.

EXHIBIT 7A-1
APPLICABILITY OF PHA TECHNIQUES

	Checklist	What-If	What-If-Checklist	HAZOP	FMEA	FTA
R&D		✓				
Design	✓	✓	✓			
Pilot Plant Operation	✓	✓	✓	✓	✓	✓
Detailed Engineering	✓	✓	✓	✓	✓	✓
Construction/Start-Up	✓	✓	✓			
Routine Operation	✓	✓	✓	✓	✓	✓
Modification	✓	✓	✓	✓	✓	✓
Incident Investigation		✓		✓	✓	✓
Decommissioning	✓	✓	✓			

Factors in Selecting a Technique

Type of process will affect your selection of a technique. AIChE states that most of the techniques can be used for any process, but some are better suited for certain processes than others. FMEA efficiently analyzes the hazards associated with computer and electronic systems; HAZOPs do not work as well with these. Processes or storage units designed to industry or government standards can be handled with checklists.

Analysis of multiple failure situations is best handled by FTA. Single-failure techniques, such as HAZOP and FMEA, are not normally used to handle these although they can be extended to evaluate a few simple accident situations involving more than one event.

AIChE states that when a process has operated relatively free of accidents for a long time, the potential for high consequence events is low, and there have been few changes to invalidate the experience base, the less exhaustive techniques, such as a Checklist, can be used. When the opposite is true, the more rigorous techniques are more appropriate.

A final factor in selecting a technique is time required for various techniques. Exhibit 7A-2 summarizes AIChE's estimates of the time required for various steps. The full team is usually involved in the evaluation step; for some techniques, only the team leader and scribe are involved in the preparation and documentation steps.

EXHIBIT 7A-2
TIME AND STAFFING FOR PHA TECHNIQUES

	Checklist	What-If	What-If Checklist	HAZOP	FMEA	FTA
Simple/Small System						
# Staff	1-2	2-3	2-3	3-4	1-2	2-3
Preparation	2-4 h	4-8 h	6-12 h	8-12 h	2-6 h	1-3 d
Modeling						3-6 d
Evaluation	4-8 h	1-3 d	6-12 h	1-3 d	1-3 d	2-4 d
Documentation	4-8 h	1-2 d	4-8 h	2-6 d	1-3 d	3-5 d
Large/Complex Process						
# Staff	1-2	3-5	3-5	5-7	2-4	2-5
Preparation	1-3 d	1-3 d	1-3 d	2-4 d	1-3 d	4-6 d
Modeling						2-3 w
Evaluation	3-5 d	4-7 d	4-7 d	1-3 w	1-3 w	1-4 w
Documentation	2-4 d	4-7 d	1-3 w	2-6 w	2-4 w	3-5 w

h = hours d = days (8 hours) w = weeks (40 hours)

CHAPTER 8: EMERGENCY RESPONSE PROGRAM

If you have at least one Program 2 or Program 3 process at your facility, then part 68 may require you to implement an emergency response program, consisting of an emergency response plan, emergency response equipment procedures, employee training, and procedures to ensure the program is up-to-date. This requirement applies if your employees will respond to some releases involving regulated substances. (See the box on the next page for more information on What is Response?)

EPA recognizes that, in some cases (particularly for small operations with few employees), it may not be appropriate for employees to conduct response operations for releases of regulated substances. For example, it would be inappropriate, and probably unsafe, for a WWTP with only one full-time employee at a site to expect that a tank fire could be handled without the help of the local fire department or other emergency responder. EPA does not intend to force such facilities to develop emergency response capabilities. At the same time, you are responsible for ensuring effective emergency response to any releases at your facility. If your local public responders are not capable of providing such response, you must take steps to ensure that effective response is available (e.g., by hiring response contractors).

8.1 NON-RESPONDING FACILITIES (§ 68.90(b))

EPA has adopted a policy for non-responding facilities similar to that adopted by OSHA in its Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard (29 CFR 1910.120), which allows certain facilities to develop an emergency action plan (29 CFR 1910.38(a)) to ensure employee safety, rather than a full-fledged emergency response plan. (Note that EPA adopted HAZWOPER by reference for any state or local facility not subject to OSHA rules (40 CFR part 311). If your employees will not respond to accidental releases of regulated substances, then you need not comply with the emergency response plan and program requirements. Instead, you are simply required to coordinate with local response agencies to ensure that they will be prepared to respond to an emergency at your facility. (You may want to briefly review the program design issues discussed in 8.2 prior to making this decision.) This will help to ensure that your community has a strategy for responding to and mitigating the threat posed by a release of a regulated substance from your facility. Coordination with local responders entails the following steps:

Ensure that you have set up a way to notify emergency responders when there is need for a response.

If you have a covered process with a regulated toxic, work with the local emergency planning entity to ensure that the facility is included in the community emergency response plan prepared under EPCRA regarding a response to a potential release.

If you have a covered process with a regulated flammable (e.g., methane), work with the local fire department regarding a response to a potential release.

Although you do not need to describe these activities in your risk management plan, to document your efforts you should keep a record of:

The emergency contact (i.e., name or organization and number) that you will call for a toxic or flammable release, and

What is "Response"?

EPA interprets "response" to be consistent with the definition of response specified under OSHA's HAZWOPER Standard. OSHA defines emergency response as "a response effort by employees from outside the immediate release area or by other designated responders ... to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance." The key factor here is that responders are designated for such tasks by their employer. This definition *excludes* "responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel" as well as "responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure)." Thus, if you expect your employees to take action to end a small leak (e.g., shutting a valve) or clean up a spill that does not pose an immediate safety or health hazard, this action could be considered an incidental response and you would not need to develop an emergency response program if your employees are limited to such activities.

However, due to the nature of the regulated substances subject to EPA's rule, only the most minor incidents would be included in this exception. In general, most activities will qualify as a response due to the immediacy of the dispersion of a toxic plume or spread of a fire, the volatilization of a spill, and the threat to people on and off site. As a result, if you will have your employees involved in any substantial way in responding to releases, you will need to develop an emergency response program. Your emergency response procedures need only apply to "response" actions; other activities will be described in your maintenance and operating procedures.

The organization that you worked with on response procedures.

The remainder of this chapter is applicable only to those WWTPs that will conduct a more extensive level of response operations. As noted above, you may want to review the next section before making a decision on whether the facility will take responsibility for conducting any response activities.

8.2 ELEMENTS OF AN EMERGENCY RESPONSE PROGRAM (§ 68.95)

If you will respond to releases of regulated substances with your own employees, your emergency response program must consist of the following elements:

An emergency response plan (maintained at the facility) that includes:

Procedures for informing the public and emergency response agencies about releases,
Documentation of proper first aid and emergency medical treatment necessary to treat human exposures, and
Procedures and measures for emergency response.

What is a Local Emergency Planning Committee?

Local emergency planning committees (LEPCs) were formed under the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986. The committees are designed to serve as a community forum for issues relating to preparedness for emergencies involving releases of hazardous substances in their jurisdictions. They consist of representatives from local government (including law enforcement and firefighting), local industry, transportation groups, health and medical organizations, community groups, and the media. LEPCs:

Collect information from facilities on hazardous substances that pose a risk to the community;
Develop a contingency plan for the community based on this information; and
Make information on hazardous substances available to the general public.

Contact the mayor's office or the county emergency management office for more information on your LEPC.

Procedures for using, inspecting, testing, and maintaining your emergency response equipment;

Training for all employees in relevant procedures; and

Procedures to review and update, as appropriate, the emergency response plan to reflect changes at the facility and ensure that employees are informed of changes.

Finally, your plan must be coordinated with the community plan developed under the Emergency Planning and Community Right-to-Know Act (EPCRA, also known as SARA Title III). In addition, at the request of local emergency planning or

response officials, you must provide any information necessary for developing and implementing the community plan.

In keeping with the approach outlined in Chapter 6, EPA is not requiring facilities to document training and maintenance activities. However, as noted above, facilities must maintain an on-site emergency response plan as well as emergency response equipment maintenance and program evaluation procedures.

Although EPA's required elements are essential to any emergency response program, they are not comprehensive guidelines for creating an adequate response capability. Rather than establish another set of federal requirements for an emergency response program, EPA has limited the provisions of its rule to those the CAA mandates. If you have a regulated substance on site, you are already subject to at least one emergency response rule: OSHA's and EPA's HAZWOPER requirements, which are identical. Under HAZWOPER, any facility that handles "hazardous substances" (a broad term that includes all of the CAA section 112(r) regulated substances and thus applies to all facilities with covered processes) must comply with either 29 CFR 1910.38(a) (emergency action plan) or 1910.119(q) (HAZWOPER). If you have a hazmat team, you are subject to the 29 CFR 1910.119(q) requirements. If you determine that the emergency response programs you have developed to comply with these other rules satisfy the elements listed at the beginning of this section, you will not have to do anything additional to comply with these elements. Additional guidance on making this decision is provided in section 8.5.

In addition, be careful not to confuse writing a set of emergency response procedures in a plan with developing an emergency response program. An emergency response plan is only one element of the integrated effort that makes an emergency response program. Although the plan outlines the actions and equipment necessary to respond effectively, training, program evaluation, equipment maintenance, and coordination with local agencies must occur regularly if your plan is to be useful in an emergency: The goal of the program is to enable you to respond quickly and effectively to any emergency. The documents listed in Exhibit 8-1 may be helpful in developing specific elements of your emergency response program.

Finally, remember that under the General Duty Clause of CAA section 112(r)(1) you are responsible for ensuring that any release from your processes can be handled effectively. If you plan to rely on local responders for some or all of the response, you must determine that those responders have both the equipment and training needed to do so. If they do not, you must take steps to meet any needs, either by developing your own response capabilities, developing mutual aid agreements with other facilities, hiring response contractors, or providing support to local responders so they can acquire equipment or training.

RELATIONSHIP TO HAZWOPER

If you choose to establish and maintain onsite emergency response capabilities, then you will be subject to the detailed provisions of the OSHA or EPA HAZWOPER Standard. HAZWOPER covers preparing an emergency response plan, employee training, medical monitoring of employees, recordkeeping, and other issues. Call your state or federal district OSHA office (see the list in Appendix D) for more information on complying with the HAZWOPER Standard. State and local governments in states without a delegated OSHA program are subject to HAZWOPER under EPA's 40 CFR part 311.

Exhibit 8-1
Federal Guidance on Emergency Planning and Response

Hazardous Materials Emergency Planning Guide (NRT-1), National Response Team, March 1987. Although designed to assist communities in planning for hazmat incidents, this guide provides useful information on developing a response plan, including planning teams, plan review, and ongoing planning efforts.

Criteria for Review of Hazardous Materials Emergency Plans (NRT-1A), National Response Team, May 1988. This guide provides criteria for evaluating response plans.

Integrated Contingency Plan, National Response Team, (61 FR 28642, June 5, 1996). This provides guidance on how to consolidate multiple plans developed to comply with various federal regulations into a single, functional emergency response plan..

North American Emergency Response Guidebook (NAERG96), U.S. Department of Transportation, 1996. This guidebook lists over 1,000 hazardous materials and provides information on their general hazards and recommended isolation distances.

Response Information Data Sheets (RIDS), US EPA and National Oceanic and Atmospheric Administration. Developed for use with the Computer-Aided Management of Emergency Operations (CAMEO) software, these documents outline the properties, hazards, and basic safety and response practices for thousands of hazardous chemicals.

How Does the Emergency Response Program Apply?

The requirements for the emergency response program are intended to apply across all covered processes at a facility. Although certain elements of the program (e.g., how to use specific items of response equipment) may differ from one process to another, EPA does not intend or expect you to develop a separate emergency response program for each covered process. With this in mind, you should realize that your emergency response program will probably apply to your entire facility, although technically it need only apply to covered processes.

For example, a facility may have two storage tanks, one containing slightly more than a threshold quantity of a regulated substance and one with slightly less. The facility is likely to adopt the same response approach (e.g., procedures, equipment, and training) for releases whether or not the process is "covered." Similarly, a facility may have two adjacent flammables storage tanks, one containing a regulated substance above the threshold and the other containing another, unlisted flammable. The facility is likely to adopt the same approach for releases whether or not the process is "covered."

8.3 DEVELOPING AN EMERGENCY RESPONSE PROGRAM

The development of an emergency response program should be approached systematically. As described in section 8.2, all facilities complying with these emergency response program provisions will already be subject to OSHA HAZWOPER. As a result, you are likely to fall into one of two groups:

You have already met several federal requirements for emergency planning and are interested in developing an integrated program to minimize duplication (section 8.4).

You have a pre-existing emergency response program (perhaps based on an internal policy decision) and need to determine what additional activities you will need to conduct (section 8.5).

STEPS FOR GETTING STARTED

The following steps outline a systematic approach that can serve as the framework for the program development process in each of these cases. Following these initial steps will allow you to conduct the rest of the process more efficiently.

Form an emergency response program team. The team should consist of employees with varying degrees of emergency response responsibilities, as well as personnel with expertise from each functional area of your facility. You should consider including persons from the following departments or areas:

Maintenance;
Operations or line personnel;

Upper and line management (for POTWs this may include governing boards);
Legal;
Fire and hazmat response;
Environmental, health, and safety affairs;
Training;
Security;
EPCRA section 302 emergency coordinator (if one exists);
Public relations; and
Human resources.

Of course, the membership of the team will need to be more or less extensive depending on the scope of the emergency response program. A three-member team may be appropriate for a small facility with a couple of process operators cross-trained as fire responders, while a facility with its own hazmat team and environmental affairs department may need a dozen representatives.

Collect relevant facility documents. Members of the development team should collect and review all of the following:

Site plans;
Existing emergency response plans and procedures;
Submissions to the LEPC under EPCRA sections 302 and 303;
Hazard evaluation and release modeling information;
Hazard communication and emergency response training;
Emergency drill and exercise programs;
After-action reports and response critiques; and
Mutual aid agreements.

Identify existing programs to coordinate efforts. The team should identify any related programs from the following sources:

Corporate- and industry-sponsored safety, training, and planning efforts; and

Federal, state, and local government safety, training, and planning efforts (see Exhibit 8-2).

Exhibit 8-2
Federal Emergency Planning Regulations

The following is a list of some of the federal emergency planning regulations:

EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements) - 40 CFR part 112.7(d) and 112.20-.21;
EPA's Risk Management Programs Regulation - 40 CFR part 68;
OSHA's Emergency Action Plan Regulation - 29 CFR 1910.38(a);
OSHA's Process Safety Standard - 29 CFR 1910.119;
OSHA's HAZWOPER Regulation - 29 CFR 1910.120;
OSHA's Fire Brigade Regulation - 29 CFR 1910.156;
EPA's Resource Conservation and Recovery Act Contingency Planning Requirements - 40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52.
EPA's Emergency Planning and Community Right-to-Know Act Requirements - 40 CFR part 355. (These planning requirements apply to communities, rather than facilities, but will be relevant when facilities are coordinating with local planning and response entities).
EPA's Storm water Regulations - 40 CFR 122.26.

Facilities may also be subject to state and local planning requirements.

Determine the status of each required program element. Using the information collected, you should assess whether each required program element (see section 8.2) is:

In place and sufficient to meet the requirements of part 68;

In place, but not sufficient to meet the requirements of Part 68; or

Not in place.

This examination will shape the nature of your efforts to complete the emergency response program required under the risk management program. For example, if you are already in compliance with OSHA's HAZWOPER Standard, you have probably satisfied most, if not all, of the requirements for an emergency response program. Section 8.6 explains the intent of each of EPA's requirements to help you determine whether you are already in compliance.

Take additional actions as necessary.

TAILORING YOUR PROGRAM TO YOUR HAZARDS

If your processes and chemicals pose a variety of hazards, it may be necessary to tailor some elements of your emergency response program to these specific hazards. Unless each part of your program element is appropriate to the release scenarios that may occur, your emergency response program cannot be fully effective. Your program should include core elements that are appropriate to most of the scenarios, supplemented with more specific response information for individual scenarios. This distinction should be reflected in your emergency response plan, which should explain when to access the general and specific response information. To do this, you will need to consider the following four steps:

Identify and characterize the hazards for each covered process. Most WWTPs will have the potential for toxic releases, fires, and explosions.

For each program element, compare the activities involved in responding to each type of accident scenario and decide if they are different enough to require separate approaches. For example, response equipment and training will likely be different for releases of toxic versus flammable gases.

For those program elements that may be chemical- or process-specific, identify what and how systems and procedures need to be modified. For example, if existing mitigation systems are inadequate for responding to certain types of releases, you will need to consider what additional types of equipment are needed.

Consider possible causes of emergencies in developing your emergency response program. You should consider both the hazards at your facility and in the surrounding environment. In making this determination, you should consider your susceptibility to:

- Fires, spills, and vapor releases;
- Floods, temperature extremes, tornadoes, earthquakes, and hurricanes;
- Loss of utilities, including power failures; and
- Train derailments, bomb threats, and other man-made disasters.

8.4 INTEGRATION OF EXISTING PROGRAMS

A number of other federal statutes and regulations require emergency response planning (see Exhibit 8-2). On June 5, 1996, the National Response Team (NRT), a multi-agency group chaired by EPA, published the Integrated Contingency Plan Guidance in the *Federal Register* (61 FR 28642). This guidance is intended to be

used by facilities to prepare emergency response plans for responding to releases of oil and hazardous substances. The guidance provides a mechanism for consolidating multiple plans that you prepared to comply with various regulations into a single, functional emergency response plan or integrated contingency plan (ICP).

The ICP guidance does not change existing regulatory requirements; rather, it provides a format for organizing and presenting material currently required by regulations. Individual regulations are often more detailed than the ICP guidance. To ensure full compliance, you will still need to read and comply with all of the federal regulations that apply. The guidance contains a series of matrices designed to assist you in consolidating various plans while documenting compliance with these federal requirements.

The NRT and the agencies responsible for reviewing and approving plans to which the ICP option applies have agreed that integrated response plans prepared according to the guidance will be acceptable and the federally preferred method of response planning. The NRT anticipates that future development of all federal regulations addressing emergency response planning will incorporate use of the ICP guidance.

As shown in Exhibit 8-3, the ICP format is organized into three main sections: an introductory section, a core plan, and a series of supporting annexes. The notice published in the Federal Register explains the intended structure of the ICP and provides detailed annotation. EPA's EPCRA/RCRA/Superfund Hotline can supply you with a copy and answer general questions about the guidance; for further information and guidance on complying with specific regulations, you should contact the appropriate federal agencies.

AN APPROACH TO INTEGRATION

Like many other facilities, you may have opted to develop and maintain separate documents and procedures for each federal emergency planning requirement. However, meeting the Clean Air Act emergency response requirements provides you with the opportunity to integrate several existing programs. Integrating the various emergency response efforts you conduct (both those mandated by management and by government) will increase the usefulness of your emergency preparedness activities and decrease the burden associated with maintaining multiple programs. Integration will improve your chances to respond effectively to a release by streamlining your training and eliminating overlaps and conflicts in the roles and responsibilities of your employees under different programs. However, it is important to note that, although you are encouraged to integrate your emergency response efforts, it is not a requirement of the Clean Air Act.

If you have multiple emergency response programs, you should consider integrating them into a single program with procedures for responding to your most likely release scenarios. The ICP Guidance discussed above provides comparison matrices for a number of federal programs that will help you accomplish the following:

Distinguish the individual regulatory provisions with which you must comply, and

Identify where an integrated effort can meet the requirements of two or more regulations.

The requirements of various emergency response programs may be similar, but the subtle differences between requirements will likely determine the degree to which integration is a feasible and beneficial undertaking. To help you identify the relevant rules and regulations, the ICP Guidance provides section-by-section regulatory citations for each emergency response program element for each of the regulatory programs listed in Exhibit 8-2.

8.5 HAVE I MET PART 68 REQUIREMENTS?

EPA believes that the creation of multiple response plans to meet slightly different federal or state standards is counterproductive, diverting resources that could be used to develop better response capabilities. Therefore, as part of the overall effort to reduce the imposition of potentially duplicative or redundant federal requirements, EPA has limited its requirements for the emergency response program to the general provisions mandated by Congress, as described in Section 8.2.

As a result, EPA believes that facilities subject to other federal emergency planning requirements may have already met the requirements of these regulations. For example, plans developed to comply with other EPA contingency planning requirements and the HAZWOPER rule (29 CFR 1910.120) will likely meet the requirements for the emergency response plan (and most of the requirements for the emergency response program). The following discussion presents some general guidance on what actions you need to take for each of the required elements.

EMERGENCY RESPONSE PLAN

If you already have a written plan to comply with another planning regulation, you do not need to write another plan, but only add to it as necessary to cover the elements listed below.

Keep in mind: At a minimum, your plan must describe:

Your procedures for informing the public and offsite emergency response agencies of a release. This must include the groups and individuals that will be contacted and why, the means by which they will be contacted, the time frame for notification, and the information that will be provided.

Exhibit 8-3
Integrated Contingency Plan Outline

Section I - Plan Introduction Elements

1. Purpose and Scope of Plan Coverage
2. Table of Contents
3. Current Revision Date
4. General Facility Identification Information

a. Facility name
b. Owner/operator/agent (include physical and mailing address and phone number)
c. Physical address of the facility (include county/parish/borough, latitude/longitude, and directions)
d. Mailing address of the facility (correspondence contact)
e. Other identifying information (e.g., ID numbers, SIC Code, oil storage start-up date)
f. Key contact(s) for plan development and maintenance
g. Phone number for key contact(s)
h. Facility phone number
I. Facility fax number

Section II - Core Plan Elements

1. Discovery
2. Initial Response

a. Procedures for internal and external notifications (i.e., contact, organization name, and phone number of facility emergency response coordinator, facility response team personnel, federal, state, and local officials)
b. Establishment of a response management system
c. Procedures for preliminary assessment of the situation, including an identification of incident type, hazards involved, magnitude of the problem, and resources threatened
d. Procedures for establishment of objectives and priorities for response to the specific incident, including:
   (1) Immediate goals/tactical planning (e.g., protection of workers and public as priorities)
   (2) Mitigating actions (e.g., discharge/release control, containment, and recovery, as appropriate)
   (3) Identification of resources required for response
e. Procedures for implementation of tactical plan
f. Procedure for mobilization of resources

3. Sustained Actions
4. Termination and Follow-Up Actions

Section III - Annexes

Annex 1. Facility and Locality Information

a. Facility maps
b. Facility drawings
c. Facility description/layout, including identification of facility hazards and vulnerable resources and populations on and off the facility which may be impacted by an incident

Exhibit 8-3 (continued)

Annex 2. Notification
a. Internal notifications
b. Community notifications
c. Federal and state agency notifications
Annex 3. Response Management System
a. General
b. Command
c. Operations
d. Planning
e. Logistics
f. Finance/procurement/administration
Annex 4. Incident Documentation
a. Post accident investigation
b. Incident history
Annex 5. Training and Exercises/Drills
Annex 6. Response Critique and Plan Review and Modification Process
Annex 7. Prevention
Annex 8. Regulatory Compliance and Cross-Reference Matrices

The proper first aid and emergency medical treatment for employees, first responders, and members of the public who may have been exposed to a release of a regulated substance. This must include standard safety precautions for victims (e.g., apply water to exposed skin immediately) as well as more detailed information for medical professionals. You must also indicate who is likely to be responsible for providing the appropriate treatment: an employee, an employee with specialized training, or a medical professional.

Your procedures for emergency response in the event of a release of a regulated substance. This must include descriptions of the actions to be taken by employees and other individuals on-site over the entire course of the release event:

Activation of alarm systems and interpretation of signals;
Safe evacuation, assembly, and return;
Selection of response strategies and incident command structure;
Use of response equipment and other release mitigation activities; and
Post-release equipment and personnel cleanup and decontamination.

PLANNING COORDINATION

One of the most important issues in an emergency response program is deciding which response actions will be assigned to employees and which will be handled by offsite personnel. As a result, talking to public response organizations will be critical when you develop your emergency response procedures. Although EPA is not requiring you to be able to respond to a release alone, you should not simply assume that local responders will be able to manage an emergency. You must work with them to determine what they can do, and then expand your own abilities or establish mutual aid agreements or contracts to handle those situations for which you lack the appropriate training or equipment.

If you have already coordinated with local response agencies on how to respond to potential releases of regulated substances and you have ensured an effective response, you do not need to take any further action.

Keep in mind: Your coordination must involve planning for releases of regulated substances from all covered processes and must cover:

- What offsite response assistance you will require for potential release scenarios, including fire-fighting, security, and notification of the public;
- How you will request offsite response assistance; and
- Who will be in charge of the response operation and how will authority be delegated down the internal and offsite chain of command.

Coordination equivalent to that required for planning for extremely hazardous substances under EPCRA sections 302-303 will be considered sufficient to meet this requirement. A more detailed discussion of this element is provided in 8.6.

EMERGENCY EQUIPMENT

If you already have written procedures for using and maintaining your emergency response equipment, you do not need to write new procedures.

Keep in mind: Your procedures must apply to any emergency equipment relevant to a response involving a covered process, including all detection and monitoring equipment, alarms and communications systems, and personal protective equipment not used as part of normal operations (and thus not subject to the prevention program requirements related to operating procedures and maintenance). The procedures must describe:

- How and when to use the equipment properly;

How and when the equipment should receive routine maintenance; and

How and when the equipment should be inspected and tested for readiness.

Written procedures comparable to those necessary for process-related equipment under the OSHA PSM Standard and EPA's Program 2 and 3 Prevention Programs will be considered sufficient to meet this requirement.

EMPLOYEE TRAINING

If you already train your employees in how to respond to (or evacuate from) releases of regulated substances, then you do not need a new training program.

Keep in mind: Your training must address the actions to take in response to releases of regulated substances from all covered processes. The training should be based directly on the procedures that you have included in your emergency response plan and must be given to all employees and contractors on site. Individuals should receive training appropriate to their responsibilities:

If they will only need to evacuate, then their training should cover when and how to evacuate their location.

If they may need to activate an alarm system in response to a release event, then their training should cover when and how to use the alarm system.

If they will serve on an emergency response team, then their training should cover how to use emergency equipment and how the incident command system works.

Emergency response training conducted in compliance with the HAZWOPER Standard and 29 CFR 1910.38 will be considered sufficient to meet this requirement.

RESPONSE PLAN EVALUATION

If you already have a formal practice for regular review and updates of your plan based on changes at the facility, you do not need to develop additional procedures.

Keep in mind: You must also identify the types of changes to the facility that would cause the plan to be updated (e.g., a new covered process) and include a method of communicating any changes to the plan to your employees (e.g., through training or safety meetings). You may want to set up a regular schedule on which you review your entire emergency response plan and identify any special conditions (e.g., a drill or exercise) that could result in an interim review.

8.6 COORDINATION WITH LOCAL EMERGENCY PLANNING ENTITIES (§ 68.95(c))

Once you determine that you have at least one covered process, you should open communications with local emergency planning and response officials, including your local emergency planning committee if one exists. Because your LEPC consists of representatives from many local emergency planning and response agencies, it is likely to be the best source of information on the critical emergency response issues in your community. However, in some cases, there may not be an active LEPC in your community. If so, or if your state has not designated your community as an emergency planning district under EPCRA, you will likely need to contact local agencies individually to determine which entities (e.g., fire department, emergency management agency, police department, civil defense office, public health agency) have jurisdiction for your facility.

KEY COORDINATION ISSUES

If you have any of the toxic regulated substances above the threshold quantity, you must have already designated an emergency coordinator to work with the LEPC on chemical emergency preparedness issues (a requirement for certain facilities regulated under EPCRA). If you have not (e.g., if your facility has only regulated flammable substances), you may want to do so at this time. The emergency coordinator should be the individual most familiar with your emergency response program (e.g., the person designated as having overall responsibility for this program in your management system — see Chapter 5).

Involvement in the activities of your LEPC can have a dramatically positive effect on your emergency response program, as well as on your relationship with the surrounding community. Your LEPC can provide technical assistance and guidance on a number of topics, such as conducting response training and exercises, developing mutual aid agreements, and evaluating public alert systems. The coordination process will help both the community and the facility prepare for an emergency, reducing expenditures of time and money, as well as helping eliminate redundant efforts.

You should consider providing the LEPC with draft versions of any emergency response program elements related to local emergency planning efforts. This submission can initiate a dialogue with the community on potential program improvements and lead to coordinated training and exercise efforts. In return, your LEPC can support your emergency response program by providing information from its own emergency planning efforts, including:

- Data on wind direction and weather conditions, or access to local meteorological data, to help you make decisions related to the evacuation of employees and public alert notification;

Lists of emergency response training programs available in the area for training police, medical, and fire department personnel, to help you identify what training is already available;

Schedules of emergency exercises designed to test the community response plan to spur coordinated community-facility exercises;

Lists of emergency response resources available from both public and private sources to help you determine whether and how a mutual aid agreement could support your program; and

Details on incident command structure, emergency points of contact, availability of emergency medical services, and public alert and notification systems.

Upon completion of your emergency response plan, you should coordinate with the LEPC, local response organizations, local hospitals, and other response organizations (e.g., state hazmat team) and offer them a copy of the plan. In some instances, only a portion of the plan may be of use to individuals or organizations; in such cases, you should consider making only that portion of the plan available. For instance, it may be appropriate to send a hospital only the sections of your plan that address emergency medical procedures and decontamination.

You may also want to provide your LEPC and local response entities with a description of your emergency response program elements, as well as any important subsequent amendments or updates, to ensure that the community is aware of the scope of your facility response efforts prior to an emergency. Although the summary of your emergency response program will be publicly available as part of your RMP, this information may not be as up-to-date or as comprehensive. Remember, the LEPC has been given the authority under EPCRA and Clean Air Act regulations to request any information necessary for preparing the community response plan.

Planning for Flammable Substances

In the case of regulated flammable substances, the fire department with jurisdiction over your facility may already be conducting fire prevention inspections and pre-planning activities under its own authority. Your participation in these efforts (as requested) will allow local responders to gather the information they need and prepare for an emergency. If there is no local fire department, or if there is only a volunteer fire department in your area, you may need to contact other local response or planning officials (e.g., police) to determine how you can work with the community.

CHAPTER 9: RISK MANAGEMENT PLAN (PART 68, SUBPART G)

You must submit one risk management plan (RMP) to EPA for all of your covered processes (§ 68.150). EPA is developing an electronic submission program for your use. If you cannot submit electronically, you may request a hardship waiver and submit your RMP on paper. In either case, your RMP is due no later than the latest of the following dates:

- June 21, 1999;
- The date on which a regulated substance is first present above a threshold quantity in a process; or
- Three years after the date on which a regulated substance is first listed by EPA.

EPA's automated tool for submitting RMPs, RMP*Submit™, discussed below, will be available in January 1999.

9.1 ELEMENTS OF THE RMP

The length and content of your RMP will vary depending on the number and program level of the covered processes at your facility. See Chapter 2 for detailed guidance on how to determine the program levels of each of the covered processes at your facility.

Any facility with one or more covered processes must include in its RMP:

- An executive summary (§ 68.155);
- The registration for the facility (§ 68.160);
- The certification statement (§ 68.185);
- A worst-case scenario for each Program 1 process; at least one worst-case scenario to cover all Program 2 and 3 processes involving regulated toxic substances; at least one worst-case scenario to cover all Program 2 and 3 processes involving regulated flammables (§ 68.165(a));
- The five-year accident history for each process (§ 68.168); and
- A summary of the emergency response program for the facility (§ 68.180).

Any facility with at least one covered process in Program 2 or 3 must also include in its RMP:

At least one alternative release scenario for each regulated toxic substance in Program 2 or 3 processes and at least one alternative release scenario to cover all regulated flammables in Program 2 or 3 processes (§ 68.165(b));

A summary of the prevention program for each Program 2 process (§ 68.170); and

A summary of the prevention program for each Program 3 process (§ 68. 175).

Subpart G of part 68 (see Appendix A) provides more detail on the data required for each of the elements. The actual RMP form, however, will contain more detailed guidance to make it possible to limit the number of text entries. For example, the rule requires you to report on the major hazards identified during a PHA or hazard review and on public receptors affected by worst-case and alternative case scenarios. The RMP will provide a list of options for you to check for these elements. Except for the executive summary, the RMP will consist primarily of yes/no answers, numerical information (e.g., dates, quantities, distances), and a few text answers (e.g., names, addresses, chemical identity). Where possible, RMP*Submit™ will provide "pick lists" to help you complete the form. For example, RMP*Submit™ will provide a list of regulated substances and automatically fill in the CAS numbers when you select a substance.

EPA will provide instructions for each of the data elements to be reported in the RMP with RMP*Submit™. The instructions will explain each data element and help you understand what acceptable data are for each. The instructions will be made available with the software and will be posted on EPA's web site.

9.2 RMP SUBMISSION

ELECTRONIC SUBMISSION

By January 1999, EPA will make RMP*Submit™ available to complete and file your RMP. RMP*Submit™ will do the following:

Provide a user-friendly, PC-based RMP Submission System available on diskettes and via the Internet;

Use a standards-based, open systems architecture so private companies can create compatible software; and

Perform data quality checks, accept limited graphics, and provide on-line help including defining data elements and providing instructions.

The software will run on Windows 3.1 and above. There will not be a DOS or MAC version.

Further details on this system will be made available as the system is completed. RMPs will be submitted to an EPA RMP Record Center on disk.

HARD COPY SUBMISSION

If you are unable to submit electronically for any reason, just fill out the Electronic Waiver form available in the RMP*Submit™ manual and send it in with your RMP. See the RMP*Submit manual for more information on the Electronic Waiver.

9.3 RESUBMISSION AND UPDATES (§ 68.190)

When you are required to update and resubmit your RMP is based on whether and what changes occur at your facility. Please refer to the Exhibit 9-1 and note that you are required to update and resubmit your RMP on the **earliest** of the dates that apply to your facility:

WHEN DOES THE OFFSITE CONSEQUENCE ANALYSIS (OCA) NEED TO BE REVISED?

You'll need to revise your OCA when a change at your facility results in the distance to an endpoint from a worst-case release rising or falling by at least a factor of two. For example, if you increase your inventory substantially or install passive mitigation to limit the potential release rate, you should re-estimate the distance at an endpoint. If the distance is at least doubled or halved, you must revise the RMP. For most substances, the quantity that would be released would have to increase by more than a factor of five to double the distance to an endpoint.

HOW DO I DE-REGISTER?

If your facility is no longer covered by this rule, you must submit a letter to the RMP Record Center within six months indicating that your stationary source is no longer covered.

EXHIBIT 9-1
RMP UPDATES

Change That Occurs at Your Facility	Date by Which You Must Update and Submit your RMP
No changes occur	Within 5 years of initial submission
A newly regulated substance is first listed by EPA	Within 3 years of the date EPA listed the newly regulated substance
A regulated substance is first present above its threshold quantity in: -- A process already covered; or -- A new process.	On or before the date the quantity of the regulated substance exceeds the threshold in the process.
A change occurs that results in a revised PHA or hazard review	Within 6 months of the change
A change occurs that requires a revised offsite consequence analysis	Within 6 months of the change
A change occurs that alters the Program level that previously applied to any covered process	Within 6 months of the change
A change occurs that makes the facility no longer subject to the requirements to submit a Risk Management Plan	Submit a revised registration (indicating that the RMP is no longer required) to EPA within 6 months of the change

Q & A
"REVISING" A PHA

Q. The rule states that I have to update my RMP whenever I revise a PHA. What constitutes a revised PHA? Every time I go through management of change procedures I make a notation in the PHA file for the process, but would that constitute a revised PHA if the change did not affect the validity of the PHA?

A. All changes (except replacement in kind) are subject to the management of change of procedures. When processes undergo minor changes (e.g., minor rerouting of a piping run), information is typically added to a PHA file to reflect the change, even though the validity of the PHA is not affected by the modification. These minor changes and the addition of information about the change to the PHA file are not considered a 'revision' of the PHA under the part 68. Major changes that invalidate' a PHA, leading you to 'update' or 'revalidate' the PHA so that it accurately reflects the hazards of the process, are considered a revision of the PHA under part 68.

CHAPTER 10: IMPLEMENTATION

10.1 IMPLEMENTING AGENCY

The implementing agency is the federal, state, or local agency that is taking the lead for implementation and enforcement of part 68. The implementing agency will review RMPs, select some RMPs for audits, and conduct on-site inspections. The implementing agency should be your primary contact for information and assistance.

WHO IS MY IMPLEMENTING AGENCY?

Under the CAA, EPA will serve as the implementing agency until a state or local agency seeks and is granted delegation under CAA section 112(l) and 40 CFR part 63, subpart E. You should check with the EPA Regional Office to determine if your state has been granted delegation or is in the process of seeking delegation. The Regional Office will be able to provide contact names at the state or local level. See Appendix C for addresses and contact information for EPA Regions and state implementing agencies.

IF THE PROGRAM IS DELEGATED, WHAT DOES THAT MEAN?

To gain delegation, a state or local agency must demonstrate that it has the authority and resources to implement and enforce part 68 for all covered processes in the state or local area. Some states may, however, elect to seek delegation to implement and enforce the rule for only sources covered by an operating permit program under Title V of the CAA. When EPA determines that a state or local agency has the required authority and resources, EPA may delegate the program. If the state's rules differ from part 68 (a state's rules are allowed to differ in certain specified respects, as discussed below), EPA will adopt, through rulemaking, the state program as a substitute for part 68 in the state, making the state program federally enforceable. In most cases, the state will take the lead in implementation and enforcement, but EPA maintains the ability to enforce part 68 in states in which EPA has delegated part 68. Should EPA decide that it is necessary to take an enforcement action in the state, the action would be based on the state rule that EPA has adopted as a substitute for part 68. Similarly, citizen actions under the CAA would be based on the state rules that EPA has adopted.

Under 40 CFR 63.90, EPA will not delegate the authority to add or delete substances from § 68.130. EPA also plans to propose, in revisions to part 63, that authority to revise Subpart G (relating to RMPs) will not be delegated. With respect to RMPs, you would continue to be required to file your part 68 RMP, in the form and manner specified by EPA, to the central location EPA designates. You should check with your state to determine whether you need to file additional data for state use or submit amended copies of the RMP with the state to cover state elements or substances.

If your state has been granted delegation, it is important that you contact them to determine if the state has requirements in addition to those in part 68. State rules

may be more stringent than part 68. This document does not cover state requirements.

QS & AS
DELEGATION

Q. What states have been granted delegation or are in the process of seeking delegation?

A. Georgia has been granted delegation. The following states have indicated that they are interested in delegation:

California	Delaware	Florida	Hawaii	Louisiana	Mississippi
Missouri	New Jersey	Nevada	North Carolina	Ohio	Rhode Island
South Carolina					

Check with your EPA Regional contacts (see Appendix C) for a current list of states granted or seeking delegation.

Q. In what ways may state rules be more stringent? Does this document provide guidance on state differences?

A. States may impose more detailed requirements, such as requiring more documentation or more frequent reporting, specifying hours of training or maintenance schedules, imposing equipment requirements or call for additional analyses. Some states are likely to cover at least some additional chemicals and may use lower thresholds. This document does not cover state differences.

Q. Will the general duty clause be delegated?

A. The general duty clause (CAA section 112(r)(1)) is not included in part 68 and, therefore, will not be delegated. States, however, may adopt their own general duty clause under state law.

10.2 REVIEWS/AUDITS/INSPECTIONS (§ 68.220)

The implementing agency is required under part 68 to review and conduct audits of RMPs. Reviews are relatively quick checks of the RMPs to determine whether they are complete and whether they contain any information that is clearly problematic. For example, if an RMP for a process containing flammables fails to list fire and explosion as a hazard in the prevention program, the implementing agency may flag that as a problem. The RMP data system will perform some of the reviews automatically by flagging RMPs submitted without necessary data elements completed.

Facilities may be selected for audits based on any of the following criteria, set out in § 68.220:

- Accident history of the facility

Accident history of other facilities in the same industry
Quantity of regulated substances handled at the site
Location of the facility and its proximity to public and environmental receptors
The presence of specific regulated substances
The hazards identified in the RMP
A plan providing for random, neutral oversight

WHAT ARE AUDITS AND HOW MANY WILL BE CONDUCTED?

Under the CAA and part 68, audits are conducted on the RMP. Audits will generally be reviews of the RMP to review its adequacy and require revisions when necessary to ensure compliance with part 68. Audits will help identify whether the underlying risk management program is being implemented properly. The implementing agency will look for any inconsistencies in the dates reported for compliance with prevention program elements. For example, if you report that the date of your last revision of operating procedures was in June 1998 but your training program was last reviewed or revised in December 1994, the implementing agency will ask why the training program was not reviewed to reflect new operating procedures.

The agency will also look at other items that may indicate problems with implementation. For example, if you fail to list an appropriate set of process hazards for the process chemicals, the agency may seek further explanations as to why you reported in the way you did. The implementing agency may compare your data with that of other facilities in the same industrial sector using the same chemicals to identify differences that may indicate compliance problems.

If audits indicate potential problems, they may lead to requests for more information or to on-site inspections. If the implementing agency determines that problems exist, it will issue a preliminary determination listing the necessary revisions to the RMP, an explanation of the reasons for the revisions, and a timetable. Section 68.220 provides details of the administrative procedures for responding to a preliminary determination.

The number of audits conducted will vary from state to state and from year to year. Neither the CAA nor part 68 sets a number or percentage of facilities that must be audited during a year. Implementing agencies will set their own goals, based on their resources and particular concerns.

WHAT ARE INSPECTIONS?

Inspections are site visits to check on the accuracy of the RMP data and on the implementation of all part 68 elements. During inspections, the implementing agency will probably review the documentation for rule elements, such as the PHA reports, operating procedures, maintenance schedules, process safety information, and training. Unlike audits, which focus on the RMP but may lead to determinations concerning needed improvements to the risk management program, inspections will focus on the underlying risk management program itself.

Implementing agencies will determine how many inspections they need to conduct. Audits may lead to inspections or inspections may be done separately. Depending on the focus of the inspection (all covered processes, a single process, or particular part of the risk management program) and the size of the facility, inspections may take several hours to several weeks.

10.3 RELATIONSHIP WITH TITLE V PERMIT PROGRAMS

Part 68 is an applicable requirement under the CAA Title V permit program and must be listed in a Title V air permit. You do not need a Title V air permit solely because you are subject to part 68. If you are required to apply for a Title V permit because you are subject to requirements under some other part of the CAA, you must:

- List part 68 as an applicable requirement in your permit
- Include conditions that require you to either submit a compliance schedule for meeting the requirements of part 68 by the applicable deadlines or include compliance with part 68 as part of your certification statement.

You must also provide the permitting agency with any other relevant information it requests. WWTPs may require air permits; check with the environmental compliance officer for your facility.

The RMP and supporting documentation are not part of the permit and should not be submitted to the permitting authority. The permitting authority is only required to ensure that you have submitted the RMP and that it is complete. The permitting authority may delegate this review of the RMP to other agencies.

If you have a Title V permit and it does not address the part 68 requirement, you should contact your permitting authority and determine whether your permit needs to be amended to reflect part 68.

10.4 PENALTIES FOR NON-COMPLIANCE

Penalties for violating the requirements or prohibitions of part 68 are set forth in CAA section 113. This section provides for both civil and criminal penalties. EPA may assess civil penalties of not more than $27,500 per day per violation. Any one convicted of knowingly violating part 68 may also be punished by a fine pursuant to Title 18 of the U.S. Code or by imprisonment for no more than five years, or both; anyone convicted of knowingly filing false information may be punished by a fine pursuant to Title 18 or by imprisonment for no more than two years.

QS & AS
AUDITS

Q. If we are a Voluntary Protection Program (VPP) facility under OSHA's VPP program, are we exempt from audits?

A. You are exempt from audits based on accident history of your industry sector or on random, neutral oversight. An implementing agency that is basing its auditing strategy on other factors may include your facility although EPA expects that VPP facilities will generally not be a high priority for audits unless they have a serious accident.

Q. If we have been audited by a qualified third party, for ISO 14001 certification or for other programs, are we exempt from audits?

A. No, but you may want to inform your implementing agency that you have gained such certification and indicate whether the third party reviewed part 68 compliance as part of its audit. The implementing agency has the discretion to determine whether you should be audited.

Q. Will we be audited if a member of the public requests an audit of our facility?

A. The implementing agency will have to decide whether to respond to such public requests. EPA's intention is that part 68 implementation reflect that hazards are primarily a local concern.

CHAPTER 11: COMMUNICATION WITH THE PUBLIC

Once you have prepared and submitted your RMP, EPA will make it available to the public. Public availability of the RMP is a requirement under section 114(c) of the Clean Air Act (the Act provides for protection of trade secrets, and EPA will accordingly protect any portion of the RMP that contains Confidential Business Information). Therefore, you can expect that your community will discuss the hazards and risks associated with your facility as indicated in your RMP. You will necessarily be part of such discussions. The public and the press are likely to ask you questions because only you can provide specific answers about your facility and your accident prevention program. This dialogue is a most important step in preventing chemical accidents and should be encouraged. You should respond to these questions honestly and candidly. Refusing to answer, reacting defensively, or attacking the regulation as unnecessary are likely to make people suspicious and willing to assume the worst. A basic fact of risk communication is that trust, once lost, is very hard to regain. As a result, you should prepare as early as possible to begin talking about these issues with the community, Local Emergency Planning Committees (LEPCs), State Emergency Response Commissions (SERCs), other local and state officials, and other interested parties.

Communication with the public can be an opportunity to develop your relationship with the community and build a level of trust among you, your neighbors, and the community at large. By complying with the RMP rule, you are taking a number of steps to prevent accidents and protect the community. These steps are the individual elements of your risk management program. A well-designed and properly implemented risk management program will set the stage for informative and productive dialogue between you and your community. The purpose of this chapter is to suggest how this dialogue may occur. In addition, note that some industries have developed guidance and other materials to assist in this process; contact your trade association for more information.

11.1 BASIC RULES OF RISK COMMUNICATION

Risk communication means establishing and maintaining a dialogue with the public about the hazards at your operation and discussing the steps that have been or can be taken to reduce the risk posed by these hazards. Of particular concern under this rule are the hazards related to the chemicals you use and what would happen if you had an accidental release.

Many companies, government agencies, and other entities have confronted the same issue you may face: how to discuss with the public the risks the community is subject to. Exhibit 11-1 outlines seven "rules" of risk communication that have been developed based on many experiences of dealing with the public about risks.

A key message of these "rules" is the importance and legitimacy of public concerns. People generally are less tolerant of risks they cannot control than those they can. For example, most people are willing to accept the risks of driving because they have some control over what happens to them. However, they are generally more

uncomfortable accepting the risks of living near a facility that handles hazardous chemicals if they feel that they have no control over whether the facility has an accident. The Clean Air Act's provision for public availability of RMPs gives public an opportunity to take part in reducing the risk of chemical accidents that might occur in their community.

Exhibit 11-1: Seven Cardinal Rules of Risk Communication

1. Accept and involve the public as a legitimate partner
2. Plan carefully and evaluate your efforts
3. Listen to the public's specific concerns
4. Be honest, frank, and open
5. Coordinate and collaborate with other credible sources
6. Meet the needs of the media
7. Speak clearly and with compassion

HAZARDS VERSUS RISKS

Dialogue in the community will be concerned with both hazards and risks; it is useful to be clear about the difference between them.

Hazards are inherent properties that cannot be changed. Chlorine is toxic when inhaled or ingested; propane is flammable. There is little that you can do with these chemicals to change their toxicity or flammability. If you are in an earthquake zone or an area affected by hurricanes, earthquakes and hurricanes are hazards. When you conduct your hazard review or process hazards analysis, you will be identifying your hazards and determining whether the potential exposure to the hazard can be reduced in any way (e.g., by limiting the quantity of chlorine stored on-site).

Risk is usually evaluated based on several variables, including the likelihood of a release occurring, the inherent hazards of the chemicals combined with the quantity released, and the potential impact of the release on the public and the environment. For example, if a release during loading occurs frequently, but the quantity of chemical released is typically small and does not generally migrate offsite, the overall risk to the public is low. If the likelihood of a catastrophic release occurring is extremely low, but the number of people who could be affected if it occurred is large, the overall risk may still be low because of the low probability that a release will occur. On the other hand, if a release occurs relatively frequently *and* a large number of people could be affected, the overall risk to the public is high.

The rule does not require you to assess risk in a quantitative way because, in most cases, the data you would need to estimate risk levels (e.g., one in 100 years) are not available. Even in cases where data such as equipment failure rates are available, there are large uncertainties in using that data to determine a numerical risk level for your facility, because your facility is probably not the same as other facilities, and your situation may be dynamic. Therefore, you may want to assign qualitative values (high, medium, low) to the risks that you have identified at your facility, but you should be prepared to explain the terms if you do. For example, if you believe that the worst-case release is very unlikely to occur, you must give good reasons; you must be able to provide specific examples of measures that you have taken to prevent such a release, such as installation of new equipment, careful training of your workers, rigorous preventive maintenance, etc. You should also be able to show documentation to support your claim.

WHO WILL ASK QUESTIONS?

Your Local Emergency Planning Committee (LEPC) and other facilities can help you identify individuals in the following groups who may be reviewing RMP data and asking questions. Interested parties may include:

(1) Persons living near the facility and elsewhere in the community or working at a neighboring facility

(2) Local officials from zoning and planning boards, fire and police departments, health and building code officials, elected officials, and various county and state officials

(3) Your employees

(4) Special interest groups including environmental organizations, chambers of commerce, unions, and various civic organizations

(5) Journalists, reporters, and other media representatives

(6) Medical professionals, educators, consultants, neighboring companies and others with special expertise or interests

In general, people will be concerned about accident risks at your facility, how you manage the risks, and potential impacts of an accident on health, safety, property, natural resources, community infrastructure, community image, property values, and other matters. Those individuals in the public and private sector who are responsible for dealing with these impacts and the associated risks also will have an interest in working with you to address these risks.

WHAT INFORMATION ABOUT YOUR FACILITY IS AVAILABLE TO THE PUBLIC?

Even though the non-confidential information you provide in your RMP is available to the public, it is likely that people will want additional information. Interested

parties will know that you retain additional information at your facility (e.g., documentation of the results of the offsite consequence analysis reported in your RMP) and are required to make it available to EPA or its implementing agency during inspections or compliance audits. Therefore, they may request such information. EPA encourages you to provide public access to this information. If EPA or its implementing agency were to request this information, it would be available to the public under section 114(c) of the CAA.

The public may also be interested in other information relevant to risk management at your facility, such as:

- Submissions under sections 302, 304, 311-312, and 313 of the Emergency Planning and Community Right to Know Act (EPCRA) reporting on chemical storage and releases, as well as the community emergency response plan prepared under EPCRA section 303

- Other reports on hazardous materials made, used, generated, stored, spilled, released and transported, that you submitted to federal, state, and local agencies

- Reports on workplace safety and accidents developed under the Occupational Safety and Health Act that you provide to employees, who may choose to make the information publicly available, such as medical and exposure records, chemical data sheets, and training materials

- Any other information you have provided to public agencies that can be accessed by members of the public under the federal Freedom of Information Act and similar state laws (and that may have been made widely available over the Internet)

- Any published materials on facility safety (either industry- or site-specific), such as agency reports on facility accidents, safety engineering manuals and textbooks, and professional journal articles on facility risk management, for example

11.2 SAMPLE QUESTIONS FOR COMMUNICATING WITH THE PUBLIC

Smaller businesses may not have the resources or time to develop the types of outreach programs, described later in this chapter, that many larger chemical companies have used to handle public questions and community relations. For many small businesses, communication with the public will usually occur when you are asked questions about information in your RMP. It is important that you respond to these questions constructively. Go beyond just answering questions; discuss what you have done to prevent accidents and work with the community to reduce risks. The people in your community will be looking to you to provide answers.

To help you establish a productive dialogue with the community, the rest of this section presents questions you are likely to be asked and a framework for answering

them. These are elements of the public dialogue that you may anticipate. The person from your facility designated as responsible for communicating with the public should review the following and talk to other community organizations to determine which questions are most likely to be raised and identify other foreseeable issues. Remember that others in the community, notably LEPCs and other emergency management organizations are also likely to be asked these and other similar questions. You should consider the unique features of your facility, your RMP, and your historical relationship with the community (e.g., prior accidents, breakdowns in the coordination of emergency response efforts, and management-labor disputes), and work together with these other organizations to answer these questions for your situation and to resolve the issues associated with them.

What Does Your Worst-case Release Distance Mean?

The distance is intended to provide an estimate of the maximum possible area that might be affected under catastrophic conditions. It is intended to ensure that no potential risks to public health are overlooked, but the distance to an endpoint estimated under worst-case conditions should not be considered a "public danger zone."

In most cases, the mathematical models used to analyze the worst-case release scenario as defined in the rule may overestimate the area that would be impacted by a release. In other cases, the models may underestimate the area. For distances greater than approximately six miles, the results of toxic gas dispersion models are especially uncertain, and you should be prepared to discuss such possibilities in an open, honest manner.

Reasons that modeling may underestimate the distance generally relate to the inability of some models to account for site-specific factors that might tend to increase the actual endpoint distance. For example, assume a facility is located in a river valley and handles dense toxic gases such as chlorine. If a release were to occur, the river valley could channel the toxic cloud much farther than it might travel if it were to disperse in a location with generally flat terrain. In such cases, the actual endpoint distance might be longer than that predicted using generic lookup tables.

Reasons that the area may be overestimated include:

For toxics, the weather conditions (very low wind speed, calm conditions) assumed for a worst-case release scenario are uncommon and probably would not last as long as the time the release would take to travel the distance estimated. If weather conditions are different, the distance would be much shorter.

For flammables, although explosions can occur, a release of a flammable is more likely to disperse harmlessly or burn. If an explosion does occur, however, this area could be affected by the blast; debris from the blast could affect an even broader area.

In general, some models cannot take into account other site-specific factors that might tend to disperse the chemicals more quickly and limit the distance.

Note: When estimating worst case release distances, the rule does not allow facilities to take into account active mitigation systems and practices that could limit the scope of a release. Specific systems (e.g., monitoring, detection, control, pressure relief, alarms, mitigation) may limit a release or prevent the failure from occurring. Also, if you are required to analyze alternative release scenarios (i.e., if your facility is in Program 2 or Program 3), these scenarios are generally more realistic than the worst case, and you can offer to provide additional information on those scenarios.

What does it mean that we could be exposed if we live/work/shop/go to school X miles away?

(For an accident involving a flammable substance):

The distance means that people who are in that area around the facility could be hurt if the contents of a tank or other vessel exploded. The blast of the explosion could shatter windows and damage buildings. Injuries would be the result of the force of the explosion and of flying glass or falling debris.

(For an accident involving a toxic substance):

The distance is based on a concentration of the chemical that you could be exposed to for an hour without suffering irreversible health effects or other symptoms that would make it difficult for you to escape. If you are within that distance, you could be exposed to a greater concentration of the chemical. If you were exposed to higher levels for an extended period of time (10 minutes, 30 minutes, or longer), you could be seriously hurt. However, that does not mean that you would be. Remember, for worst case scenarios, the rule requires you to make certain conservative assumptions with respect to, for example, wind speed and atmospheric stability. If the wind speed is higher than that used in the modeling, or if the atmosphere is more unstable, a chemical release would be dispersed more quickly, and the distances would be much smaller and the exposure times would be shorter. If the question pertains to an alternative release scenario, you probably assumed typical weather conditions in the modeling. Therefore, the actual impact distance could be shorter or longer, and you should be prepared to acknowledge this and clearly explain how you chose the conditions for your release scenario.

In general, the possibility of harm depends on the concentration of the chemical you are exposed to and the length of time you are exposed.

IF THERE IS AN ACCIDENT, WILL EVERYONE WITHIN THAT DISTANCE BE HURT? WHAT ABOUT PROPERTY DAMAGE?

In general, no. For an explosion, everyone within the circle would certainly feel the blast wave since it would move in all directions at once. However, while some people within the circle could be hurt, it is unlikely that everyone would be since some people would probably be in less vulnerable locations. Most injuries would probably be due to the effects of flying glass, falling debris, or impact with nearby objects.

Two types of chemicals may be modeled - toxics and flammables. Releases of flammables do not usually lead to explosions; released flammables are more likely to disperse without igniting. If the released flammable does ignite, a fire is more likely than an explosion, and fires are usually concentrated at the facility.

For toxic chemicals, whether someone is hurt by a release depends on many factors. First, the released chemicals would usually move in the direction of the wind (except for some dense gases, which may be constrained by terrain features to flow in a different direction). Generally, only people downwind from the facility would be at risk of exposure if a release occurred, and this is normally only a part of the population inside the circle. If the wind speed is moderate, the chemicals would disperse quickly, and people would be exposed to lower levels of the chemical. If the release is stopped quickly, they might be exposed for a very short period time, which is less likely to cause injury. However, if the wind speed is low or the release continues for a long time, exposure levels will be higher and more dangerous. The population at risk would be a larger proportion of the total population inside the circle. You should be prepared to discuss both possibilities.

Generally, it is the people who are closest to the facility — within a half mile or less — who would face the greatest danger if an accident occurred.

Damage to property and the environment will depend on the type of chemical released. In an explosion, environmental impacts and property damage may extend beyond the distance at which injuries could occur. For a vapor release, environmental effects and property damage may occur as a result of the reactivity or corrosivity of the chemical or toxic contamination.

How Sure Are You of Your Distances?

Perhaps the largest single difficulty associated with hazard assessment is that different models and modeling assumptions will yield somewhat different results. There is no one model or set of assumptions that will yield "certain" results. Models represent scientists' best efforts to account for all the variables involved in an accidental release. While all models are generally based on the same physical principles, dispersion modeling is not an exact science due to the limited opportunity for real-world validation of results. No model is perfect, and every model represents a somewhat different analytical approach. As a result, for a given scenario, people can use different consequence models and obtain predictions of the distance to the toxic endpoint that in some situations might vary by a factor of ten. Even using the same model, different input assumptions can cause wide variations in the predictions. It follows that, when you present a single predicted value as your best estimate of the predicted distance, others will be able to claim that the answer ought to be different, perhaps greater, perhaps smaller, depending on the assumptions used in modeling and the choice of model itself.

You therefore need to recognize that your predicted distance lies within a considerable band of uncertainty, and to communicate this fact to those who have an interest in your results. A neighboring facility handling the same covered substances as you do may have come up with a different result for the same scenario for these reasons.

If you use this guidance document, you will be able to address the issue of uncertainty by stating that the results you have generated are conservative (that is they are likely to overestimate distances). However, if you use other models, you will have to provide your own assessment of where your specific prediction lies within the plausible range of uncertainties.

Why Do You Need to Store So Much On-Site?

If you have not previously considered the feasibility of reducing the quantity, you should do so when you develop your risk management program. Many companies have cited public safety concerns as a reason for reducing the quantities of hazardous chemicals stored on-site or for switching to non-hazardous substitutes. If you have evaluated your process and determined that you need a certain volume to maintain your operations, you should explain this fact to the public in a forthright manner. As appropriate, you should also discuss any alternatives, such as reducing storage quantities and scheduling more frequent deliveries. Perhaps these options are feasible - if so, you should consider implementing them; if not, explain why you consider these alternatives to be unacceptable. For example, in some situations, more frequent deliveries would mean more trucks carrying the substance through the community on a regular basis and a greater opportunity for smaller-scale releases because of more frequent loading and unloading.

WHAT ARE YOU DOING TO PREVENT RELEASES?

If you have rigorously implemented your risk management program, this question will be your chance, if you have not already done so, to tell the community about your prevention activities, the safe design features of your operations, the specific activities that you are performing such as training, operating procedures, maintenance, etc., and any industry codes or standards you use to operate safely. If you have installed new equipment or safety systems, upgraded training, or had outside experts review your site for safety (e.g., insurance inspectors), you could offer to share the results. You may also want to mention state or federal rules you comply with.

WHAT ARE YOU DOING TO PREPARE FOR RELEASES?

For such questions, you will need to talk about any coordination that you have done with the local fire department, LEPC, or mutual aid groups. Such coordination may include activities such as defining an incident command structure, developing notification protocols, conducting response training and exercises, developing mutual aid agreements, and evaluating public alert systems. This description is particularly important if your employees are not designated or trained to respond to releases of regulated substances.

If your employees will be involved in a response, you should describe your emergency response plan and the emergency response resources available at the facility (e.g., equipment, personnel), as well as through response contractors, if appropriate. You also may want to indicate the types of events for which such resources are applicable. Finally, indicate your schedule for internal emergency response training and drills and exercises and discuss the results of the latest relevant drill or exercise, including problems found and actions taken to address them.

DO YOU NEED TO USE THIS CHEMICAL?

Again, if you have not yet considered the feasibility of switching to a non-hazardous substitute, you should do so when you develop your risk management program. Assuming that there is no substitute, you should describe why the chemical is critical to what you produce and explain what you do to handle it safely. If there are substitutes available, you should describe how you have evaluated such options.

WHY ARE YOUR DISTANCES DIFFERENT FROM THE DISTANCES IN THE EPA LOOKUP TABLES?

If you did your own modeling, this question may come up. You should be ready to explain in a general way how your model works and why it produces different results. EPA allows using other models (as long as certain parameters and conditions specified by the rule are met) because it realizes that EPA lookup table results will not necessarily reflect all site-specific conditions.

In addition, although all models are generally based on the same physical principles, dispersion modeling is not an exact science due to the limited opportunity for real-world validation of the results. Thus, the method by which different models combine the basic factors such as wind speed and atmospheric stability can result in distances that readily vary by a factor of two (e.g., five miles versus ten miles). The introduction of site-specific factors can produce additional differences.

EPA recognizes that different models will produce differing predictions of the distance to an endpoint, especially for releases of toxic substances. The Agency has provided a discussion of the uncertainties associated with the model it has adopted for the OCA Guidance. You need to understand that the distances produced by another model lie within a band of uncertainty and be able to demonstrate and communicate this fact to those who are reviewing your results.

HOW LIKELY ARE THE WORST-CASE AND ALTERNATIVE RELEASE SCENARIOS?

It is generally not possible to provide accurate numerical estimates of how likely these scenarios are. EPA has stated that providing such numbers for accident scenarios rarely is feasible because the data needed (e.g., on rates for equipment failure and human error) are not usually available. Even when data are available, there are large uncertainties in applying the data because each facility's situation is unique.

In general, the risk of the worst-case scenario is low. Although catastrophic vessel failures have occurred, they are rare events. Combining them with worst-case weather conditions makes the overall scenario even less likely. This does not mean that such events cannot or will not happen, however.

At normal temperatures, experiments indicate that methane is very unlikely to explode; cold methane explodes more readily. Digester gas, which is usually at normal temperatures, is therefore unlikely to explode.

For the alternative scenario, the likelihood of the release is greater and will depend, in part, on the scenario you chose. If you selected a scenario based on your accident history or industry accident history, you should explain this to the public. You should also discuss any steps you are taking to prevent such an accident from recurring.

IS THE WORST-CASE RELEASE YOU REPORTED REALLY THE WORST ACCIDENT YOU CAN HAVE?

The answer to this question will depend on the type of facility you have and how you handle chemicals. EPA defined a specific scenario (failure of the single largest vessel) to provide a common basis of comparison among facilities nationwide. So, if you have only one vessel, EPA's worst case is likely to be the worst event you could have.

On the other hand, if you have a process which involves multiple co-located or interconnected vessels, it is possible that you could have an accident more severe than EPA's worst case scenario. If credible scenarios exist that could be more serious (in terms of quantities released or consequences) than the EPA worst case scenario, you should be ready to discuss them. For example, if you store chlorine in small containers such as 150-pound cylinders, the EPA-defined worst-case release scenario may involve a limited quantity, but a fire or explosion at the facility could release larger quantities if multiple containers are involved. In this case, you should be ready to frankly discuss such a scenario with the public. If you take precautions to prevent such scenarios from occurring, you should explain these precautions also. If an accidental release is more likely to involve multiple cylinders than a single cylinder as a result, for example, of the cylinders being stored closely together, then you must select such a scenario as your alternative release scenario so that information on this scenario is available in your RMP.

WHAT ABOUT THE ACCIDENT AT THE [NAME OF SIMILAR FACILITY] THAT HAPPENED LAST MONTH?

This question highlights an important point: you need to be aware of events in your industry (e.g., accidents, new safety measures) for two reasons. First, your performance likely will be compared to that of your competitors. Second, learning about the circumstances and causes of accidents at other facilities like yours can help you prevent such accidents from occurring at your facility.

You should be familiar with accidents that happen at facilities similar to yours, and you should have evaluated whether your facility is at risk for similar accidents. You should take the appropriate measures to prevent the accident from occurring and be prepared to describe these actions. If your facility has experienced a similar release in the past, this information may be documented in your accident history or other publicly available records, depending on the date and nature of the incident, the quantity released, and other factors. If you have already taken steps specifically designed to address this type of accident, whether as a result of this accident, a prior accident at your facility, or other internal decision-making, you should describe these efforts. If, based on your evaluation, you determine that the accident could not occur at your facility, you should discuss the pertinent differences between the two facilities and explain why you believe those differences should prevent the accident from occurring at your facility.

WHAT ACTIONS HAVE YOU TAKEN TO INVOLVE THE COMMUNITY IN YOUR ACCIDENT PREVENTION AND EMERGENCY PLANNING EFFORTS?

If you have not actively involved the community in accident prevention and emergency planning in the past, you should acknowledge this as an area where you could improve and start doing so as you develop your risk management program. First, you may want to begin participating in the LEPC, SERC, and regional mutual aid organizations if you aren't doing so already. Other opportunities for community involvement are fire safety coordination activities with the local fire department, joint training and exercises with local public and private sector response personnel, the establishment of green fields between the facility and the community, and similar efforts.

When discussing accident prevention and emergency planning with the community, you should indicate any national programs in which you participate, such as the Chemical Manufacturers Association's Responsible Care program or Community Awareness and Emergency Response program or OSHA's Voluntary Protection Program. If fully implemented, these programs can help improve the safety of the facility and the community. You may have future plans to participate in areas described previously or have new initiatives associated with the risk management program. Be sure you ask what else the community would like you to do and explain how you will do it.

CAN WE SEE THE DOCUMENTATION YOU KEEP ON SITE?

If the requested information is not confidential business information, EPA encourages you to make it available to the public. Although you are not required to provide this information to the public, refusing to provide it simply because you are not compelled to is not the best approach. If you decide not to provide any or most of this material, you should have good reasons for not doing so and be prepared to explain these reasons to the public. Simply taking a defensive position or referring to the extent of your legal obligations is likely to threaten the effectiveness of your interaction with the community. Offer as much information as possible to the public; if particular documents would reveal proprietary information, try to provide a redacted copy, summary, or some other form that answers the community's concerns. You may want to work with your LEPC on this issue. You should also be aware that information that EPA or the implementing agency obtains as part of an inspection or investigation conducted under section 114 of the Clean Air Act would be available to the public under section 114(c) of the Act to the extent it does not reveal confidential business information.

11.3 COMMUNICATION ACTIVITIES AND TECHNIQUES

Although this section is most applicable to larger companies, small businesses may want to review it and use some of the ideas to expand their communications with

the public. To prepare for effective communication with the community, you should:

(1) Adopt an organizational policy that includes basic risk communication principles (see exhibit 11-1)

(2) Assign responsibilities and resources to implement the policy

(3) Plan to use "best communication practices"

ADOPT AN ORGANIZATIONAL COMMUNICATIONS POLICY

An organizational policy will support communication with the public on your RMP and make it an integral part of management practices. Otherwise, breakdowns are likely to occur, which could cause mistrust, hostility and conflicts.

A policy helps to establish communication as a normal organizational function and to present it as an opportunity rather than a burden or threat. The policy can be incorporated in an organization's policies, an approach taken by many companies who belong to the Responsible Care program of the Chemical Manufacturers Association (CMA). These companies have adopted CMA's Codes of Management Practices, which contain risk communication principles and practices.

Remember that what you communicate is more important than the type of communication policy or program you use, and what you actually *do* to maintain a safe facility is more important than anything you say. Your company's safety and prevention steps in your risk management program should serve as the core elements of any risk communication program.

ASSIGN RESPONSIBILITIES AND RESOURCES

A policy is only a paper promise until it is regularly and effectively implemented. Thus, you should follow up your communication policy by (1) having top management participate at the outset and at key points throughout the communication process, and (2) assigning communication responsibilities within your organization and providing the necessary resources.

Experience has demonstrated that assigning responsibility to knowledgeable managers, plant engineers, and staff and encouraging participation by employees, (most of whom are likely to be community residents) is a good communications practice. Delegating communication functions to outside technical consultants, attorneys, and public relations specialists has repeatedly failed to impress the community and even tends to incur mistrust. (However, if you hired a firm with acknowledged expertise in dispersion modeling, you may want them on hand to help respond to technical questions.)

Communications staff will need work time and resources to prepare presentation materials, hold meetings with interested persons in the community, and do other work necessary to respond to questions and concerns and maintain ongoing dialogue.

A training program in communication skills and incentives for good performance also may be advisable.

Organizations have a legitimate interest in preventing disclosure of confidential business information or statements that inadvertently and unfairly harm the organization or its employees. Thus, you should assure that your risk communication staff is instructed on how to deal with situations that pose these problems. This may mean that you have an internal procedure enabling your staff to bring such situations to top management and legal counsel for quick resolution, keeping in mind that unduly defensive or legalistic responses that result in restricting the amount of information that is provided can damage or destroy the risk communication process.

Your communication staff may find the following steps helpful in addressing the priority issues in the communication process:

Prior to RMP Submittal

Enlist employee support for, and involvement in, the communication process

Build on work you have done with your LEPC, fire department, and local officials, and gain their insights

Incorporate technical expertise, management commitment, and employee involvement in the risk communication process

Use your RMP's executive summary to begin the dialogue with the community; be sure you have taken all of the steps you present

Taking a community perspective, identify which data elements need to be clarified, interpreted, or amplified, and which are most likely to raise community concerns; then compile the information needed to respond and determine the most understandable methods (e.g., use of graphics) for presenting the information

At Submittal

Review the RMP to assure that you are familiar with its data elements and how they were developed. In particular, review the hazard assessment, prevention, and response program features, as well as documentation of the methods, data, and assumptions used, especially if an outside consultant performed the analyses and developed these materials. You have certified their accuracy and your spokesperson should know them intimately, as they reflect your plan

Review your performance in implementing the prevention and response programs and prepare to discuss problems identified and actions taken

Review your performance in investigating accidents and prepare to discuss any corrective actions that followed

Other Steps

Identify the most likely concerns about risks identified in the RMP but not fully addressed, consult with management and safety engineering, and determine additional measures the organization will take to resolve these concerns

Avoid misrepresentations and minimize the roles of public relations specialists

Identify "best communication practices" (as described in the next section) and plan how to use them

USE "BEST COMMUNICATION PRACTICES"

Many facilities already have gained considerable experience in communicating with the public. Lessons from their experiences are described below. However, the value of these best practices and your credibility will depend on your facility's possession and ongoing demonstration of certain essential qualities:

Top management commitment (e.g., owner and facility manager) to improving safety

Honesty, openness, and concern for the community

Respect for public concerns and perceptions

Commitment to maintaining a dialogue with all sectors of the community, to learning from this dialogue, and to being prepared to change your practices to make your facility more safe

Commitment to continuous improvement through internal procedures for evaluating incidents and promoting organizational learning

Knowledge of safety issues and safety management methods

Good working relationships with the LEPC, fire department, and other local officials

Active support for the LEPC and related activities

Employee support and commitment

Continuation of commitment despite potential public hostility or mistrust

Another note: Because each facility and community involves a unique combination of factors, the practices used to achieve good risk communication in one case do not necessarily ensure the same quality result when used in another case. Therefore, while it is advisable for you to review such experience to identify "best communication practices," you should carefully evaluate such practices to determine if they can be adapted to fit your unique circumstances. For example, if your facility is in the middle of an urban area, you probably will use different approaches than you would use if it were located in an industrial area far from any residential populations. These practices are complementary approaches to delivering your risk management message and responding to the concerns of the community.

With these cautions in mind, a number of "best" practices are outlined below for consideration. First, you will want to establish formal channels for information-sharing and communication with stakeholders. The most basic approaches include:

Convene public meetings for discussion and dialogue regarding your risk management program and RMP and take steps to have the facility owner or manager and all sectors of the community participate, including minorities and low-income residents

Arrange meetings with local media representatives to facilitate their understanding of your risk management program and the program summary presented in your RMP

Establish a repository of information on safety matters for the LEPC and the public and, if electronic, provide software for public use. Some organizations also have provided computer terminals for public use in the community library or fire department

Other, more resource-intensive activities of this type to consider include:

Create and convene focus groups (small working groups) to facilitate dialogue and action on specific concerns, including technical matters, and take steps to assure that membership in each group reflects a cross section of the community and includes technically trained persons (e.g., engineers, medical professionals)

Hold seminars on hypothetical release scenarios, prevention and response programs, applicable standards and industry practices, analytic methods and models (e.g., on dispersion of airborne releases, health effects of airborne concentrations), and other matters of special concern or complexity

Convene special meetings to foster dialogue and collaborations with the LEPC and the fire department and to establish a mutual assistance network with other facility managers in the community or region

Establish hot lines for telephone and e-mail communications between interested parties and your designated risk communication staff and, if feasible, a web site for posting useful information

In all of these efforts, remember to use plain language and commonly understood terms; avoid the use of acronyms and technical and legal jargon. In addition, depending on your audience, keep in mind that the preparation of multilingual materials may be useful or even necessary.

Secondly, you may want to initiate or expand programs that more directly involve the community in your operations and safety programs. Traditional approaches include:

Arrange facility tours so that members of the public can view operations and discuss safety procedures with supervisors and employees

Schedule drills and simulations of incidents to demonstrate how prevention and response programs work, with participation by community responders and other organizations (e.g., neighboring companies)

Conduct a "Safety Street" - a community forum generally sponsored by several industries in a locality, where your representatives present facility safety information, explain risks, and respond to public questions (see Section 11.4 for a reference to more information on this program)

Periodically reaffirm and demonstrate your commitment to safety in accordance with and beyond regulatory requirements and present data on your safety performance, using appropriate benchmarks or measures, in newsletters and by posting the information at your web site

Publicly honor and reward managers and employees who have performed safety responsibilities in superior fashion and citizens who have made important contributions to the dialogue on safety

If community interest is significant, you may also want to consider the following activities:

Invite public participation in monitoring implementation of your risk management program elements

Invite public participation in auditing your performance in safety responsibilities, such as chemical handling and tracking procedures and analysis and follow-up on accidents and near misses

Organize a committee comprised of representatives from the facility, other industry, emergency planning and response organizations, and community groups and chaired by a community leader to independently evaluate your safety and communication efforts (e.g., a Community Advisory Panel). You may also want to finance the committee to pay for an independent engineering

consultant to assist with technical issues and learn what can be done to improve safety, and thereby share control with the community

Your communication staff should review these examples, consider designing their own activities as well as joint efforts with other local organizations, and ultimately decide with the community on which set of practices are feasible and can best create a healthy risk communication process in your community. Once these decisions are made, you may want to integrate the chosen set of practices in an overall communication program for your facility, transform some into standard procedures, and monitor and evaluate them for continuous improvement.

OTHER COMMUNICATION OPPORTUNITIES

By complying with the RMP rule and participating in the communications process with the community, you should have developed a comprehensive system for preventing, mitigating, and responding to chemical accidents at your facility. Why not share this knowledge with your staff, others you do business with (e.g., customers, distributors, contractors), and, perhaps through industry groups, others in your industry? If you transfer this knowledge to others, you can help improve their chemical safety management capabilities, enhance public safety beyond your community, and possibly gain economic benefits for your organization.

11.4 FOR MORE INFORMATION

Among the numerous publications on risk communication, the following may be particularly helpful:

Improving Risk Communication, National Academy Press, Washington, D.C., 1989

"Safety Street" and other materials on the Kanawha Valley Demonstration Program, Chemical Manufacturers Association, Arlington, VA

Community Awareness and Emergency Response Code of Management Practices and various Guidance, Chemical Manufacturers Association, Arlington, VA

Communicating Risks to the Public, R. Kasperson and P. Stallen, eds., Kluwer Publishing Co., 1991

"Challenges in Risk and Safety Communication with the Public," S. Maher, Risk Management Professionals, Mission Viejo, CA, April 1996

Primer on Health Risk Communication Principles and Practices, Agency for Toxic Substances and Disease Registry, on the World Wide Web at atsdr1.atsdr.cdc.gov:8080

Risk Communication about Chemicals in Your Community: A Manual for Local Officials, US Environmental Protection Agency, EPA EPCRA/Superfund/RCRA/CAA Hotline

Risk Communication about Chemicals in Your Community: Facilitator's Manual and Guide, US Environmental Protection Agency, EPA EPCRA/Superfund/RCRA/CAA Hotline

Chemicals, the Press, and the Public: A Journalist's Guide to Reporting on Chemicals in the Community, US Environmental Protection Agency, EPA EPCRA/Superfund/RCRA/CAA Hotline

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shall be paid to the State or local agent.

§ 67.43 Procedure where a formal State hearing was held.

(a) In reviewing a penalty calculation for which a hearing conforming to § 67.11(b)(4) was held, the Administrator may invite comment on issues identified by him as relevant to his review and shall propose or make findings as to the correctness of the determination and shall evaluate the accuracy and adequacy of the material transmitted pursuant to § 67.11(b)(5).

(b) The Administrator shall notify all participants in the State hearing of his findings and conclusions. If the Administrator finds that the State determination conformed to the requirements of the Act, part 66 (as modified by § 67.11), the Technical Support Document, and the Instruction Manual, his determination shall constitute a final action pursuant to section 120. If the Administrator finds that the State determination did not conform to the requirements of the Act or of part 66 (as modified by § 67.11) or to the Technical Support Document or Instruction Manual, the findings shall constitute proposed findings, and the notice shall invite participants to file exceptions to his proposed findings and, if necessary, schedule a time for argument.

(c) Within 60 days of receipt of any briefs or exceptions or after oral argument, the Administrator shall affirm, modify, or revoke his proposed findings that the State or local agent's determination did not conform to the requirements of the Act or of part 66 (as modified by § 67.11) or the Technical Support Document or Instruction Manual. The decision shall be in writing. Notice and a copy of the decision, which shall constitute final administrative action by EPA pursuant to section 120, shall be provided to the source owner or operator and to all other participants in the State hearing.

(d) If the Administrator finds that deficiencies in the State or local agent's hearing record prevent him from determining whether the State or local agent's determination conformed to the requirements of the Act and part 66 (as modified by § 67.11) or the Technical Support Document or Instruction Manual, he shall notify the State or local agent of his decision and specify what dificiencies exist and schedule a hearing in accordance with subpart F of part 66. Such notice shall operate to withdraw EPA's delegation of authority to the State or local agent over the facility in question unless the State or local agent within 15 days schedules a supplemental hearing to correct the deficiencies.

(e) Unless otherwise provided in the Administrator's notice to the State or local agent, any noncompliance penalties owed by the source owner or operator shall be paid to the State or local agent.

APPENDIX A TO PART 67—TECHNICAL SUPPORT DOCUMENT

NOTE: EPA will make copies of appendix A available from: Director, Stationary Source Compliance Division, EN-341, 401 M Street, SW., Washington, DC 20460.

[54 FR 25259, June 20, 1989]

APPENDIX B TO PART 67—INSTRUCTION MANUAL

NOTE: EPA will make copies of appendix B available from: Director, Stationary Source Compliance Division, EN-341, 401 M Street, SW., Washington, DC 20460.

[54 FR 25259, June 20, 1989]

APPENDIX C TO PART 67—COMPUTER PROGRAM

NOTE: EPA will make copies of appendix C available from: Director, Stationary Source Compliance Division, EN-341, 401 M Street, SW., Washington, DC 20460.

[54 FR 25259, June 20, 1989]

PART 68—CHEMICAL ACCIDENT PREVENTION PROVISIONS

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APPENDIX A TO PART 68—TABLE OF TOXIC ENDPOINTS

AUTHORITY: 42 U.S.C. 7412(r), 7601(a)(1), 7661–7661f.

SOURCE: 59 FR 4493, Jan. 31, 1994, unless otherwise noted.

Subpart A—General

§68.1 Scope.

This part sets forth the list of regulated substances and thresholds, the petition process for adding or deleting substances to the list of regulated substances, the requirements for owners or operators of stationary sources concerning the prevention of accidental releases, and the State accidental release prevention programs approved under section 112(r). The list of substances, threshold quantities, and accident prevention regulations promulgated under this part do not limit in any way the general duty provisions under section 112(r)(1).

§68.2 Stayed provisions.

(a) Notwithstanding any other provision of this part, the effectiveness of the following provisions is stayed from March 2, 1994 to December 22, 1997.

(1) In Sec. 68.3, the definition of "stationary source," to the extent that such definition includes naturally occurring hydrocarbon reservoirs or transportation subject to oversight or regulation under a state natural gas or hazardous liquid program for which the state has in effect a certification to DOT under 49 U.S.C. 60105;

(2) Section 68.115(b)(2) of this part, to the extent that such provision requires an owner or operator to treat as a regulated flammable substance:

(i) Gasoline, when in distribution or related storage for use as fuel for internal combustion engines;

(ii) Naturally occurring hydrocarbon mixtures prior to entry into a petroleum refining process unit or a natural gas processing plant. Naturally occurring hydrocarbon mixtures include any of the following: condensate, crude oil, field gas, and produced water, each as defined in paragraph (b) of this section;

(iii) Other mixtures that contain a regulated flammable substance and

that do not have a National Fire Protection Association flammability hazard rating of 4, the definition of which is in the NFPA 704, Standard System for the Identification of the Fire Hazards of Materials, National Fire Protection Association, Quincy, MA, 1990, available from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101; and

(3) Section 68.130(a).

(b) From March 2, 1994 to December 22, 1997, the following definitions shall apply to the stayed provisions described in paragraph (a) of this section:

Condensate means hydrocarbon liquid separated from natural gas that condenses because of changes in temperature, pressure, or both, and remains liquid at standard conditions.

Crude oil means any naturally occurring, unrefined petroleum liquid.

Field gas means gas extracted from a production well before the gas enters a natural gas processing plant.

Natural gas processing plant means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of natural gas liquids to natural gas products, or both. A separator, dehydration unit, heater treater, sweetening unit, compressor, or similar equipment shall not be considered a "processing site" unless such equipment is physically located within a natural gas processing plant (gas plant) site.

Petroleum refining process unit means a process unit used in an establishment primarily engaged in petroleum refining as defined in the Standard Industrial Classification code for petroleum refining (2911) and used for the following: Producing transportation fuels (such as gasoline, diesel fuels, and jet fuels), heating fuels (such as kerosene, fuel gas distillate, and fuel oils), or lubricants; separating petroleum; or separating, cracking, reacting, or reforming intermediate petroleum streams. Examples of such units include, but are not limited to, petroleum based solvent units, alkylation units, catalytic hydrotreating, catalytic hydrorefining, catalytic hydrocracking, catalytic reforming, catalytic cracking, crude distillation, lube oil processing, hydrogen production, isomerization, polymerization, thermal processes, and blending, sweetening, and treating processes. Petroleum refining process units include sulfur plants.

Produced water means water extracted from the earth from an oil or natural gas production well, or that is separated from oil or natural gas after extraction.

[59 FR 4493, Jan. 31, 1994, as amended at 61 FR 31731, June 20, 1996]

§ 68.3 Definitions.

For the purposes of this part:

Accidental release means an unanticipated emission of a regulated substance or other extremely hazardous substance into the ambient air from a stationary source.

Act means the Clean Air Act as amended (42 U.S.C. 7401 *et seq.*)

Administrative controls mean written procedural mechanisms used for hazard control.

Administrator means the administrator of the U.S. Environmental Protection Agency.

AIChE/CCPS means the American Institute of Chemical Engineers/Center for Chemical Process Safety.

API means the American Petroleum Institute.

Article means a manufactured item, as defined under 29 CFR 1910.1200(b), that is formed to a specific shape or design during manufacture, that has end use functions dependent in whole or in part upon the shape or design during end use, and that does not release or otherwise result in exposure to a regulated substance under normal conditions of processing and use.

ASME means the American Society of Mechanical Engineers.

CAS means the Chemical Abstracts Service.

Catastrophic release means a major uncontrolled emission, fire, or explosion, involving one or more regulated substances that presents imminent and substantial endangerment to public health and the environment.

Classified information means "classified information" as defined in the Classified Information Procedures Act, 18 U.S.C. App. 3, section 1(a) as "any information or material that has been determined by the United States Government pursuant to an executive order, statute, or regulation, to require

protection against unauthorized disclosure for reasons of national security."

Covered process means a process that has a regulated substance present in more than a threshold quantity as determined under §68.115.

Designated agency means the state, local, or Federal agency designated by the state under the provisions of §68.215(d).

DOT means the United States Department of Transportation.

Environmental receptor means natural areas such as national or state parks, forests, or monuments; officially designated wildlife sanctuaries, preserves, refuges, or areas; and Federal wilderness areas, that could be exposed at any time to toxic concentrations, radiant heat, or overpressure greater than or equal to the endpoints provided in §68.22(a), as a result of an accidental release and that can be identified on local U. S. Geological Survey maps.

Hot work means work involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations.

Implementing agency means the state or local agency that obtains delegation for an accidental release prevention program under subpart E, 40 CFR part 63. The implementing agency may, but is not required to, be the state or local air permitting agency. If no state or local agency is granted delegation, EPA will be the implementing agency for that state.

Injury means any effect on a human that results either from direct exposure to toxic concentrations; radiant heat; or overpressures from accidental releases or from the direct consequences of a vapor cloud explosion (such as flying glass, debris, and other projectiles) from an accidental release and that requires medical treatment or hospitalization.

Major change means introduction of a new process, process equipment, or regulated substance, an alteration of process chemistry that results in any change to safe operating limits, or other alteration that introduces a new hazard.

Mechanical integrity means the process of ensuring that process equipment is fabricated from the proper materials of construction and is properly installed, maintained, and replaced to prevent failures and accidental releases.

Medical treatment means treatment, other than first aid, administered by a physician or registered professional personnel under standing orders from a physician.

Mitigation or mitigation system means specific activities, technologies, or equipment designed or deployed to capture or control substances upon loss of containment to minimize exposure of the public or the environment. Passive mitigation means equipment, devices, or technologies that function without human, mechanical, or other energy input. Active mitigation means equipment, devices, or technologies that need human, mechanical, or other energy input to function.

NFPA means the National Fire Protection Association.

Offsite means areas beyond the property boundary of the stationary source, and areas within the property boundary to which the public has routine and unrestricted access during or outside business hours.

OSHA means the U.S. Occupational Safety and Health Administration. Owner or operator means any person who owns, leases, operates, controls, or supervises a stationary source.

Population means the public.

Process means any activity involving a regulated substance including any use, storage, manufacturing, handling, or on-site movement of such substances, or combination of these activities. For the purposes of this definition, any group of vessels that are interconnected, or separate vessels that are located such that a regulated substance could be involved in a potential release, shall be considered a single process.

Public means any person except employees or contractors at the stationary source.

Public receptor means offsite residences, institutions (e.g., schools, hospitals), industrial, commercial, and office buildings, parks, or recreational areas inhabited or occupied by the public at any time without restriction by the stationary source where members of the public could be exposed to toxic

concentrations, radiant heat, or overpressure, as a result of an accidental release.

Regulated substance is any substance listed pursuant to section 112(r)(3) of the Clean Air Act as amended, in § 68.130.

Replacement in kind means a replacement that satisfies the design specifications.

RMP means the risk management plan required under subpart G of this part.

SIC means Standard Industrial Classification.

Stationary source means any buildings, structures, equipment, installations, or substance emitting stationary activities which belong to the same industrial group, which are located on one or more contiguous properties, which are under the control of the same person (or persons under common control), and from which an accidental release may occur. A stationary source includes transportation containers that are no longer under active shipping papers and transportation containers that are connected to equipment at the stationary source for the purposes of temporary storage, loading, or unloading. The term stationary source does not apply to transportation, including the storage incident to transportation, of any regulated substance or any other extremely hazardous substance under the provisions of this part, provided that such transportation is regulated under 49 CFR parts 192, 193, or 195. Properties shall not be considered contiguous solely because of a railroad or gas pipeline right-of-way.

Threshold quantity means the quantity specified for regulated substances pursuant to section 112(r)(5) of the Clean Air Act as amended, listed in § 68.130 and determined to be present at a stationary source as specified in § 68.115 of this part.

Typical meteorological conditions means the temperature, wind speed, cloud cover, and atmospheric stability class, prevailing at the site based on data gathered at or near the site or from a local meteorological station.

Vessel means any reactor, tank, drum, barrel, cylinder, vat, kettle, boiler, pipe, hose, or other container.

Worst-case release means the release of the largest quantity of a regulated substance from a vessel or process line failure that results in the greatest distance to an endpoint defined in § 68.22(a).

[59 FR 4493, Jan. 31, 1994, as amended at 61 FR 31717, June 20, 1996]

EFFECTIVE DATE NOTE: At 61 FR 31717, June 20, 1996, § 68.3 was amended by adding the definitions for *Act, Administrative controls, AIChE/CCPS, API, ASME, Catastrophic release, Classified information, Covered process, Designated agency, Environmental receptor, Hot work, Implementing agency, Injury, Major change, Mechanical integrity, Medical treatment, Mitigation or mitigation system, NFPA, Offsite, OSHA, Population, Public, Public receptor, Replacement in kind, RMP, SIC, Typical meterological conditions,* and *Worst-case release*, effective Aug. 19, 1996.

§ 68.10 Applicability.

(a) An owner or operator of a stationary source that has more than a threshold quantity of a regulated substance in a process, as determined under § 68.115, shall comply with the requirements of this part no later than the latest of the following dates:

(1) June 21, 1999;

(2) Three years after the date on which a regulated substance is first listed under § 68.130; or

(3) The date on which a regulated substance is first present above a threshold quantity in a process.

(b) Program 1 eligibility requirements. A covered process is eligible for Program 1 requirements as provided in § 68.12(b) if it meets all of the following requirements:

(1) For the five years prior to the submission of an RMP, the process has not had an accidental release of a regulated substance where exposure to the substance, its reaction products, overpressure generated by an explosion involving the substance, or radiant heat generated by a fire involving the substance led to any of the following offsite:

(i) Death;

(ii) Injury; or

(iii) Response or restoration activities for an exposure of an environmental receptor;

(2) The distance to a toxic or flammable endpoint for a worst-case release assessment conducted under Subpart B

and §68.25 is less than the distance to any public receptor, as defined in §68.30; and

(3) Emergency response procedures have been coordinated between the stationary source and local emergency planning and response organizations.

(c) Program 2 eligibility requirements. A covered process is subject to Program 2 requirements if it does not meet the eligibility requirements of either paragraph (b) or paragraph (d) of this section.

(d) Program 3 eligibility requirements. A covered process is subject to Program 3 if the process does not meet the requirements of paragraph (b) of this section, and if either of the following conditions is met:

(1) The process is in SIC code 2611, 2812, 2819, 2821, 2865, 2869, 2873, 2879, or 2911; or

(2) The process is subject to the OSHA process safety management standard, 29 CFR 1910.119.

(e) If at any time a covered process no longer meets the eligibility criteria of its Program level, the owner or operator shall comply with the requirements of the new Program level that applies to the process and update the RMP as provided in §68.190.

[61 FR 31717, June 20, 1996]

EFFECTIVE DATE NOTE: At 61 FR 31717, June 20, 1996, §68.10 was added, effective Aug. 19, 1996.

§68.12 General requirements.

(a) General requirements. The owner or operator of a stationary source subject to this part shall submit a single RMP, as provided in §§68.150 to 68.185. The RMP shall include a registration that reflects all covered processes.

(b) Program 1 requirements. In addition to meeting the requirements of paragraph (a) of this section, the owner or operator of a stationary source with a process eligible for Program 1, as provided in §68.10(b), shall:

(1) Analyze the worst-case release scenario for the process(es), as provided in §68.25; document that the nearest public receptor is beyond the distance to a toxic or flammable endpoint defined in §68.22(a); and submit in the RMP the worst-case release scenario as provided in §68.165;

(2) Complete the five-year accident history for the process as provided in §68.42 of this part and submit it in the RMP as provided in §68.168;

(3) Ensure that response actions have been coordinated with local emergency planning and response agencies; and

(4) Certify in the RMP the following: "Based on the criteria in 40 CFR 68.10, the distance to the specified endpoint for the worst-case accidental release scenario for the following process(es) is less than the distance to the nearest public receptor: [list process(es)]. Within the past five years, the process(es) has (have) had no accidental release that caused offsite impacts provided in the risk management program rule (40 CFR 68.10(b)(1)). No additional measures are necessary to prevent offsite impacts from accidental releases. In the event of fire, explosion, or a release of a regulated substance from the process(es), entry within the distance to the specified endpoints may pose a danger to public emergency responders. Therefore, public emergency responders should not enter this area except as arranged with the emergency contact indicated in the RMP. The undersigned certifies that, to the best of my knowledge, information, and belief, formed after reasonable inquiry, the information submitted is true, accurate, and complete. [Signature, title, date signed]."

(c) Program 2 requirements. In addition to meeting the requirements of paragraph (a) of this section, the owner or operator of a stationary source with a process subject to Program 2, as provided in §68.10(c), shall:

(1) Develop and implement a management system as provided in §68.15;

(2) Conduct a hazard assessment as provided in §§68.20 through 68.42;

(3) Implement the Program 2 prevention steps provided in §§68.48 through 68.60 or implement the Program 3 prevention steps provided in §§68.65 through 68.87;

(4) Develop and implement an emergency response program as provided in §§68.90 to 68.95; and

(5) Submit as part of the RMP the data on prevention program elements for Program 2 processes as provided in §68.170.

(d) Program 3 requirements. In addition to meeting the requirements of paragraph (a) of this section, the owner or operator of a stationary source with a process subject to Program 3, as provided in § 68.10(d) shall:

(1) Develop and implement a management system as provided in §68.15;

(2) Conduct a hazard assessment as provided in §§ 68.20 through 68.42;

(3) Implement the prevention requirements of §§ 68.65 through 68.87;

(4) Develop and implement an emergency response program as provided in §§ 68.90 to 68.95 of this part; and

(5) Submit as part of the RMP the data on prevention program elements for Program 3 processes as provided in § 68.175.

[61 FR 31718, June 20, 1996]

EFFECTIVE DATE NOTE: At 61 FR 31718, June 20, 1996, § 68.12 was added, effective Aug. 19, 1996.

§ 68.15 Management.

(a) The owner or operator of a stationary source with processes subject to Program 2 or Program 3 shall develop a management system to oversee the implementation of the risk management program elements.

(b) The owner or operator shall assign a qualified person or position that has the overall responsibility for the development, implementation, and integration of the risk management program elements.

(c) When responsibility for implementing individual requirements of this part is assigned to persons other than the person identified under paragraph (b) of this section, the names or positions of these people shall be documented and the lines of authority defined through an organization chart or similar document.

[61 FR 31718, June 20, 1996]

EFFECTIVE DATE NOTE: At 61 FR 31718, June 20, 1996, § 68.15 was added, effective Aug. 19, 1996.

Subpart B—Hazard Assessment

SOURCE: 61 FR 31718, June 20, 1996, unless otherwise noted.

EFFECTIVE DATE NOTE: At 61 FR 31718, June 20, 1996, subpart B was added, effective Aug. 19, 1996.

§ 68.20 Applicability.

The owner or operator of a stationary source subject to this part shall prepare a worst-case release scenario analysis as provided in §68.25 of this part and complete the five-year accident history as provided in §68.42. The owner or operator of a Program 2 and 3 process must comply with all sections in this subpart for these processes.

§ 68.22 Offsite consequence analysis parameters.

(a) Endpoints. For analyses of offsite consequences, the following endpoints shall be used:

(1) Toxics. The toxic endpoints provided in appendix A of this part.

(2) Flammables. The endpoints for flammables vary according to the scenarios studied:

(i) Explosion. An overpressure of 1 psi.

(ii) Radiant heat/exposure time. A radiant heat of 5 kw/m² for 40 seconds.

(iii) Lower flammability limit. A lower flammability limit as provided in NFPA documents or other generally recognized sources.

(b) Wind speed/atmospheric stability class. For the worst-case release analysis, the owner or operator shall use a wind speed of 1.5 meters per second and F atmospheric stability class. If the owner or operator can demonstrate that local meteorological data applicable to the stationary source show a higher minimum wind speed or less stable atmosphere at all times during the previous three years, these minimums may be used. For analysis of alternative scenarios, the owner or operator may use the typical meteorological conditions for the stationary source.

(c) Ambient temperature/humidity. For worst-case release analysis of a regulated toxic substance, the owner or operator shall use the highest daily maximum temperature in the previous three years and average humidity for the site, based on temperature/humidity data gathered at the stationary source or at a local meteorological station; an owner or operator using the RMP Offsite Consequence Analysis Guidance may use 25°C and 50 percent humidity as values for these variables. For analysis of alternative scenarios, the owner or operator may use typical

temperature/humidity data gathered at the stationary source or at a local meteorological station.

(d) Height of release. The worst-case release of a regulated toxic substance shall be analyzed assuming a ground level (0 feet) release. For an alternative scenario analysis of a regulated toxic substance, release height may be determined by the release scenario.

(e) Surface roughness. The owner or operator shall use either urban or rural topography, as appropriate. Urban means that there are many obstacles in the immediate area; obstacles include buildings or trees. Rural means there are no buildings in the immediate area and the terrain is generally flat and unobstructed.

(f) Dense or neutrally buoyant gases. The owner or operator shall ensure that tables or models used for dispersion analysis of regulated toxic substances appropriately account for gas density.

(g) Temperature of released substance. For worst case, liquids other than gases liquified by refrigeration only shall be considered to be released at the highest daily maximum temperature, based on data for the previous three years appropriate for the stationary source, or at process temperature, whichever is higher. For alternative scenarios, substances may be considered to be released at a process or ambient temperature that is appropriate for the scenario.

§68.25 Worst-case release scenario analysis.

(a) The owner or operator shall analyze and report in the RMP:

(1) For Program 1 processes, one worst-case release scenario for each Program 1 process;

(2) For Program 2 and 3 processes:

(i) One worst-case release scenario that is estimated to create the greatest distance in any direction to an endpoint provided in appendix A of this part resulting from an accidental release of regulated toxic substances from covered processes under worst-case conditions defined in §68.22;

(ii) One worst-case release scenario that is estimated to create the greatest distance in any direction to an endpoint defined in §68.22(a) resulting from an accidental release of regulated flammable substances from covered processes under worst-case conditions defined in §68.22; and

(iii) Additional worst-case release scenarios for a hazard class if a worst-case release from another covered process at the stationary source potentially affects public receptors different from those potentially affected by the worst-case release scenario developed under paragraphs (a)(2)(i) or (a)(2)(ii) of this section.

(b) *Determination of worst-case release quantity.* The worst-case release quantity shall be the greater of the following:

(1) For substances in a vessel, the greatest amount held in a single vessel, taking into account administrative controls that limit the maximum quantity; or

(2) For substances in pipes, the greatest amount in a pipe, taking into account administrative controls that limit the maximum quantity.

(c) *Worst-case release scenario—toxic gases.* (1) For regulated toxic substances that are normally gases at ambient temperature and handled as a gas or as a liquid under pressure, the owner or operator shall assume that the quantity in the vessel or pipe, as determined under paragraph (b) of this section, is released as a gas over 10 minutes. The release rate shall be assumed to be the total quantity divided by 10 unless passive mitigation systems are in place.

(2) For gases handled as refrigerated liquids at ambient pressure:

(i) If the released substance is not contained by passive mitigation systems or if the contained pool would have a depth of 1 cm or less, the owner or operator shall assume that the substance is released as a gas in 10 minutes;

(ii) If the released substance is contained by passive mitigation systems in a pool with a depth greater than 1 cm, the owner or operator may assume that the quantity in the vessel or pipe, as determined under paragraph (b) of this section, is spilled instantaneously

to form a liquid pool. The volatilization rate (release rate) shall be calculated at the boiling point of the substance and at the conditions specified in paragraph (d) of this section.

(d) *Worst-case release scenario—toxic liquids.* (1) For regulated toxic substances that are normally liquids at ambient temperature, the owner or operator shall assume that the quantity in the vessel or pipe, as determined under paragraph (b) of this section, is spilled instantaneously to form a liquid pool.

(i) The surface area of the pool shall be determined by assuming that the liquid spreads to 1 centimeter deep unless passive mitigation systems are in place that serve to contain the spill and limit the surface area. Where passive mitigation is in place, the surface area of the contained liquid shall be used to calculate the volatilization rate.

(ii) If the release would occur onto a surface that is not paved or smooth, the owner or operator may take into account the actual surface characteristics.

(2) The volatilization rate shall account for the highest daily maximum temperature occurring in the past three years, the temperature of the substance in the vessel, and the concentration of the substance if the liquid spilled is a mixture or solution.

(3) The rate of release to air shall be determined from the volatilization rate of the liquid pool. The owner or operator may use the methodology in the RMP Offsite Consequence Analysis Guidance or any other publicly available techniques that account for the modeling conditions and are recognized by industry as applicable as part of current practices. Proprietary models that account for the modeling conditions may be used provided the owner or operator allows the implementing agency access to the model and describes model features and differences from publicly available models to local emergency planners upon request.

(e) *Worst-case release scenario—flammables.* The owner or operator shall assume that the quantity of the substance, as determined under paragraph (b) of this section, vaporizes resulting in a vapor cloud explosion. A yield factor of 10 percent of the available energy released in the explosion shall be used to determine the distance to the explosion endpoint if the model used is based on TNT-equivalent methods.

(f) *Parameters to be applied.* The owner or operator shall use the parameters defined in §68.22 to determine distance to the endpoints. The owner or operator may use the methodology provided in the RMP Offsite Consequence Analysis Guidance or any commercially or publicly available air dispersion modeling techniques, provided the techniques account for the modeling conditions and are recognized by industry as applicable as part of current practices. Proprietary models that account for the modeling conditions may be used provided the owner or operator allows the implementing agency access to the model and describes model features and differences from publicly available models to local emergency planners upon request.

(g) *Consideration of passive mitigation.* Passive mitigation systems may be considered for the analysis of worst case provided that the mitigation system is capable of withstanding the release event triggering the scenario and would still function as intended.

(h) *Factors in selecting a worst-case scenario.* Notwithstanding the provisions of paragraph (b) of this section, the owner or operator shall select as the worst case for flammable regulated substances or the worst case for regulated toxic substances, a scenario based on the following factors if such a scenario would result in a greater distance to an endpoint defined in §68.22(a) beyond the stationary source boundary than the scenario provided under paragraph (b) of this section:

(1) Smaller quantities handled at higher process temperature or pressure; and

(2) Proximity to the boundary of the stationary source.

§ 68.28 Alternative release scenario analysis.

(a) The number of scenarios. The owner or operator shall identify and analyze at least one alternative release scenario for each regulated toxic substance held in a covered process(es) and

at least one alternative release scenario to represent all flammable substances held in covered processes.

(b) *Scenarios to consider.* (1) For each scenario required under paragraph (a) of this section, the owner or operator shall select a scenario:

(i) That is more likely to occur than the worst-case release scenario under §68.25; and

(ii) That will reach an endpoint offsite, unless no such scenario exists.

(2) Release scenarios considered should include, but are not limited to, the following, where applicable:

(i) Transfer hose releases due to splits or sudden hose uncoupling;

(ii) Process piping releases from failures at flanges, joints, welds, valves and valve seals, and drains or bleeds;

(iii) Process vessel or pump releases due to cracks, seal failure, or drain, bleed, or plug failure;

(iv) Vessel overfilling and spill, or overpressurization and venting through relief valves or rupture disks; and

(v) Shipping container mishandling and breakage or puncturing leading to a spill.

(c) Parameters to be applied. The owner or operator shall use the appropriate parameters defined in §68.22 to determine distance to the endpoints. The owner or operator may use either the methodology provided in the RMP Offsite Consequence Analysis Guidance or any commercially or publicly available air dispersion modeling techniques, provided the techniques account for the specified modeling conditions and are recognized by industry as applicable as part of current practices. Proprietary models that account for the modeling conditions may be used provided the owner or operator allows the implementing agency access to the model and describes model features and differences from publicly available models to local emergency planners upon request.

(d) Consideration of mitigation. Active and passive mitigation systems may be considered provided they are capable of withstanding the event that triggered the release and would still be functional.

(e) Factors in selecting scenarios. The owner or operator shall consider the following in selecting alternative release scenarios:

(1) The five-year accident history provided in §68.42; and

(2) Failure scenarios identified under §68.50 or §68.67.

§68.30 Defining offsite impacts—population.

(a) The owner or operator shall estimate in the RMP the population within a circle with its center at the point of the release and a radius determined by the distance to the endpoint defined in §68.22(a).

(b) *Population to be defined.* Population shall include residential population. The presence of institutions (schools, hospitals, prisons), parks and recreational areas, and major commercial, office, and industrial buildings shall be noted in the RMP.

(c) *Data sources acceptable.* The owner or operator may use the most recent Census data, or other updated information, to estimate the population potentially affected.

(d) *Level of accuracy.* Population shall be estimated to two significant digits.

§68.33 Defining offsite impacts—environment.

(a) The owner or operator shall list in the RMP environmental receptors within a circle with its center at the point of the release and a radius determined by the distance to the endpoint defined in §68.22(a) of this part.

(b) Data sources acceptable. The owner or operator may rely on information provided on local U.S. Geological Survey maps or on any data source containing U.S.G.S. data to identify environmental receptors.

68.36 Review and update.

(a) The owner or operator shall review and update the offsite consequence analyses at least once every five years.

(b) If changes in processes, quantities stored or handled, or any other aspect of the stationary source might reasonably be expected to increase or decrease the distance to the endpoint by a factor of two or more, the owner or operator shall complete a revised analysis within six months of the change

and submit a revised risk management plan as provided in § 68.190.

§ 68.39 Documentation.

The owner or operator shall maintain the following records on the offsite consequence analyses:

(a) For worst-case scenarios, a description of the vessel or pipeline and substance selected as worst case, assumptions and parameters used, and the rationale for selection; assumptions shall include use of any administrative controls and any passive mitigation that were assumed to limit the quantity that could be released. Documentation shall include the anticipated effect of the controls and mitigation on the release quantity and rate.

(b) For alternative release scenarios, a description of the scenarios identified, assumptions and parameters used, and the rationale for the selection of specific scenarios; assumptions shall include use of any administrative controls and any mitigation that were assumed to limit the quantity that could be released. Documentation shall include the effect of the controls and mitigation on the release quantity and rate.

(c) Documentation of estimated quantity released, release rate, and duration of release.

(d) Methodology used to determine distance to endpoints.

(e) Data used to estimate population and environmental receptors potentially affected.

§ 68.42 Five-year accident history.

(a) The owner or operator shall include in the five-year accident history all accidental releases from covered processes that resulted in deaths, injuries, or significant property damage on site, or known offsite deaths, injuries, evacuations, sheltering in place, property damage, or environmental damage.

(b) *Data required.* For each accidental release included, the owner or operator shall report the following information:

(1) Date, time, and approximate duration of the release;

(2) Chemical(s) released;

(3) Estimated quantity released in pounds;

(4) The type of release event and its source;

(5) Weather conditions, if known;

(6) On-site impacts;

(7) Known offsite impacts;

(8) Initiating event and contributing factors if known;

(9) Whether offsite responders were notified if known; and

(10) Operational or process changes that resulted from investigation of the release.

(c) *Level of accuracy.* Numerical estimates may be provided to two significant digits.

Subpart C—Program 2 Prevention Program

SOURCE: 61 FR 31721, June 20, 1996, unless otherwise noted.

EFFECTIVE DATE NOTE: At 61 FR 31721, June 20, 1996, subpart C was added, effective Aug. 19, 1996.

§ 68.48 Safety information.

(a) The owner or operator shall compile and maintain the following up-to-date safety information related to the regulated substances, processes, and equipment:

(1) Material Safety Data Sheets that meet the requirements of 29 CFR 1910.1200(g);

(2) Maximum intended inventory of equipment in which the regulated substances are stored or processed;

(3) Safe upper and lower temperatures, pressures, flows, and compositions;

(4) Equipment specifications; and

(5) Codes and standards used to design, build, and operate the process.

(b) The owner or operator shall ensure that the process is designed in compliance with recognized and generally accepted good engineering practices. Compliance with Federal or state regulations that address industry-specific safe design or with industry-specific design codes and standards may be used to demonstrate compliance with this paragraph.

(c) The owner or operator shall update the safety information if a major change occurs that makes the information inaccurate.

§ 68.50 Hazard review.

(a) The owner or operator shall conduct a review of the hazards associated with the regulated substances, process, and procedures. The review shall identify the following:

(1) The hazards associated with the process and regulated substances;

(2) Opportunities for equipment malfunctions or human errors that could cause an accidental release;

(3) The safeguards used or needed to control the hazards or prevent equipment malfunction or human error; and

(4) Any steps used or needed to detect or monitor releases.

(b) The owner or operator may use checklists developed by persons or organizations knowledgeable about the process and equipment as a guide to conducting the review. For processes designed to meet industry standards or Federal or state design rules, the hazard review shall, by inspecting all equipment, determine whether the process is designed, fabricated, and operated in accordance with the applicable standards or rules.

(c) The owner or operator shall document the results of the review and ensure that problems identified are resolved in a timely manner.

(d) The review shall be updated at least once every five years. The owner or operator shall also conduct reviews whenever a major change in the process occurs; all issues identified in the review shall be resolved before startup of the changed process.

§ 68.52 Operating procedures.

(a) The owner or operator shall prepare written operating procedures that provide clear instructions or steps for safely conducting activities associated with each covered process consistent with the safety information for that process. Operating procedures or instructions provided by equipment manufacturers or developed by persons or organizations knowledgeable about the process and equipment may be used as a basis for a stationary source's operating procedures.

(b) The procedures shall address the following:

(1) Initial startup;

(2) Normal operations;

(3) Temporary operations;

(4) Emergency shutdown and operations;

(5) Normal shutdown;

(6) Startup following a normal or emergency shutdown or a major change that requires a hazard review;

(7) Consequences of deviations and steps required to correct or avoid deviations; and

(8) Equipment inspections.

(c) The owner or operator shall ensure that the operating procedures are updated, if necessary, whenever a major change occurs and prior to startup of the changed process.

§ 68.54 Training.

(a) The owner or operator shall ensure that each employee presently operating a process, and each employee newly assigned to a covered process have been trained or tested competent in the operating procedures provided in § 68.52 that pertain to their duties. For those employees already operating a process on June 21, 1999, the owner or operator may certify in writing that the employee has the required knowledge, skills, and abilities to safely carry out the duties and responsibilities as provided in the operating procedures.

(b) Refresher training. Refresher training shall be provided at least every three years, and more often if necessary, to each employee operating a process to ensure that the employee understands and adheres to the current operating procedures of the process. The owner or operator, in consultation with the employees operating the process, shall determine the appropriate frequency of refresher training.

(c) The owner or operator may use training conducted under Federal or state regulations or under industry-specific standards or codes or training conducted by covered process equipment vendors to demonstrate compliance with this section to the extent that the training meets the requirements of this section.

(d) The owner or operator shall ensure that operators are trained in any updated or new procedures prior to startup of a process after a major change.

§ 68.56 Maintenance.

(a) The owner or operator shall prepare and implement procedures to maintain the on-going mechanical integrity of the process equipment. The owner or operator may use procedures or instructions provided by covered process equipment vendors or procedures in Federal or state regulations or industry codes as the basis for stationary source maintenance procedures.

(b) The owner or operator shall train or cause to be trained each employee involved in maintaining the on-going mechanical integrity of the process. To ensure that the employee can perform the job tasks in a safe manner, each such employee shall be trained in the hazards of the process, in how to avoid or correct unsafe conditions, and in the procedures applicable to the employee's job tasks.

(c) Any maintenance contractor shall ensure that each contract maintenance employee is trained to perform the maintenance procedures developed under paragraph (a) of this section.

(d) The owner or operator shall perform or cause to be performed inspections and tests on process equipment. Inspection and testing procedures shall follow recognized and generally accepted good engineering practices. The frequency of inspections and tests of process equipment shall be consistent with applicable manufacturers' recommendations, industry standards or codes, good engineering practices, and prior operating experience.

§ 68.58 Compliance audits.

(a) The owner or operator shall certify that they have evaluated compliance with the provisions of this subpart at least every three years to verify that the procedures and practices developed under the rule are adequate and are being followed.

(b) The compliance audit shall be conducted by at least one person knowledgeable in the process.

(c) The owner or operator shall develop a report of the audit findings.

(d) The owner or operator shall promptly determine and document an appropriate response to each of the findings of the compliance audit and document that deficiencies have been corrected.

(e) The owner or operator shall retain the two (2) most recent compliance audit reports. This requirement does not apply to any compliance audit report that is more than five years old.

§ 68.60 Incident investigation.

(a) The owner or operator shall investigate each incident which resulted in, or could reasonably have resulted in a catastrophic release.

(b) An incident investigation shall be initiated as promptly as possible, but not later than 48 hours following the incident.

(c) A summary shall be prepared at the conclusion of the investigation which includes at a minimum:

(1) Date of incident;

(2) Date investigation began;

(3) A description of the incident;

(4) The factors that contributed to the incident; and,

(5) Any recommendations resulting from the investigation.

(d) The owner or operator shall promptly address and resolve the investigation findings and recommendations. Resolutions and corrective actions shall be documented.

(e) The findings shall be reviewed with all affected personnel whose job tasks are affected by the findings.

(f) Investigation summaries shall be retained for five years.

Subpart D—Program 3 Prevention Program

SOURCE: 61 FR 31722, June 20, 1996, unless otherwise noted.

EFFECTIVE DATE NOTE: At 61 FR 31722, June 20, 1996, subpart D was added, effective Aug. 19, 1996.

§ 68.65 Process safety information.

(a) In accordance with the schedule set forth in §68.67, the owner or operator shall complete a compilation of written process safety information before conducting any process hazard analysis required by the rule. The compilation of written process safety information is to enable the owner or operator and the employees involved in operating the process to identify and understand the hazards posed by those processes involving regulated substances.

This process safety information shall include information pertaining to the hazards of the regulated substances used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process.

(b) Information pertaining to the hazards of the regulated substances in the process. This information shall consist of at least the following:

(1) Toxicity information;

(2) Permissible exposure limits;

(3) Physical data;

(4) Reactivity data:

(5) Corrosivity data;

(6) Thermal and chemical stability data; and

(7) Hazardous effects of inadvertent mixing of different materials that could foreseeably occur.

NOTE TO PARAGRAPH (B): Material Safety Data Sheets meeting the requirements of 29 CFR 1910.1200(g) may be used to comply with this requirement to the extent they contain the information required by this subparagraph.

(c) Information pertaining to the technology of the process.

(1) Information concerning the technology of the process shall include at least the following:

(i) A block flow diagram or simplified process flow diagram;

(ii) Process chemistry;

(iii) Maximum intended inventory;

(iv) Safe upper and lower limits for such items as temperatures, pressures, flows or compositions; and,

(v) An evaluation of the consequences of deviations.

(2) Where the original technical information no longer exists, such information may be developed in conjunction with the process hazard analysis in sufficient detail to support the analysis.

(d) Information pertaining to the equipment in the process.

(1) Information pertaining to the equipment in the process shall include:

(i) Materials of construction;

(ii) Piping and instrument diagrams (P&ID's);

(iii) Electrical classification;

(iv) Relief system design and design basis;

(v) Ventilation system design;

(vi) Design codes and standards employed;

(vii) Material and energy balances for processes built after June 21, 1999; and

(viii) Safety systems (e.g. interlocks, detection or suppression systems).

(2) The owner or operator shall document that equipment complies with recognized and generally accepted good engineering practices.

(3) For existing equipment designed and constructed in accordance with codes, standards, or practices that are no longer in general use, the owner or operator shall determine and document that the equipment is designed, maintained, inspected, tested, and operating in a safe manner.

§ 68.67 Process hazard analysis.

(a) The owner or operator shall perform an initial process hazard analysis (hazard evaluation) on processes covered by this part. The process hazard analysis shall be appropriate to the complexity of the process and shall identify, evaluate, and control the hazards involved in the process. The owner or operator shall determine and document the priority order for conducting process hazard analyses based on a rationale which includes such considerations as extent of the process hazards, number of potentially affected employees, age of the process, and operating history of the process. The process hazard analysis shall be conducted as soon as possible, but not later than June 21, 1999. Process hazards analyses completed to comply with 29 CFR 1910.119(e) are acceptable as initial process hazards analyses. These process hazard analyses shall be updated and revalidated, based on their completion date.

(b) The owner or operator shall use one or more of the following methodologies that are appropriate to determine and evaluate the hazards of the process being analyzed.

(1) What-If;

(2) Checklist;

(3) What-If/Checklist;

(4) Hazard and Operability Study (HAZOP);

(5) Failure Mode and Effects Analysis (FMEA);

(6) Fault Tree Analysis; or

(7) An appropriate equivalent methodology.

(c) The process hazard analysis shall address:

(1) The hazards of the process;

(2) The identification of any previous incident which had a likely potential for catastrophic consequences.

(3) Engineering and administrative controls applicable to the hazards and their interrelationships such as appropriate application of detection methodologies to provide early warning of releases. (Acceptable detection methods might include process monitoring and control instrumentation with alarms, and detection hardware such as hydrocarbon sensors.);

(4) Consequences of failure of engineering and administrative controls;

(5) Stationary source siting;

(6) Human factors; and

(7) A qualitative evaluation of a range of the possible safety and health effects of failure of controls.

(d) The process hazard analysis shall be performed by a team with expertise in engineering and process operations, and the team shall include at least one employee who has experience and knowledge specific to the process being evaluated. Also, one member of the team must be knowledgeable in the specific process hazard analysis methodology being used.

(e) The owner or operator shall establish a system to promptly address the team's findings and recommendations; assure that the recommendations are resolved in a timely manner and that the resolution is documented; document what actions are to be taken; complete actions as soon as possible; develop a written schedule of when these actions are to be completed; communicate the actions to operating, maintenance and other employees whose work assignments are in the process and who may be affected by the recommendations or actions.

(f) At least every five (5) years after the completion of the initial process hazard analysis, the process hazard analysis shall be updated and revalidated by a team meeting the requirements in paragraph (d) of this section, to assure that the process hazard analysis is consistent with the current process. Updated and revalidated process hazard analyses completed to comply with 29 CFR 1910.119(e) are acceptable to meet the requirements of this paragraph.

(g) The owner or operator shall retain process hazards analyses and updates or revalidations for each process covered by this section, as well as the documented resolution of recommendations described in paragraph (e) of this section for the life of the process.

§ 68.69 Operating procedures.

(a) The owner or operator shall develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information and shall address at least the following elements.

(1) Steps for each operating phase:

(i) Initial startup;

(ii) Normal operations;

(iii) Temporary operations;

(iv) Emergency shutdown including the conditions under which emergency shutdown is required, and the assignment of shutdown responsibility to qualified operators to ensure that emergency shutdown is executed in a safe and timely manner.

(v) Emergency operations;

(vi) Normal shutdown; and,

(vii) Startup following a turnaround, or after an emergency shutdown.

(2) Operating limits:

(i) Consequences of deviation; and

(ii) Steps required to correct or avoid deviation.

(3) Safety and health considerations:

(i) Properties of, and hazards presented by, the chemicals used in the process;

(ii) Precautions necessary to prevent exposure, including engineering controls, administrative controls, and personal protective equipment;

(iii) Control measures to be taken if physical contact or airborne exposure occurs;

(iv) Quality control for raw materials and control of hazardous chemical inventory levels; and,

(v) Any special or unique hazards.

(4) Safety systems and their functions.

(b) Operating procedures shall be readily accessible to employees who work in or maintain a process.

(c) The operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology, and equipment, and changes to stationary sources. The owner or operator shall certify annually that these operating procedures are current and accurate.

(d) The owner or operator shall develop and implement safe work practices to provide for the control of hazards during operations such as lockout/tagout; confined space entry; opening process equipment or piping; and control over entrance into a stationary source by maintenance, contractor, laboratory, or other support personnel. These safe work practices shall apply to employees and contractor employees.

§ 68.71 Training.

(a) *Initial training.* (1) Each employee presently involved in operating a process, and each employee before being involved in operating a newly assigned process, shall be trained in an overview of the process and in the operating procedures as specified in §68.69. The training shall include emphasis on the specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee's job tasks.

(2) In lieu of initial training for those employees already involved in operating a process on June 21, 1999 an owner or operator may certify in writing that the employee has the required knowledge, skills, and abilities to safely carry out the duties and responsibilities as specified in the operating procedures.

(b) *Refresher training.* Refresher training shall be provided at least every three years, and more often if necessary, to each employee involved in operating a process to assure that the employee understands and adheres to the current operating procedures of the process. The owner or operator, in consultation with the employees involved in operating the process, shall determine the appropriate frequency of refresher training.

(c) *Training documentation.* The owner or operator shall ascertain that each employee involved in operating a process has received and understood the training required by this paragraph. The owner or operator shall prepare a record which contains the identity of the employee, the date of training, and the means used to verify that the employee understood the training.

§ 68.73 Mechanical integrity.

(a) *Application.* Paragraphs (b) through (f) of this section apply to the following process equipment:

(1) Pressure vessels and storage tanks;

(2) Piping systems (including piping components such as valves);

(3) Relief and vent systems and devices;

(4) Emergency shutdown systems;

(5) Controls (including monitoring devices and sensors, alarms, and interlocks) and,

(6) Pumps.

(b) *Written procedures.* The owner or operator shall establish and implement written procedures to maintain the on-going integrity of process equipment.

(c) *Training for process maintenance activities.* The owner or operator shall train each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.

(d) *Inspection and testing.* (1) Inspections and tests shall be performed on process equipment.

(2) Inspection and testing procedures shall follow recognized and generally accepted good engineering practices.

(3) The frequency of inspections and tests of process equipment shall be consistent with applicable manufacturers' recommendations and good engineering practices, and more frequently if determined to be necessary by prior operating experience.

(4) The owner or operator shall document each inspection and test that has been performed on process equipment. The documentation shall identify the

date of the inspection or test, the name of the person who performed the inspection or test, the serial number or other identifier of the equipment on which the inspection or test was performed, a description of the inspection or test performed, and the results of the inspection or test.

(e) *Equipment deficiencies.* The owner or operator shall correct deficiencies in equipment that are outside acceptable limits (defined by the process safety information in §68.65) before further use or in a safe and timely manner when necessary means are taken to assure safe operation.

(f) *Quality assurance.* (1) In the construction of new plants and equipment, the owner or operator shall assure that equipment as it is fabricated is suitable for the process application for which they will be used.

(2) Appropriate checks and inspections shall be performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions.

(3) The owner or operator shall assure that maintenance materials, spare parts and equipment are suitable for the process application for which they will be used.

§ 68.75 Management of change.

(a) The owner or operator shall establish and implement written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, equipment, and procedures; and, changes to stationary sources that affect a covered process.

(b) The procedures shall assure that the following considerations are addressed prior to any change:

(1) The technical basis for the proposed change;

(2) Impact of change on safety and health;

(3) Modifications to operating procedures;

(4) Necessary time period for the change; and,

(5) Authorization requirements for the proposed change.

(c) Employees involved in operating a process and maintenance and contract employees whose job tasks will be affected by a change in the process shall be informed of, and trained in, the change prior to start-up of the process or affected part of the process.

(d) If a change covered by this paragraph results in a change in the process safety information required by §68.65 of this part, such information shall be updated accordingly.

(e) If a change covered by this paragraph results in a change in the operating procedures or practices required by §68.69, such procedures or practices shall be updated accordingly.

§ 68.77 Pre-startup review.

(a) The owner or operator shall perform a pre-startup safety review for new stationary sources and for modified stationary sources when the modification is significant enough to require a change in the process safety information.

(b) The pre-startup safety review shall confirm that prior to the introduction of regulated substances to a process:

(1) Construction and equipment is in accordance with design specifications;

(2) Safety, operating, maintenance, and emergency procedures are in place and are adequate;

(3) For new stationary sources, a process hazard analysis has been performed and recommendations have been resolved or implemented before startup; and modified stationary sources meet the requirements contained in management of change, §68.75.

(4) Training of each employee involved in operating a process has been completed.

§ 68.79 Compliance audits.

(a) The owner or operator shall certify that they have evaluated compliance with the provisions of this section at least every three years to verify that the procedures and practices developed under the standard are adequate and are being followed.

(b) The compliance audit shall be conducted by at least one person knowledgeable in the process.

(c) A report of the findings of the audit shall be developed.

(d) The owner or operator shall promptly determine and document an appropriate response to each of the findings of the compliance audit, and

document that deficiencies have been corrected.

(e) The owner or operator shall retain the two (2) most recent compliance audit reports.

§ 68.81 Incident investigation.

(a) The owner or operator shall investigate each incident which resulted in, or could reasonably have resulted in a catastrophic release of a regulated substance.

(b) An incident investigation shall be initiated as promptly as possible, but not later than 48 hours following the incident.

(c) An incident investigation team shall be established and consist of at least one person knowledgeable in the process involved, including a contract employee if the incident involved work of the contractor, and other persons with appropriate knowledge and experience to thoroughly investigate and analyze the incident.

(d) A report shall be prepared at the conclusion of the investigation which includes at a minimum:

(1) Date of incident;

(2) Date investigation began;

(3) A description of the incident;

(4) The factors that contributed to the incident; and,

(5) Any recommendations resulting from the investigation.

(e) The owner or operator shall establish a system to promptly address and resolve the incident report findings and recommendations. Resolutions and corrective actions shall be documented.

(f) The report shall be reviewed with all affected personnel whose job tasks are relevant to the incident findings including contract employees where applicable.

(g) Incident investigation reports shall be retained for five years.

§ 68.83 Employee participation.

(a) The owner or operator shall develop a written plan of action regarding the implementation of the employee participation required by this section.

(b) The owner or operator shall consult with employees and their representatives on the conduct and development of process hazards analyses and on the development of the other elements of process safety management in this rule.

(c) The owner or operator shall provide to employees and their representatives access to process hazard analyses and to all other information required to be developed under this rule.

§ 68.85 Hot work permit.

(a) The owner or operator shall issue a hot work permit for hot work operations conducted on or near a covered process.

(b) The permit shall document that the fire prevention and protection requirements in 29 CFR 1910.252(a) have been implemented prior to beginning the hot work operations; it shall indicate the date(s) authorized for hot work; and identify the object on which hot work is to be performed. The permit shall be kept on file until completion of the hot work operations.

§ 68.87 Contractors.

(a) *Application.* This section applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process. It does not apply to contractors providing incidental services which do not influence process safety, such as janitorial work, food and drink services, laundry, delivery or other supply services.

(b) *Owner or operator responsibilities.* (1) The owner or operator, when selecting a contractor, shall obtain and evaluate information regarding the contract owner or operator's safety performance and programs.

(2) The owner or operator shall inform contract owner or operator of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process.

(3) The owner or operator shall explain to the contract owner or operator the applicable provisions of subpart E of this part.

(4) The owner or operator shall develop and implement safe work practices consistent with §68.69(d), to control the entrance, presence, and exit of the contract owner or operator and contract employees in covered process areas.

(5) The owner or operator shall periodically evaluate the performance of

the contract owner or operator in fulfilling their obligations as specified in paragraph (c) of this section.

(c) *Contract owner or operator responsibilities.* (1) The contract owner or operator shall assure that each contract employee is trained in the work practices necessary to safely perform his/her job.

(2) The contract owner or operator shall assure that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to his/her job and the process, and the applicable provisions of the emergency action plan.

(3) The contract owner or operator shall document that each contract employee has received and understood the training required by this section. The contract owner or operator shall prepare a record which contains the identity of the contract employee, the date of training, and the means used to verify that the employee understood the training.

(4) The contract owner or operator shall assure that each contract employee follows the safety rules of the stationary source including the safe work practices required by §68.69(d).

(5) The contract owner or operator shall advise the owner or operator of any unique hazards presented by the contract owner or operator's work, or of any hazards found by the contract owner or operator's work.

Subpart E—Emergency Response

SOURCE: 61 FR 31725, June 20, 1996, unless otherwise noted.

EFFECTIVE DATE NOTE: At 61 FR 31725, June 20, 1996, subpart E was added, effective Aug. 19, 1996.

§ 68.90 Applicability.

(a) Except as provided in paragraph (b) of this section, the owner or operator of a stationary source with Program 2 and Program 3 processes shall comply with the requirements of §68.95.

(b) The owner or operator of stationary source whose employees will not respond to accidental releases of regulated substances need not comply with §68.95 of this part provided that they meet the following:

(1) For stationary sources with any regulated toxic substance held in a process above the threshold quantity, the stationary source is included in the community emergency response plan developed under 42 U.S.C. 11003;

(2) For stationary sources with only regulated flammable substances held in a process above the threshold quantity, the owner or operator has coordinated response actions with the local fire department; and

(3) Appropriate mechanisms are in place to notify emergency responders when there is a need for a response.

§ 68.95 Emergency response program.

(a) The owner or operator shall develop and implement an emergency response program for the purpose of protecting public health and the environment. Such program shall include the following elements:

(1) An emergency response plan, which shall be maintained at the stationary source and contain at least the following elements:

(i) Procedures for informing the public and local emergency response agencies about accidental releases;

(ii) Documentation of proper first-aid and emergency medical treatment necessary to treat accidental human exposures; and

(iii) Procedures and measures for emergency response after an accidental release of a regulated substance;

(2) Procedures for the use of emergency response equipment and for its inspection, testing, and maintenance;

(3) Training for all employees in relevant procedures; and

(4) Procedures to review and update, as appropriate, the emergency response plan to reflect changes at the stationary source and ensure that employees are informed of changes.

(b) A written plan that complies with other Federal contingency plan regulations or is consistent with the approach in the National Response Team's Integrated Contingency Plan Guidance ("One Plan") and that, among other matters, includes the elements provided in paragraph (a) of this section, shall satisfy the requirements of this section if the owner or operator also complies with paragraph (c) of this section.

(c) The emergency response plan developed under paragraph (a)(1) of this section shall be coordinated with the community emergency response plan developed under 42 U.S.C. 11003. Upon request of the local emergency planning committee or emergency response officials, the owner or operator shall promptly provide to the local emergency response officials information necessary for developing and implementing the community emergency response plan.

Subpart F—Regulated Substances for Accidental Release Prevention

SOURCE: 59 FR 4493, Jan. 31, 1994, unless otherwise noted. Redesignated at 61 FR 31717, June 20, 1996.

EFFECTIVE DATE NOTE: At 61 FR 31717, June 20, 1996, subpart C was redesignated as subpart F, effective Aug. 19, 1996.

§68.100 Purpose.

This subpart designates substances to be listed under section 112(r)(3), (4), and (5) of the Clean Air Act, as amended, identifies their threshold quantities, and establishes the requirements for petitioning to add or delete substances from the list.

§68.115 Threshold determination.

(a) A threshold quantity of a regulated substance listed in §68.130 is present at a stationary source if the total quantity of the regulated substance contained in a process exceeds the threshold.

(b) For the purposes of determining whether more than a threshold quantity of a regulated substance is present at the stationary source, the following exemptions apply:

(1) *Concentrations of a regulated toxic substance in a mixture.* If a regulated substance is present in a mixture and the concentration of the substance is below one percent by weight of the mixture, the amount of the substance in the mixture need not be considered when determining whether more than a threshold quantity is present at the stationary source. Except for oleum, toluene 2,4-diisocyanate, toluene 2,6-diisocyanate, and toluene diisocyanate (unspecified isomer), if the concentration of the regulated substance in the mixture is one percent or greater by weight, but the owner or operator can demonstrate that the partial pressure of the regulated substance in the mixture (solution) under handling or storage conditions in any portion of the process is less than 10 millimeters of mercury (mm Hg), the amount of the substance in the mixture in that portion of the process need not be considered when determining whether more than a threshold quantity is present at the stationary source. The owner or operator shall document this partial pressure measurement or estimate.

(2) *Concentrations of a regulated flammable substance in a mixture.* If a regulated substance is present in a mixture and the concentration of the substance is below one percent by weight of the mixture, the mixture need not be considered when determining whether more than a threshold quantity of the regulated substance is present at the stationary source. If the concentration of the regulated substance in the mixture is one percent or greater by weight, then, for purposes of determining whether more than a threshold quantity is present at the stationary source, the entire weight of the mixture shall be treated as the regulated substance unless the owner or operator can demonstrate that the mixture itself does not meet the criteria for flammability of flash point below 73°F (22.8°C) and boiling point below 100°F (37.8°C). The owner or operator shall document these flash point and boiling point measurements or estimates.

(3) *Concentrations of a regulated explosive substance in a mixture.* Mixtures of Division 1.1 explosives listed in 49 CFR 172.101 (Hazardous Materials Table) and other explosives need not be included when determining whether a threshold quantity is present in a process, when the mixture is intended to be used on-site in a non-accidental release in a manner consistent with applicable BATF regulations. Other mixtures of Division 1.1 explosives listed in 49 CFR 172.101 and other explosives shall be included in determining whether more than a threshold quantity is present in a process if such mixtures would be treated as Division 1.1 explosives under 49 CFR parts 172 and 173.

(4) *Articles.* Regulated substances contained in articles need not be considered when determining whether more than a threshold quantity is present at the stationary source.

(5) *Uses.* Regulated substances, when in use for the following purposes, need not be included in determining whether more than a threshold quantity is present at the stationary source:

(i) Use as a structural component of the stationary source;

(ii) Use of products for routine janitorial maintenance;

(iii) Use by employees of foods, drugs, cosmetics, or other personal items containing the regulated substance; and

(iv) Use of regulated substances present in process water or non-contact cooling water as drawn from the environment or municipal sources, or use of regulated substances present in air used either as compressed air or as part of combustion.

(6) *Activities in laboratories.* If a regulated substance is manufactured, processed, or used in a laboratory at a stationary source under the supervision of a technically qualified individual as defined in §720.3(ee) of this chapter, the quantity of the substance need not be considered in determining whether a threshold quantity is present. This exemption does not apply to:

(i) Specialty chemical production;

(ii) Manufacture, processing, or use of substances in pilot plant scale operations; and

(iii) Activities conducted outside the laboratory.

§ 68.120 Petition process.

(a) Any person may petition the Administrator to modify, by addition or deletion, the list of regulated substances identified in §68.130. Based on the information presented by the petitioner, the Administrator may grant or deny a petition.

(b) A substance may be added to the list if, in the case of an accidental release, it is known to cause or may be reasonably anticipated to cause death, injury, or serious adverse effects to human health or the environment.

(c) A substance may be deleted from the list if adequate data on the health and environmental effects of the substance are available to determine that the substance, in the case of an accidental release, is not known to cause and may not be reasonably anticipated to cause death, injury, or serious adverse effects to human health or the environment.

(d) No substance for which a national primary ambient air quality standard has been established shall be added to the list. No substance regulated under title VI of the Clean Air Act, as amended, shall be added to the list.

(e) The burden of proof is on the petitioner to demonstrate that the criteria for addition and deletion are met. A petition will be denied if this demonstration is not made.

(f) The Administrator will not accept additional petitions on the same substance following publication of a final notice of the decision to grant or deny a petition, unless new data becomes available that could significantly affect the basis for the decision.

(g) Petitions to modify the list of regulated substances must contain the following:

(1) Name and address of the petitioner and a brief description of the organization(s) that the petitioner represents, if applicable;

(2) Name, address, and telephone number of a contact person for the petition;

(3) Common chemical name(s), common synonym(s), Chemical Abstracts Service number, and chemical formula and structure;

(4) Action requested (add or delete a substance);

(5) Rationale supporting the petitioner's position; that is, how the substance meets the criteria for addition and deletion. A short summary of the rationale must be submitted along with a more detailed narrative; and

(6) Supporting data; that is, the petition must include sufficient information to scientifically support the request to modify the list. Such information shall include:

(i) A list of all support documents;

(ii) Documentation of literature searches conducted, including, but not limited to, identification of the database(s) searched, the search strategy, dates covered, and printed results;

(iii) Effects data (animal, human, and environmental test data) indicating

the potential for death, injury, or serious adverse human and environmental impacts from acute exposure following an accidental release; printed copies of the data sources, in English, should be provided; and

(iv) Exposure data or previous accident history data, indicating the potential for serious adverse human health or environmental effects from an accidental release. These data may include, but are not limited to, physical and chemical properties of the substance, such as vapor pressure; modeling results, including data and assumptions used and model documentation; and historical accident data, citing data sources.

(h) Within 18 months of receipt of a petition, the Administrator shall publish in the FEDERAL REGISTER a notice either denying the petition or granting the petition and proposing a listing.

§68.125 Exemptions.

Agricultural nutrients. Ammonia used as an agricultural nutrient, when held by farmers, is exempt from all provisions of this part.

§68.130 List of substances.

(a) Explosives listed by DOT as Division 1.1 in 49 CFR 172.101 are covered under section 112(r) of the Clean Air Act. The threshold quantity for explosives is 5,000 pounds.

(b) Regulated toxic and flammable substances under section 112(r) of the Clean Air Act are the substances listed in Tables 1, 2, 3, and 4. Threshold quantities for listed toxic and flammable substances are specified in the tables.

(c) The basis for placing toxic and flammable substances on the list of regulated substances are explained in the notes to the list.

TABLE 1 TO §68.130.—LIST OF REGULATED TOXIC SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION

[Alphabetical Order—77 Substances]

Chemical name	CAS No.	Threshold quantity (lbs)	Basis for listing
Acrolein [2-Propenal].	107–02–8	5,000	b
Acrylonitrile [2-Propenenitrile].	107–13–1	20,000	b

TABLE 1 TO §68.130.—LIST OF REGULATED TOXIC SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION—Continued

[Alphabetical Order—77 Substances]

Chemical name	CAS No.	Threshold quantity (lbs)	Basis for listing
Acrylyl chloride [2-Propenoyl chloride].	814–68–6	5,000	b
Allyl alcohol [2-Propen-l-ol].	107–18–61	15,000	b
Allylamine [2-Propen-l-amine].	107–11–9	10,000	b
Ammonia (anhydrous).	7664–41–7	10,000	a, b
Ammonia (conc 20% or greater).	7664–41–7	20,000	a, b
Arsenous trichloride.	7784–34–1	15,000	b
Arsine	7784–42–1	1,000	b
Boron trichloride [Borane, trichloro-].	10294–34–5	5,000	b
Boron trifluoride [Borane, trifluoro-].	7637–07–2	5,000	b
Boron trifluoride compound with methyl ether (1:1) [Boron, trifluoro [oxybis [metane]]-, T-4-.	353–42–4	15,000	b
Bromine	7726–95–6	10,000	a, b
Carbon disulfide	75–15–0	20,000	b
Chlorine	7782–50–5	2,500	a, b
Chlorine dioxide [Chlorine oxide (ClO2)].	10049–04–4	1,000	c
Chloroform [Methane, trichloro-].	67–66–3	20,000	b
Chloromethyl ether [Methane, oxybis[chloro-].	542–88–1	1,000	b
Chloromethyl methyl ether [Methane, chloromethoxy-].	107–30–2	5,000	b
Crotonaldehyde [2-Butenal].	4170–30–3	20,000	b
Crotonaldehyde, (E)- [2-Butenal, (E)-].	123–73–9	20,000	b
Cyanogen chloride.	506–77–4	10,000	c
Cyclohexylamine [Cyclohexanamine].	108–91–8	15,000	b
Diborane	19287–45–7	2,500	b
Dimethyldichlorosilane [Silane, dichlorodimethyl-].	75–78–5	5,000	b
1,1-Dimethylhydrazine [Hydrazine, 1,1-dimethyl-].	57–14–7	15,000	b
Epichlorohydrin [Oxirane, (chloromethyl)-].	106–89–8	20,000	b

TABLE 1 TO § 68.130.—LIST OF REGULATED TOXIC SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION—Continued

[Alphabetical Order—77 Substances]

Chemical name	CAS No.	Threshold quantity (lbs)	Basis for listing
Ethylenediamine [1,2-Ethanediamine].	107–15–3	20,000	b
Ethyleneimine [Aziridine].	151–56–4	10,000	b
Ethylene oxide [Oxirane].	75–21–8	10,000	a, b
Fluorine	7782–41–4	1,000	b
Formaldehyde (solution).	50–00–0	15,000	b
Furan	110–00–9	5,000	b
Hydrazine	302–01–2	15,000	b
Hydrochloric acid (conc 30% or greater).	7647–01–0	15,000	d
Hydrocyanic acid	74–90–8	2,500	a, b
Hydrogen chloride (anhydrous) [Hydrochloric acid].	7647–01–0	5,000	a
Hydrogen fluoride/ Hydrofluoric acid (conc 50% or greater) [Hydrofluoric acid].	7664–39–3	1,000	a, b
Hydrogen selenide.	7783–07–5	500	b
Hydrogen sulfide	7783–06–4	10,000	a, b
Iron, pentacarbonyl- [Iron carbonyl (Fe(CO)5), (TB-5-11)-].	13463–40–6	2,500	b
Isobutyronitrile [Propanenitrile, 2-methyl-].	78–82–0	20,000	b
Isopropyl chloroformate [Carbonochloridic acid, 1-methylethyl ester].	108–23–6	15,000	b
Methacrylonitrile [2-Propenenitrile, 2-methyl-].	126–98–7	10,000	b
Methyl chloride [Methane, chloro-].	74–87–3	10,000	a
Methyl chloroformate [Carbonochloridic acid, methylester].	79–22–1	5,000	b
Methyl hydrazine [Hydrazine, methyl-].	60–34–4	15,000	b
Methyl isocyanate [Methane, isocyanato-].	624–83–9	10,000	a, b
Methyl mercaptan [Methanethiol].	74–93–1	10,000	b

TABLE 1 TO § 68.130.—LIST OF REGULATED TOXIC SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION—Continued

[Alphabetical Order—77 Substances]

Chemical name	CAS No.	Threshold quantity (lbs)	Basis for listing
Methyl thiocyanate [Thiocyanic acid, methyl ester].	556–64–9	20,000	b
Methyltrichlorosilane [Silane, trichloromethyl-].	75–79–6	5,000	b
Nickel carbonyl	13463–39–3	1,000	b
Nitric acid (conc 80% or greater).	7697–37–2	15,000	b
Nitric oxide [Nitrogen oxide (NO)].	10102–43–9	10,000	b
Oleum (Fuming Sulfuric acid) [Sulfuric acid, mixture with sulfur trioxide][1].	8014–95–7	10,000	e
Peracetic acid [Ethaneperoxoic acid].	79–21–0	10,000	b
Perchloromethylmercaptan [Methanesulfenyl chloride, trichloro-].	594–42–3	10,000	b
Phosgene [Carbonic dichloride].	75–44–5	500	a, b
Phosphine	7803–51–2	5,000	b
Phosphorus oxychloride [Phosphoryl chloride].	10025–87–3	5,000	b
Phosphorus trichloride [Phosphorous trichloride].	7719–12–2	15,000	b
Piperidine	110–89–4	15,000	b
Propionitrile [Propanenitrile].	107–12–0	10,000	b
Propyl chloroformate [Carbonochloridic acid, propylester].	109–61–5	15,000	b
Propyleneimine [Aziridine, 2-methyl-].	75–55–8	10,000	b
Propylene oxide [Oxirane, methyl-].	75–56–9	10,000	b
Sulfur dioxide (anhydrous).	7446–09–5	5,000	a, b
Sulfur tetrafluoride [Sulfur fluoride (SF4), (T-4)-].	7783–60–0	2,500	b
Sulfur trioxide	7446–11–9	10,000	a, b
Tetramethyllead [Plumbane, tetramethyl-].	75–74–1	10,000	b
Tetranitromethane [Methane, tetranitro-].	509–14–8	10,000	b

TABLE 1 TO § 68.130.—LIST OF REGULATED TOXIC SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION—Continued

[Alphabetical Order—77 Substances]

Chemical name	CAS No.	Threshold quantity (lbs)	Basis for listing
Titanium tetrachloride [Titanium chloride (TiCl4) (T-4)-].	7550-45-0	2,500	b
Toluene 2,4-diisocyanate [Benzene, 2,4-diisocyanato-1-methyl-][1].	584-84-9	10,000	a
Toluene 2,6-diisocyanate [Benzene, 1,3-diisocyanato-2-methyl-][1].	91-08-7	10,000	a
Toluene diisocyanate (unspecified isomer) [Benzene, 1,3-diisocyanatomethyl-][1].	26471-62-5	10,000	a
Trimethylchlorosilane [Silane, chlorotrimethyl-].	75-77-4	10,000	b
Vinyl acetate monomer [Acetic acid ethenyl ester].	108-05-4	15,000	b

[1] The mixture exemption in §68.115(b)(1) does not apply to the substance.

NOTE: Basis for Listing:
a Mandated for listing by Congress.
b On EHS list, vapor pressure 10 mmHg or greater.
c Toxic gas.
d Toxicity of hydrogen chloride, potential to release hydrogen chloride, and history of accidents.
e Toxicity of sulfur trioxide and sulfuric acid, potential to release sulfur trioxide, and history of accidents.

TABLE 2 TO § 68.130.—LIST OF REGULATED TOXIC SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION

[CAS Number Order—77 Substances]

CAS No.	Chemical name	Threshold quantity (lbs)	Basis for listing
50-00-0	Formaldehyde (solution)	15,000	b
57-14-7	1,1-Dimethylhydrazine [Hydrazine, 1,1-dimethyl-]	15,000	b
60-34-4	Methyl hydrazine [Hydrazine, methyl-]	15,000	b
67-66-3	Chloroform [Methane, trichloro-]	20,000	b
74-87-3	Methyl chloride [Methane, chloro-]	10,000	a
74-90-8	Hydrocyanic acid	2,500	a, b
74-93-1	Methyl mercaptan [Methanethiol]	10,000	b
75-15-0	Carbon disulfide	20,000	b
75-21-8	Ethylene oxide [Oxirane]	10,000	a, b
75-44-5	Phosgene [Carbonic dichloride]	500	a, b
75-55-8	Propyleneimine [Aziridine, 2-methyl-]	10,000	b
75-56-9	Propylene oxide [Oxirane, methyl-]	10,000	b
75-74-1	Tetramethyllead [Plumbane, tetramethyl-]	10,000	b
75-77-4	Trimethylchlorosilane [Silane, chlorotrimethyl-]	10,000	b
75-78-5	Dimethyldichlorosilane [Silane, dichlorodimethyl-]	5,000	b
75-79-6	Methyltrichlorosilane [Silane, trichloromethyl-]	5,000	b
78-82-0	Isobutyronitrile [Propanenitrile, 2-methyl-]	20,000	b
79-21-0	Peracetic acid [Ethaneperoxoic acid]	10,000	b
79-22-1	Methyl chloroformate [Carbonochloridic acid, methylester]	5,000	b
91-08-7	Toluene 2,6-diisocyanate [Benzene, 1,3-diisocyanato-2-methyl-][1]	10,000	a
106-89-8	Epichlorohydrin [Oxirane, (chloromethyl)-]	20,000	b
107-02-8	Acrolein [2-Propenal]	5,000	b
107-11-9	Allylamine [2-Propen-1-amine]	10,000	b
107-12-0	Propionitrile [Propanenitrile]	10,000	b
107-13-1	Acrylonitrile [2-Propenenitrile]	20,000	b
107-15-3	Ethylenediamine [1,2-Ethanediamine]	20,000	b
107-18-6	Allyl alcohol [2-Propen-1-ol]	15,000	b
107-30-2	Chloromethyl methyl ether [Methane, chloromethoxy-]	5,000	b
108-05-4	Vinyl acetate monomer [Acetic acid ethenyl ester]	15,000	b
108-23-6	Isopropyl chloroformate [Carbonochloridic acid, 1-methylethyl ester]	15,000	b
108-91-8	Cyclohexylamine [Cyclohexanamine]	15,000	b
109-61-5	Propyl chloroformate [Carbonochloridic acid, propylester]	15,000	b
110-00-9	Furan	5,000	b
110-89-4	Piperidine	15,000	b
123-73-9	Crotonaldehyde, (E)- [2-Butenal, (E)-]	20,000	b

TABLE 2 TO § 68.130.—LIST OF REGULATED TOXIC SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION—Continued

[CAS Number Order—77 Substances]

CAS No.	Chemical name	Threshold quantity (lbs)	Basis for listing
126–98–7	Methacrylonitrile [2-Propenenitrile, 2-methyl-]	10,000	b
151–56–4	Ethyleneimine [Aziridine]	10,000	b
302–01–2	Hydrazine	15,000	b
353–42–4	Boron trifluoride compound with methyl ether (1:1) [Boron, trifluoro[oxybis[methane]]-, T-4-.	15,000	b
506–77–4	Cyanogen chloride	10,000	c
509–14–8	Tetranitromethane [Methane, tetranitro-]	10,000	b
542–88–1	Chloromethyl ether [Methane, oxybis[chloro-]	1,000	b
556–64–9	Methyl thiocyanate [Thiocyanic acid, methyl ester]	20,000	b
584–84–9	Toluene 2,4-diisocyanate [Benzene, 2,4-diisocyanato-1-methyl-][1]	10,000	a
594–42–3	Perchloromethylmercaptan [Methanesulfenyl chloride, trichloro-]	10,000	b
624–83–9	Methyl isocyanate [Methane, isocyanato-]	10,000	a, b
814–68–6	Acrylyl chloride [2-Propenoyl chloride]	5,000	b
4170–30–3	Crotonaldehyde [2-Butenal]	20,000	b
7446–09–5	Sulfur dioxide (anhydrous)	5,000	a, b
7446–11–9	Sulfur trioxide	10,000	a, b
7550–45–0	Titanium tetrachloride [Titanium chloride (TiCl4) (T-4)-]	2,500	b
7637–07–2	Boron trifluoride [Borane, trifluoro-]	5,000	b
7647–01–0	Hydrochloric acid (conc 30% or greater)	15,000	d
7647–01–0	Hydrogen chloride (anhydrous) [Hydrochloric acid]	5,000	a
7664–39–3	Hydrogen fluoride/Hydrofluoric acid (conc 50% or greater) [Hydrofluoric acid]	1,000	a, b
7664–41–7	Ammonia (anhydrous)	10,000	a, b
7664–41–7	Ammonia (conc 20% or greater)	20,000	a, b
7697–37–2	Nitric acid (conc 80% or greater)	15,000	b
7719–12–2	Phosphorus trichloride [Phosphorous trichloride]	15,000	b
7726–95–6	Bromine	10,000	a, b
7782–41–4	Fluorine	1,000	b
7782–50–5	Chlorine	2,500	a, b
7783–06–4	Hydrogen sulfide	10,000	a, b
7783–07–5	Hydrogen selenide	500	b
7783–60–0	Sulfur tetrafluoride [Sulfur fluoride (SF4), (T-4)-]	2,500	b
7784–34–1	Arsenous trichloride	15,000	b
7784–42–1	Arsine	1,000	b
7803–51–2	Phosphine	5,000	b
8014–95–7	Oleum (Fuming Sulfuric acid) [Sulfuric acid, mixture with sulfur trioxide][1]	10,000	e
10025–87–3	Phosphorus oxychloride [Phosphoryl chloride]	5,000	b
10049–04–4	Chlorine dioxide [Chlorine oxide (ClO_2)]	1,000	c
10102–43–9	Nitric oxide [Nitrogen oxide (NO)]	10,000	b
10294–34–5	Boron trichloride [Borane, trichloro-]	5,000	b
13463–39–3	Nickel carbonyl	1,000	b
13463–40–6	Iron, pentacarbonyl- [Iron carbonyl ($Fe(CO)_5$), (TB-5-11)-]	2,500	b
19287–45–7	Diborane	2,500	b
26471–62–5	Toluene diisocyanate (unspecified isomer) [Benzene, 1,3-diisocyanatomethyl-1][1].	10,000	a

[1] The mixture exemption in §68.115(b)(1) does not apply to the substance.

NOTE: Basis for Listing:

a Mandated for listing by Congress.
b On EHS list, vapor pressure 10 mmHg or greater.
c Toxic gas.
e Toxicity of sulfur trioxide and sulfuric acid, potential to release sulfur trioxide, and history of accidents.

TABLE 3 TO § 68.130.—LIST OF REGULATED FLAMMABLE SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION

[Alphabetical Order—63 Substances]

Chemical name	CAS No.	Threshold quantity (lbs)	Basis for listing
Acetaldehyde	75–07–0	10,000	g
Acetylene [Ethyne]	74–86–2	10,000	f
Bromotrifluoroethylene [Ethene, bromotrifluoro-]	598–73–2	10,000	f
1,3-Butadiene	106–99–0	10,000	f
Butane	106–97–8	10,000	f
1-Butene	106–98–9	10,000	f
2-Butene	107–01–7	10,000	f
Butene	25167–67–3	10,000	f

TABLE 3 TO § 68.130.—LIST OF REGULATED FLAMMABLE SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION—Continued

[Alphabetical Order—63 Substances]

Chemical name	CAS No.	Threshold quantity (lbs)	Basis for listing
2-Butene-cis	590–18–1	10,000	f
2-Butene-trans [2-Butene, (E)]	624–64–6	10,000	f
Carbon oxysulfide [Carbon oxide sulfide (COS)]	463–58–1	10,000	f
Chlorine monoxide [Chlorine oxide]	7791–21–1	10,000	f
2-Chloropropylene [1-Propene, 2-chloro-]	557–98–2	10,000	g
1-Chloropropylene [1-Propene, 1-chloro-]	590–21–6	10,000	g
Cyanogen [Ethanedinitrile]	460–19–5	10,000	f
Cyclopropane	75–19–4	10,000	f
Dichlorosilane [Silane, dichloro-]	4109–96–0	10,000	f
Difluoroethane [Ethane, 1,1-difluoro-]	75–37–6	10,000	f
Dimethylamine [Methanamine, N-methyl-]	124–40–3	10,000	f
2,2-Dimethylpropane [Propane, 2,2-dimethyl-]	463–82–1	10,000	f
Ethane	74–84–0	10,000	f
Ethyl acetylene [1-Butyne]	107–00–6	10,000	f
Ethylamine [Ethanamine]	75–04–7	10,000	f
Ethyl chloride [Ethane, chloro-]	75–00–3	10,000	f
Ethylene [Ethene]	74–85–1	10,000	f
Ethyl ether [Ethane, 1,1'-oxybis-]	60–29–7	10,000	g
Ethyl mercaptan [Ethanethiol]	75–08–1	10,000	g
Ethyl nitrite [Nitrous acid, ethyl ester]	109–95–5	10,000	f
Hydrogen	1333–74–0	10,000	f
Isobutane [Propane, 2-methyl]	75–28–5	10,000	f
Isopentane [Butane, 2-methyl-]	78–78–4	10,000	g
Isoprene [1,3-Butadinene, 2-methyl-]	78–79–5	10,000	g
Isopropylamine [2-Propanamine]	75–31–0	10,000	g
Isopropyl chloride [Propane, 2-chloro-]	75–29–6	10,000	g
Methane	74–82–8	10,000	f
Methylamine [Methanamine]	74–89–5	10,000	f
3-Methyl-1-butene	563–45–1	10,000	f
2-Methyl-1-butene	563–46–2	10,000	g
Methyl ether [Methane, oxybis-]	115–10–6	10,000	f
Methyl formate [Formic acid, methyl ester]	107–31–3	10,000	g
2-Methylpropene [1-Propene, 2-methyl-]	115–11–7	10,000	f
1,3-Pentadinene	504–60–9	10,000	f
Pentane	109–66–0	10,000	g
1-Pentene	109–67–1	10,000	g
2-Pentene, (E)-	646–04–8	10,000	g
2-Pentene, (Z)-	627–20–3	10,000	g
Propadiene [1,2-Propadiene]	463–49–0	10,000	f
Propane	74–98–6	10,000	f
Propylene [1-Propene]	115–07–1	10,000	f
Propyne [1-Propyne]	74–99–7	10,000	f
Silane	7803–62–5	10,000	f
Tetrafluoroethylene [Ethene, tetrafluoro-]	116–14–3	10,000	f
Tetramethylsilane [Silane, tetramethyl-]	75–76–3	10,000	g
Trichlorosilane [Silane, trichloro-]	10025–78–2	10,000	g
Trifluorochloroethylene [Ethene, chlorotrifluoro-]	79–38–9	10,000	f
Trimethylamine [Methanamine, N,N-dimethyl-]	75–50–3	10,000	f
Vinyl acetylene [1-Buten-3-yne]	689–97–4	10,000	f
Vinyl chloride [Ethene, chloro-]	75–01–4	10,000	a, f
Vinyl ethyl ether [Ethene, ethoxy-]	109–92–2	10,000	g
Vinyl fluoride [Ethene, fluoro-]	75–02–5	10,000	f
Vinylidene chloride [Ethene, 1,1-dichloro-]	75–35–4	10,000	g
Vinylidene fluoride [Ethene, 1,1-difluoro-]	75–38–7	10,000	f
Vinyl methyl ether [Ethene, methoxy-]	107–25–5	10,000	f

NOTE: Basis for Listing:
a Mandated for listing by Congress.
f Flammable gas.
g Volatile flammable liquid.

TABLE 4 TO § 68.130.—LIST OF REGULATED FLAMMABLE SUBSTANCES AND THRESHOLD QUANTITIES FOR ACCIDENTAL RELEASE PREVENTION

[CAS Number Order—63 Substances]

CAS No.	Chemical name	CAS No.	Threshold quantity (lbs)	Basis for listing
60–29–7	Ethyl ether [Ethane, 1,1'-oxybis-]	60–29–7	10,000	g
74–82–8	Methane	74–82–8	10,000	f
74–84–0	Ethane	74–84–0	10,000	f
74–85–1	Ethylene [Ethene]	74–85–1	10,000	f
74–86–2	Acetylene [Ethyne]	74–86–2	10,000	f
74–89–5	Methylamine [Methanamine]	74–89–5	10,000	f
74–98–6	Propane	74–98–6	10,000	f
74–99–7	Propyne [1-Propyne]	74–99–7	10,000	f
75–00–3	Ethyl chloride [Ethane, chloro-]	75–00–3	10,000	f
75–01–4	Vinyl chloride [Ethene, chloro-]	75–01–4	10,000	a, f
75–02–5	Vinyl fluoride [Ethene, fluoro-]	75–02–5	10,000	f
75–04–7	Ethylamine [Ethanamine]	75–04–7	10,000	f
75–07–0	Acetaldehyde	75–07–0	10,000	g
75–08–1	Ethyl mercaptan [Ethanethiol]	75–08–1	10,000	g
75–19–4	Cyclopropane	75–19–4	10,000	f
75–28–5	Isobutane [Propane, 2-methyl]	75–28–5	10,000	f
75–29–6	Isopropyl chloride [Propane, 2-chloro-]	75–29–6	10,000	g
75–31–0	Isopropylamine [2-Propanamine]	75–31–0	10,000	g
75–35–4	Vinylidene chloride [Ethene, 1,1-dichloro-]	75–35–4	10,000	g
75–37–6	Difluoroethane [Ethane, 1,1-difluoro-]	75–37–6	10,000	f
75–38–7	Vinylidene fluoride [Ethene, 1,1-difluoro-]	75–38–7	10,000	f
75–50–3	Trimethylamine [Methanamine, N, N-dimethyl-]	75–50–3	10,000	f
75–76–3	Tetramethylsilane [Silane, tetramethyl-]	75–76–3	10,000	g
78–78–4	Isopentane [Butane, 2-methyl-]	78–78–4	10,000	g
78–79–5	Isoprene [1,3,-Butadiene, 2-methyl-]	78–79–5	10,000	g
79–38–9	Trifluorochloroethylene [Ethene, chlorotrifluoro-]	79–38–9	10,000	f
106–97–8	Butane	106–97–8	10,000	f
106–98–9	1-Butene	106–98–9	10,000	f
106–99–0	1,3-Butadiene	106–99–0	10,000	f
107–00–6	Ethyl acetylene [1-Butyne]	107–00–6	10,000	f
107–01–7	2-Butene	107–01–7	10,000	f
107–25–5	Vinyl methyl ether [Ethene, methoxy-]	107–25–5	10,000	f
107–31–3	Methyl formate [Formic acid, methyl ester]	107–31–3	10,000	g
109–66–0	Pentane	109–66–0	10,000	g
109–67–1	1-Pentene	109–67–1	10,000	g
109–92–2	Vinyl ethyl ether [Ethene, ethoxy-]	109–92–2	10,000	g
109–95–5	Ethyl nitrite [Nitrous acid, ethyl ester]	109–95–5	10,000	f
115–07–1	Propylene [1-Propene]	115–07–1	10,000	f
115–10–6	Methyl ether [Methane, oxybis-]	115–10–6	10,000	f
115–11–7	2-Methylpropene [1-Propene, 2-methyl-]	115–11–7	10,000	f
116–14–3	Tetrafluoroethylene [Ethene, tetrafluoro-]	116–14–3	10,000	f
124–40–3	Dimethylamine [Methanamine, N-methyl-]	124–40–3	10,000	f
460–19–5	Cyanogen [Ethanedinitrile]	460–19–5	10,000	f
463–49–0	Propadiene [1,2-Propadiene]	463–49–0	10,000	f
463–58–1	Carbon oxysulfide [Carbon oxide sulfide (COS)]	463–58–1	10,000	f
463–82–1	2,2-Dimethylpropane [Propane, 2,2-dimethyl-]	463–82–1	10,000	f
504–60–9	1,3-Pentadiene	504–60–9	10,000	f
557–98–2	2-Chloropropylene [1-Propene, 2-chloro-]	557–98–2	10,000	g
563–45–1	3-Methyl-1-butene	563–45–1	10,000	f
563–46–2	2-Methyl-1-butene	563–46–2	10,000	g
590–18–1	2-Butene-cis	590–18–1	10,000	f
590–21–6	1-Chloropropylene [1-Propene, 1-chloro-]	590–21–6	10,000	g
598–73–2	Bromotrifluorethylene [Ethene, bromotrifluoro-]	598–73–2	10,000	f
624–64–6	2-Butene-trans [2-Butene, (E)]	624–64–6	10,000	f
627–20–3	2-Pentene, (Z)-	627–20–3	10,000	g
646–04–8	2-Pentene, (E)-	646–04–8	10,000	g
689–97–4	Vinyl acetylene [1-Buten-3-yne]	689–97–4	10,000	f
1333–74–0	Hydrogen	1333–74–0	10,000	f
4109–96–0	Dichlorosilane [Silane, dichloro-]	4109–96–0	10,000	f
7791–21–1	Chlorine monoxide [Chlorine oxide]	7791–21–1	10,000	f
7803–62–5	Silane	7803–62–5	10,000	f
10025–78–2	Trichlorosilane [Silane,trichloro-]	10025–78–2	10,000	g
25167–67–3	Butene	25167–67–3	10,000	f

Note: Basis for Listing: a Mandated for listing by Congress. f Flammable gas. g Volatile flammable liquid.

Subpart G—Risk Management Plan

SOURCE: 61 FR 31726, June 20, 1996, unless otherwise noted.

EFFECTIVE DATE NOTE: At 61 FR 31726, June 20, 1996, subpart G was added, effective Aug. 19, 1996.

§ 68.150 Submission.

(a) The owner or operator shall submit a single RMP that includes the information required by §§68.155 through 68.185 for all covered processes. The RMP shall be submitted in a method and format to a central point as specified by EPA prior to June 21, 1999.

(b) The owner or operator shall submit the first RMP no later than the latest of the following dates:

(1) June 21, 1999;

(2) Three years after the date on which a regulated substance is first listed under § 68.130; or

(3) The date on which a regulated substance is first present above a threshold quantity in a process.

(c) Subsequent submissions of RMPs shall be in accordance with §68.190.

(d) Notwithstanding the provisions of §§68.155 to 68.190, the RMP shall exclude classified information. Subject to appropriate procedures to protect such information from public disclosure, classified data or information excluded from the RMP may be made available in a classified annex to the RMP for review by Federal and state representatives who have received the appropriate security clearances.

§ 68.155 Executive summary.

The owner or operator shall provide in the RMP an executive summary that includes a brief description of the following elements:

(a) The accidental release prevention and emergency response policies at the stationary source;

(b) The stationary source and regulated substances handled;

(c) The worst-case release scenario(s) and the alternative release scenario(s), including administrative controls and mitigation measures to limit the distances for each reported scenario;

(d) The general accidental release prevention program and chemical-specific prevention steps;

(e) The five-year accident history;

(f) The emergency response program; and

(g) Planned changes to improve safety.

§ 68.160 Registration.

(a) The owner or operator shall complete a single registration form and include it in the RMP. The form shall cover all regulated substances handled in covered processes.

(b) The registration shall include the following data:

(1) Stationary source name, street, city, county, state, zip code, latitude, and longitude;

(2) The stationary source Dun and Bradstreet number;

(3) Name and Dun and Bradstreet number of the corporate parent company;

(4) The name, telephone number, and mailing address of the owner or operator;

(5) The name and title of the person or position with overall responsibility for RMP elements and implementation;

(6) The name, title, telephone number, and 24-hour telephone number of the emergency contact;

(7) For each covered process, the name and CAS number of each regulated substance held above the threshold quantity in the process, the maximum quantity of each regulated substance or mixture in the process (in pounds) to two significant digits, the SIC code, and the Program level of the process;

(8) The stationary source EPA identifier;

(9) The number of full-time employees at the stationary source;

(10) Whether the stationary source is subject to 29 CFR 1910.119;

(11) Whether the stationary source is subject to 40 CFR part 355;

(12) Whether the stationary source has a CAA Title V operating permit; and

(13) The date of the last safety inspection of the stationary source by a Federal, state, or local government agency and the identity of the inspecting entity.

§ 68.165 Offsite consequence analysis.

(a) The owner or operator shall submit in the RMP information:

(1) One worst-case release scenario for each Program 1 process; and

(2) For Program 2 and 3 processes, one worst-case release scenario to represent all regulated toxic substances held above the threshold quantity and one worst-case release scenario to represent all regulated flammable substances held above the threshold quantity. If additional worst-case scenarios for toxics or flammables are required by § 68.25(a)(2)(iii), the owner or operator shall submit the same information on the additional scenario(s). The owner or operator of Program 2 and 3 processes shall also submit information on one alternative release scenario for each regulated toxic substance held above the threshold quantity and one alternative release scenario to represent all regulated flammable substances held above the threshold quantity.

(b) The owner or operator shall submit the following data:

(1) Chemical name;

(2) Physical state (toxics only);

(3) Basis of results (give model name if used);

(4) Scenario (explosion, fire, toxic gas release, or liquid spill and vaporization);

(5) Quantity released in pounds;

(6) Release rate;

(7) Release duration;

(8) Wind speed and atmospheric stability class (toxics only);

(9) Topography (toxics only);

(10) Distance to endpoint;

(11) Public and environmental receptors within the distance;

(12) Passive mitigation considered; and

(13) Active mitigation considered (alternative releases only);

§ 68.168 Five-year accident history.

The owner or operator shall submit in the RMP the information provided in § 68.42(b) on each accident covered by § 68.42(a).

§ 68.170 Prevention program/Program 2.

(a) For each Program 2 process, the owner or operator shall provide in the RMP the information indicated in paragraphs (b) through (k) of this section. If the same information applies to more than one covered process, the owner or operator may provide the information only once, but shall indicate to which processes the information applies.

(b) The SIC code for the process.

(c) The name(s) of the chemical(s) covered.

(d) The date of the most recent review or revision of the safety information and a list of Federal or state regulations or industry-specific design codes and standards used to demonstrate compliance with the safety information requirement.

(e) The date of completion of the most recent hazard review or update.

(1) The expected date of completion of any changes resulting from the hazard review;

(2) Major hazards identified;

(3) Process controls in use;

(4) Mitigation systems in use;

(5) Monitoring and detection systems in use; and

(6) Changes since the last hazard review.

(f) The date of the most recent review or revision of operating procedures.

(g) The date of the most recent review or revision of training programs;

(1) The type of training provided—classroom, classroom plus on the job, on the job; and

(2) The type of competency testing used.

(h) The date of the most recent review or revision of maintenance procedures and the date of the most recent equipment inspection or test and the equipment inspected or tested.

(i) The date of the most recent compliance audit and the expected date of completion of any changes resulting from the compliance audit.

(j) The date of the most recent incident investigation and the expected date of completion of any changes resulting from the investigation.

(k) The date of the most recent change that triggered a review or revision of safety information, the hazard review, operating or maintenance procedures, or training.

§ 68.175 Prevention program/Program 3.

(a) For each Program 3 process, the owner or operator shall provide the information indicated in paragraphs (b) through (p) of this section. If the same information applies to more than one covered process, the owner or operator may provide the information only once, but shall indicate to which processes the information applies.

(b) The SIC code for the process.

(c) The name(s) of the substance(s) covered.

(d) The date on which the safety information was last reviewed or revised.

(e) The date of completion of the most recent PHA or update and the technique used.

(1) The expected date of completion of any changes resulting from the PHA;

(2) Major hazards identified;

(3) Process controls in use;

(4) Mitigation systems in use;

(5) Monitoring and detection systems in use; and

(6) Changes since the last PHA.

(f) The date of the most recent review or revision of operating procedures.

(g) The date of the most recent review or revision of training programs;

(1) The type of training provided—classroom, classroom plus on the job, on the job; and

(2) The type of competency testing used.

(h) The date of the most recent review or revision of maintenance procedures and the date of the most recent equipment inspection or test and the equipment inspected or tested.

(i) The date of the most recent change that triggered management of change procedures and the date of the most recent review or revision of management of change procedures.

(j) The date of the most recent prestartup review.

(k) The date of the most recent compliance audit and the expected date of completion of any changes resulting from the compliance audit;

(l) The date of the most recent incident investigation and the expected date of completion of any changes resulting from the investigation;

(m) The date of the most recent review or revision of employee participation plans;

(n) The date of the most recent review or revision of hot work permit procedures;

(o) The date of the most recent review or revision of contractor safety procedures; and

(p) The date of the most recent evaluation of contractor safety performance.

§ 68.180 Emergency response program.

(a) The owner or operator shall provide in the RMP the following information:

(1) Do you have a written emergency response plan?

(2) Does the plan include specific actions to be taken in response to an accidental releases of a regulated substance?

(3) Does the plan include procedures for informing the public and local agencies responsible for responding to accidental releases?

(4) Does the plan include information on emergency health care?

(5) The date of the most recent review or update of the emergency response plan;

(6) The date of the most recent emergency response training for employees.

(b) The owner or operator shall provide the name and telephone number of the local agency with which the plan is coordinated.

(c) The owner or operator shall list other Federal or state emergency plan requirements to which the stationary source is subject.

§ 68.185 Certification.

(a) For Program 1 processes, the owner or operator shall submit in the RMP the certification statement provided in § 68.12(b)(4).

(b) For all other covered processes, the owner or operator shall submit in the RMP a single certification that, to the best of the signer's knowledge, information, and belief formed after reasonable inquiry, the information submitted is true, accurate, and complete.

§ 68.190 Updates.

(a) The owner or operator shall review and update the RMP as specified in paragraph (b) of this section and submit it in a method and format to a

central point specified by EPA prior to June 21, 1999.

(b) The owner or operator of a stationary source shall revise and update the RMP submitted under §68.150 as follows:

(1) Within five years of its initial submission or most recent update required by paragraphs (b)(2) through (b)(7) of this section, whichever is later.

(2) No later than three years after a newly regulated substance is first listed by EPA;

(3) No later than the date on which a new regulated substance is first present in an already covered process above a threshold quantity;

(4) No later than the date on which a regulated substance is first present above a threshold quantity in a new process;

(5) Within six months of a change that requires a revised PHA or hazard review;

(6) Within six months of a change that requires a revised offsite consequence analysis as provided in §68.36; and

(7) Within six months of a change that alters the Program level that applied to any covered process.

(c) If a stationary source is no longer subject to this part, the owner or operator shall submit a revised registration to EPA within six months indicating that the stationary source is no longer covered.

Subpart H—Other Requirements

SOURCE: 61 FR 31728, June 20, 1996, unless otherwise noted.

EFFECTIVE DATE NOTE: At 61 FR 31728, June 20, 1996, subpart H was added, effective Aug. 19, 1996.

§ 68.200 Recordkeeping.

The owner or operator shall maintain records supporting the implementation of this part for five years unless otherwise provided in subpart D of this part.

§ 68.210 Availability of information to the public.

(a) The RMP required under subpart G of this part shall be available to the public under 42 U.S.C. 7414(c).

(b) The disclosure of classified information by the Department of Defense or other Federal agencies or contractors of such agencies shall be controlled by applicable laws, regulations, or executive orders concerning the release of classified information.

§ 68.215 Permit content and air permitting authority or designated agency requirements.

(a) These requirements apply to any stationary source subject to this part 68 and parts 70 or 71 of this chapter. The 40 CFR part 70 or part 71 permit for the stationary source shall contain:

(1) A statement listing this part as an applicable requirement;

(2) Conditions that require the source owner or operator to submit:

(i) A compliance schedule for meeting the requirements of this part by the date provided in §68.10(a) or;

(ii) As part of the compliance certification submitted under 40 CFR 70.6(c)(5), a certification statement that the source is in compliance with all requirements of this part, including the registration and submission of the RMP.

(b) The owner or operator shall submit any additional relevant information requested by the air permitting authority or designated agency.

(c) For 40 CFR part 70 or part 71 permits issued prior to the deadline for registering and submitting the RMP and which do not contain permit conditions described in paragraph (a) of this section, the owner or operator or air permitting authority shall initiate permit revision or reopening according to the procedures of 40 CFR 70.7 or 71.7 to incorporate the terms and conditions consistent with paragraph (a) of this section.

(d) The state may delegate the authority to implement and enforce the requirements of paragraph (e) of this section to a state or local agency or agencies other than the air permitting authority. An up-to-date copy of any delegation instrument shall be maintained by the air permitting authority. The state may enter a written agreement with the Administrator under which EPA will implement and enforce the requirements of paragraph (e) of this section.

(e) The air permitting authority or the agency designated by delegation or agreement under paragraph (d) of this section shall, at a minimum:

(1) Verify that the source owner or operator has registered and submitted an RMP or a revised plan when required by this part;

(2) Verify that the source owner or operator has submitted a source certification or in its absence has submitted a compliance schedule consistent with paragraph (a)(2) of this section;

(3) For some or all of the sources subject to this section, use one or more mechanisms such as, but not limited to, a completeness check, source audits, record reviews, or facility inspections to ensure that permitted sources are in compliance with the requirements of this part; and

(4) Initiate enforcement action based on paragraphs (e)(1) and (e)(2) of this section as appropriate.

§68.220 Audits.

(a) In addition to inspections for the purpose of regulatory development and enforcement of the Act, the implementing agency shall periodically audit RMPs submitted under subpart G of this part to review the adequacy of such RMPs and require revisions of RMPs when necessary to ensure compliance with subpart G of this part.

(b) The implementing agency shall select stationary sources for audits based on any of the following criteria:

(1) Accident history of the stationary source;

(2) Accident history of other stationary sources in the same industry;

(3) Quantity of regulated substances present at the stationary source;

(4) Location of the stationary source and its proximity to the public and environmental receptors;

(5) The presence of specific regulated substances;

(6) The hazards identified in the RMP; and

(7) A plan providing for neutral, random oversight.

(c) Exemption from audits. A stationary source with a Star or Merit ranking under OSHA's voluntary protection program shall be exempt from audits under paragraph (b)(2) and (b)(7) of this section.

(d) The implementing agency shall have access to the stationary source, supporting documentation, and any area where an accidental release could occur.

(e) Based on the audit, the implementing agency may issue the owner or operator of a stationary source a written preliminary determination of necessary revisions to the stationary source's RMP to ensure that the RMP meets the criteria of subpart G of this part. The preliminary determination shall include an explanation for the basis for the revisions, reflecting industry standards and guidelines (such as AIChE/CCPS guidelines and ASME and API standards) to the extent that such standards and guidelines are applicable, and shall include a timetable for their implementation.

(f) *Written response to a preliminary determination.* (1) The owner or operator shall respond in writing to a preliminary determination made in accordance with paragraph (e) of this section. The response shall state the owner or operator will implement the revisions contained in the preliminary determination in accordance with the timetable included in the preliminary determination or shall state that the owner or operator rejects the revisions in whole or in part. For each rejected revision, the owner or operator shall explain the basis for rejecting such revision. Such explanation may include substitute revisions.

(2) The written response under paragraph (f)(1) of this section shall be received by the implementing agency within 90 days of the issue of the preliminary determination or a shorter period of time as the implementing agency specifies in the preliminary determination as necessary to protect public health and the environment. Prior to the written response being due and upon written request from the owner or operator, the implementing agency may provide in writing additional time for the response to be received.

(g) After providing the owner or operator an opportunity to respond under paragraph (f) of this section, the implementing agency may issue the owner

or operator a written final determination of necessary revisions to the stationary source's RMP. The final determination may adopt or modify the revisions contained in the preliminary determination under paragraph (e) of this section or may adopt or modify the substitute revisions provided in the response under paragraph (f) of this section. A final determination that adopts a revision rejected by the owner or operator shall include an explanation of the basis for the revision. A final determination that fails to adopt a substitute revision provided under paragraph (f) of this section shall include an explanation of the basis for finding such substitute revision unreasonable.

(h) Thirty days after completion of the actions detailed in the implementation schedule set in the final determination under paragraph (g) of this section, the owner or operator shall be in violation of subpart G of this part and this section unless the owner or operator revises the RMP prepared under subpart G of this part as required by the final determination, and submits the revised RMP as required under § 68.150.

(i) The public shall have access to the preliminary determinations, responses, and final determinations under this section in a manner consistent with § 68.210.

(j) Nothing in this section shall preclude, limit, or interfere in any way with the authority of EPA or the state to exercise its enforcement, investigatory, and information gathering authorities concerning this part under the Act.

APPENDIX A TO PART 68—TABLE OF TOXIC ENDPOINTS

[As defined in § 68.22 of this part]

CAS No.	Chemical name	Toxic endpoint (mg/L)
107-02-8	Acrolein [2-Propenal]	00011
107-13-1	Acrylonitrile [2-Propenenitrile]	0076
814-68-6	Acrylyl chloride [2-Propenoyl chloride]	000090
107-18-6	Allyl alcohol [2-Propen-1-ol]	0036
107-11-9	Allylamine [2-Propen-1-amine]	00032
7664-41-7	Ammonia (anhydrous)	014
7664-41-7	Ammonia (conc 20% or greater)	014
7784-34-1	Arsenous trichloride	0010
7784-42-1	Arsine	00019
10294-34-5	Boron trichloride [Borane, trichloro-]	0010
7637-07-2	Boron trifluoride [Borane, trifluoro-]	0028
353-42-4	Boron trifluoride compound with methyl ether (1:1) [Boron, trifluoro[oxybis[methane]]-, T-4	0.023
7726-95-6	Bromine	00065
75-15-0	Carbon disulfide	016
7782-50-5	Chlorine	00087
10049-04-4	Chlorine dioxide [Chlorine oxide (ClO2)]	00028
67-66-3	Chloroform [Methane, trichloro-]	049
542-88-1	Chloromethyl ether [Methane, oxybis[chloro-]	000025
107-30-2	Chloromethyl methyl ether [Methane, chloromethoxy-]	00018
4170-30-3	Crotonaldehyde [2-Butenal]	0029
123-73-9	Crotonaldehyde, (E)-, [2-Butenal, (E)-]	0029
506-77-4	Cyanogen chloride	0030
108-91-8	Cyclohexylamine [Cyclohexanamine]	016
19287-45-7	Diborane	00011
75-78-5	Dimethyldichlorosilane [Silane, dichlorodimethyl-]	0026
57-14-7	1,1-Dimethylhydrazine [Hydrazine, 1,1-dimethyl-]	0012
106-89-8	Epichlorohydrin [Oxirane, (chloromethyl)-]	0076
107-15-3	Ethylenediamine [1,2-Ethanediamine]	049
151-56-4	Ethyleneimine [Aziridine]	0018
75-21-8	Ethylene oxide [Oxirane]	0090
7782-41-4	Fluorine	00039
50-00-0	Formaldehyde (solution)	0012
110-00-9	Furan	00012
302-01-2	Hydrazine	0011
7647-01-0	Hydrochloric acid (conc 30% or greater)	0030
74-90-8	Hydrocyanic acid	0011
7647-01-0	Hydrogen chloride (anhydrous) [Hydrochloric acid]	0030
7664-39-3	Hydrogen fluoride/Hydrofluoric acid (conc 50% or greater) [Hydrofluoric acid]	0.016
7783-07-5	Hydrogen selenide	000066
7783-06-4	Hydrogen sulfide	0042
13463-40-6	Iron, pentacarbonyl- [Iron carbonyl (Fe(CO)5), (TB-5-11)-]	000044
78-82-0	Isobutyronitrile [Propanenitrile, 2-methyl-]	014
108-23-6	Isopropyl chloroformate [Carbonochloride acid, 1-methylethyl ester]	010

APPENDIX A TO PART 68—TABLE OF TOXIC ENDPOINTS—Continued

[As defined in §68.22 of this part]

CAS No.	Chemical name	Toxic endpoint (mg/L)
126–98–7	Methacrylonitrile [2-Propenenitrile, 2-methyl-]	00027
74–87–3	Methyl chloride [Methane, chloro-]	082
79–22–1	Methyl chloroformate [Carbonochloridic acid, methylester]	00019
60–34–4	Methyl hydrazine [Hydrazine, methyl-]	00094
624–83–9	Methyl isocyanate [Methane, isocyanato-]	00012
74–93–1	Methyl mercaptan [Methanethiol]	0049
556–64–9	Methyl thiocyanate [Thiocyanic acid, methyl ester]	0085
75–79–6	Methyltrichlorosilane [Silane, trichloromethyl-]	0018
13463–39–3	Nickel carbonyl	000067
7697–37–2	Nitric acid (conc 80% or greater)	0026
10102–43–9	Nitric oxide [Nitrogen oxide (NO)]	0031
8014–95–7	Oleum (Fuming Sulfuric acid) [Sulfuric acid, mixture with sulfur trioxide]	0010
79–21–0	Peracetic acid [Ethaneperoxoic acid]	00045
594–42–3	Perchloromethylmercaptan [Methanesulfenyl chloride, trichloro-]	00076
75–44–5	Phosgene [Carbonic dichloride]	000081
7803–51–2	Phosphine	00035
10025–87–3	Phosphorus oxychloride [Phosphoryl chloride]	00030
7719–12–2	Phosphorus trichloride [Phosphorous trichloride]	0028
110–89–4	Piperidine	0022
107–12–0	Propionitrile [Propanenitrile]	00037
109–61–5	Propyl chloroformate [Carbonochloridic acid, propylester]	0010
75–55–8	Propyleneimine [Aziridine, 2-methyl-]	012
75–56–9	Propylene oxide [Oxirane, methyl-]	059
7446–09–5	Sulfur dioxide (anhydrous)	00078
7783–60–0	Sulfur tetrafluoride [Sulfur fluoride (SF4), (T-4)-]	00092
7446–11–9	Sulfur trioxide	0010
75–74–1	Tetramethyllead [Plumbane, tetramethyl-]	00040
509–14–8	Tetranitromethane [Methane, tetranitro-]	00040
7750–45–0	Titanium tetrachloride [Titanium chloride (TiCl4) (T-4)-]	0020
584–84–9	Toluene 2,4-diisocyanate [Benzene, 2,4-diisocyanato-1-methyl-]	00070
91–08–7	Toluene 2,6-diisocyanate [Benzene, 1,3-diisocyanato-2-methyl-]	00070
26471–62–5	Toluene diisocyanate (unspecified isomer) [Benzene, 1,3-diisocyanatomethyl-]	00070
75–77–4	Trimethylchlorosilane [Silane, chlorotrimethyl-]	0050
108–05–4	Vinyl acetate monomer [Acetic acid ethenyl ester]	026

[61 FR 31729, June 20, 1996]

EFFECTIVE DATE NOTE: At 61 FR 31729, June 20, 1996, appendix A was added to part 68, effective Aug. 19, 1996.

PART 69—SPECIAL EXEMPTIONS FROM REQUIREMENTS OF THE CLEAN AIR ACT

Subpart A—Guam

Sec.
69.11 New exemptions.
69.12 Continuing exemptions.

Subpart B—American Samoa [Reserved]

69.21 New exemptions. [Reserved]

Subpart C—Commonwealth of the Northern Mariana Islands [Reserved]

69.31 New exemptions. [Reserved]

AUTHORITY: Sec. 325, Clean Air Act, as amended (42 U.S.C. 7625-1).

SOURCE: 50 FR 25577, June 20, 1985, unless otherwise noted.

Subpart A—Guam

§69.11 New exemptions.

(a) Pursuant to section 325(a) of the Clean Air Act ("CAA") and a petition submitted by the Governor of Guam ("Petition"), the Administrator of the Environmental Protection Agency ("EPA") conditionally exempts electric generating units on Guam from certain CAA requirements.

(1) A waiver of the requirement to obtain a prevention of significant deterioration ("PSD") permit prior to construction is granted for the electric generating units identified in the Petition as Cabras Diesel No. 1, the Tenjo project, and three 6-megawatt diesel generators to be constructed at Orote, with the following conditions:

(i) Each electric generating unit shall not be operated until a final PSD permit is issued for that unit;

(ii) Each electric generating unit shall not be operated until that unit complies with all requirements of its PSD permit, including, if necessary, retrofitting with the best available control technology ("BACT");

(iii) The PSD application for each electric generating unit shall be deemed complete without the submittal of the required one year of on-site meteorological data, however, EPA will not issue a PSD permit to such a unit prior to submission of such data or data which the EPA finds to be an equivalent and acceptable substitute; and

(iv) If any electric generating unit covered by this paragraph is operated either prior to the issuance of a final PSD permit or without BACT equipment, that electric generating unit shall be deemed in violation of this waiver and the CAA beginning on the date of commencement of construction of that unit.

(2) A waiver of the three nonattainment area requirements (a construction ban, the use of lowest achievable emission rate control equipment, and emission offset requirements) currently applicable to the Cabras-Piti area is granted for electric generating units with the following conditions:

(i) A tower and meteorological station shall be constructed in the Cabras-Piti area by May 1, 1993;

(ii) Meteorological data shall be collected from the Cabras-Piti station which is sufficient to run air quality models both to demonstrate no current exceedences of the primary national ambient air quality standard for sulfur dioxide ("sulfur dioxide NAAQS"), as set forth at 40 CFR 50.4, and sufficient to submit a complete request for redesignation of the area to attainment;

(iii) Ambient sulfur dioxide monitors shall be installed and operated in accordance with the procedures set forth at 40 CFR part 58, the PSD air monitoring requirements, and any additional monitoring requested by EPA to verify the efficacy of the intermittent control strategy ("ICS") of fuel switching;

(iv) Within three years from the effective date of this waiver, the Governor of Guam shall submit to the EPA a complete request that the Cabras-Piti area be redesignated to attainment for the sulfur dioxide NAAQS;

(v) Electric generating units to be constructed in the Cabras-Piti area must submit applications for PSD permits as though the area had been redesignated to attainment for the sulfur dioxide NAAQS;

(vi) The Cabras-Piti area electric generating units shall comply with the

federal register

Monday
August 25, 1997

Part VIII

Environmental Protection Agency

40 CFR Part 68

List of Regulated Substances and Thresholds for Accidental Release Prevention; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 68

[FRL–5881–8]

List of Regulated Substances and Thresholds for Accidental Release Prevention

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is taking final action to modify the list of regulated substances and threshold quantities authorized by section 112(r) of the Clean Air Act as amended. EPA is vacating the listing and related threshold for hydrochloric acid solutions with less than 37% concentrations of hydrogen chloride. The current listing and threshold for all other regulated substances, including hydrochloric acid solutions with 37% or greater concentrations and the listing and threshold for anhydrous hydrogen chloride, are unaffected by today's rulemaking. Today's action implements, in part, a settlement agreement between EPA and the General Electric Company (GE) to resolve GE's petition for review of the rulemaking listing regulated substances and establishing thresholds under the accidental release prevention regulations.

DATES: This rule is effective August 25, 1997.

ADDRESSES: Docket: The docket for this rulemaking is A–97–28. This rule amends a final rule, the docket for which is A–91–74. The docket may be inspected between 8:00 a.m. and 5:30 p.m., Monday through Friday, at EPA's Air Docket, Room M1500, Waterside Mall, 401 M St., SW, Washington, DC 20460; telephone (202) 260–7548. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Sicy Jacob, Chemical Engineer, Chemical Emergency Preparedness and Prevention Office, Environmental Protection Agency, MC 5104, 401 M St., SW, Washington, DC 20460, (202) 260–7249.

SUPPLEMENTARY INFORMATION:

Regulated Entities

Entities potentially affected by this action include the following types of facilities if the facility has more than the 15,000-pound threshold quantity of hydrochloric acid solutions with concentrations of less than 37% hydrogen chloride.

Category	Example of regulated entities
Chemical manufacturers.	Industrial inorganics.
Petrochemical	Plastics and resins.
Other manufacturers.	Pulp and paper mills, primary metal production, fabricated metal products, electronic and other electric equipment, transportation equipment, industrial machinery and equipment, food processors.
Wholesalers	Chemical distributors.
Federal sources.	Defense and energy installations.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this action. This table lists types of entities that the EPA is now aware could potentially be affected by this action. Other types of entities not listed in the table could be affected. To determine whether your facility is affected by this action, you should carefully examine today's notice. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **For Further Information Contact** section.

The following outline is provided to aid in reading this preamble to the rule:

Table of Contents

I. Introduction and Background
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B. Regulatory History
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II. Discussion of the Final Rule and Public Comments
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A. Executive Order 12866
B. Regulatory Flexibility
C. Paperwork Reduction
D. Unfunded Mandates Reform Act
E. Submission to Congress and the General Accounting Office

I. Introduction and Background

A. Statutory Authority

This final rule is being issued under sections 112(r) and 301 of the Clean Air Act (Act) as amended.

B. Regulatory History

The Clean Air Act (CAA or Act), section 112(r), requires EPA to promulgate an initial list of at least 100 substances ("regulated substances") that, in the event of an accidental release, are known to cause or may be reasonably expected to cause death, injury, or serious adverse effects to human health and the environment. The CAA also requires EPA to establish a threshold quantity for each chemical at the time of listing. Stationary sources that have more than a threshold quantity of a regulated substance are subject to accident prevention regulations promulgated under CAA section 112(r)(7), including the requirement to develop risk management plans.

On January 31, 1994, EPA promulgated the list of regulated substances and thresholds that identify stationary sources subject to the accidental release prevention regulations (59 FR 4478) (the "List Rule"). This list included hydrochloric acid solutions with concentrations of 30% or greater. Such solutions were assigned a threshold quantity of 15,000 pounds. EPA subsequently promulgated a rule requiring owners and operators of stationary sources with listed substances above their threshold quantities to develop programs addressing accidental releases and to make publicly available risk management plans ("RMPs") summarizing these programs. (61 FR 31668, June 20, 1996) (the "RMP Rule"). For further information on these regulations, section 112(r), and related statutory provisions, see these notices. These rules can be found in 40 CFR part 68, "Chemical Accident Prevention Provisions," and collectively are referred to as the accidental release prevention regulations.

C. List Rule Litigation

The General Electric Company (GE) filed a petition for judicial review of the List Rule regarding EPA's listing criteria under the List Rule, the listing of certain substances in the List Rule, the setting of threshold quantities for certain substances in particular and all regulated toxic substances generally, and the petition process for adding and deleting regulated substances to the list. Recognizing that the public's interest would best be served by settlement of all issues raised in this litigation, GE and EPA agreed to a settlement on April 7, 1997. Under the terms of the settlement agreement, on May 22, 1997 (62 FR 27992), EPA proposed to vacate the listing and related threshold for hydrochloric acid solutions with less than 37% concentrations of hydrogen chloride. EPA is today taking final action on this proposal.

II. Discussion of the Final Rule and Public Comments

Today's final rule adopts without modification the May 22, 1997 (62 FR 27992), proposal to vacate provisions of the accidental release prevention regulations that specifically address hydrochloric acid solutions with less than 37% hydrogen chloride. The basis

and purpose of this rulemaking is set out in the above referenced proposal. As discussed in the proposal, this action addresses the essential element of the dispute between EPA and GE while eliminating the collateral uncertainty that would exist about the regulatory status of the remaining chemicals if the litigation proceeded. EPA has vigorously advocated responsible accident prevention efforts by industry even before enactment of section 112(r). The Agency is concerned that prolonging this dispute may encourage owners and operators of sources who are solely concerned about regulatory compliance to defer engaging in responsible accident prevention activities. By implementing the settlement agreement with GE and by implementing the settlement agreements reached in the other two challenges to the List Rule, EPA will be able to retain on the list of regulated substances nearly all of the chemicals originally listed and eliminate uncertainty about their regulatory status. As also discussed in the proposal, the general duty clause of section 112(r)(1) and the retention on the list of solutions with concentrations of 37% or greater ensures that today's rule is protective of public health in several respects.

EPA received 11 letters commenting on the proposed rule. All of the comments were from industry and trade associations. All commenters supported vacating the listing of hydrochloric acid in concentration below 37%. Several of them specifically supported EPA's stated position that this proposal is protective of public health in several respects and that this action will eliminate uncertainty in the regulated community regarding RMP compliance for hydrochloric acid solutions.

Several commenters brought up technical issues regarding the basis for listing hydrochloric acid in aqueous solution. EPA stated in the proposed rule that it was not reopening the rulemaking record on the listing of hydrochloric acid within the range of 30% to 37%. Any technical issues related to the listing of hydrochloric acid solutions will be addressed if EPA undertakes future regulatory actions regarding such solutions. In agreeing to the settlement with GE and in this related rulemaking, EPA has not conceded or acknowledged any technical deficiencies in its original listing of HCl solutions with less than 37% concentration.

One commenter said that solutions at 37%, as well as those below 37%, should be delisted. EPA considers this issue outside the scope of the current rulemaking. The listing of solutions at 37% and above was decided in the original List Rule and was not reopened by this rulemaking; objections to the listing of 37% solutions should have been made by seeking review of the original List Rule and are now untimely. To the extent that the commenter wishes to reopen the technical merits of listing solutions that are precisely 37% HCl, EPA would address that issue along with other technical issues if EPA were to take further action on hydrochloric acid solutions.

Two commenters referred to comments submitted on the original proposal to list hydrochloric acid solution. EPA addressed comments on the proposed List Rule when it promulgated the final rule (January 31, 1994).

Several commenters questioned the accident history of hydrochloric acid solutions and stated that EPA's accident database does not support listing hydrochloric acid solutions. To the extent to which it is relevant, EPA will consider the up-to-date accident history if it takes any further regulatory actions on the listing of hydrochloric acid solutions.

One commenter stated that EPA overestimated the number of regulated sources that would not have to comply with the List rule as a result of this vacatur. EPA's estimate of 800 sources was based on preliminary, conservative assumptions that EPA used to determine that a regulatory impact analysis was not required and was not related to the basis for the proposal. The number and type of sources that are affected by a listing are irrelevant under sections 112(r)(3) and (4). The Agency recognizes that this estimate may represent a conservative picture of the effect of the rule on the regulated community.

One commenter stated his understanding that hydrochloric acid solutions of 36.94% would not be covered by the RMP rule. EPA confirms that all solutions that can be accurately measured at less than 37% are excluded.

EPA also proposed on May 22, 1997, to extend the RMP rule compliance deadline for hydrochloric acid solutions with concentrations of 30% to 37% if EPA did not take final action to vacate the hydrochloric acid listing as proposed. Because EPA is vacating the listing of such solutions by the final action today, no action is necessary on this alternative proposal. If EPA were to relist these solutions in the future, then sources would have three years from the new listing to comply with the RMP rule.

Finally, as stated in the proposal, EPA wishes to clarify that this rule will not affect in any way the listing of anhydrous hydrogen chloride. Anhydrous hydrogen chloride will retain its 5000-pound threshold. Threshold determination provisions for regulated toxic substances would apply to anhydrous hydrogen chloride. Anhydrous mixtures of hydrogen chloride would be subject to the mixture provisions for regulated toxic substances. Aqueous mixtures of hydrochloric acid would be affected to the extent that the minimum concentration cutoff would be revised.

Based on the reasons discussed above, EPA is vacating the listing in part 68 of hydrochloric acid solutions at concentrations of less than 37% (from 30% up to 37%) hydrogen chloride. Solutions of 37% or greater will not be affected by today's rule and remain on the list. In addition, EPA is vacating other provisions of the accidental release prevention regulations insofar as they apply to hydrochloric acid solutions at concentrations less than 37% hydrogen chloride. For example, the reference to "hydrochloric acid (conc 30% or greater)" in the toxic endpoint table for 40 CFR part 68 will be revised to refer to concentrations of 37% or greater.

III. Judicial Review

Under section 307(b)(1) of the Clean Air Act (CAA), judicial review of the actions taken by this final rule is available only on the filing of a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit within 60 days of today's publication of this action. Under section 307(b)(2) of the CAA, the requirements that are subject to today's notice may not be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements.

IV. Required Analyses

A. Executive Order 12866

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must judge whether the regulatory action is "significant," and therefore subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal government or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

It has been determined that this rule is not a "significant regulatory action" under the terms of Executive Order 12866 and, therefore, is not subject to OMB review.

B. Regulatory Flexibility

EPA has determined that it is not necessary to prepare a regulatory flexibility analysis in connection with this final rule. EPA has also determined that this rule will not have a significant negative economic impact on a substantial number of small entities. This final rule will not have a significant negative impact on a substantial number of small entities because it will reduce the range of hydrochloric acid solutions listed under part 68 and thus reduce the number of stationary sources subject to part 68.

C. Paperwork Reduction

This rule does not include any information collection requirements for OMB to review under the provisions of the Paperwork Reduction Act.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Pub. L. 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation of why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. Today's rule will reduce the number of sources subject to part 68. Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA. For the same reason, EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments.

E. Submission to Congress and the General Accounting Office

Under 5 U.S.C. 801(a)(1)(A) as added by the Small Business Regulatory Enforcement Fairness Act of 1996, EPA submitted a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the General Accounting Office prior to publication of the rule in today's Federal Register. This rule is not a "major rule" as defined by 5 U.S.C. 804(2).

List of Subjects in 40 CFR Part 68

Environmental protection, Chemicals, Chemical accident prevention, Extremely hazardous substances, Incorporation by reference, Intergovernmental relations, Hazardous substances, Reporting and recordkeeping requirements.

Dated: August 19, 1997.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, title 40, chapter I, subchapter C, part 68 of the Code of Federal Regulations is amended as follows:

PART 68—CHEMICAL ACCIDENT PREVENTION PROVISIONS

1. The authority citation for part 68 continues to read as follows:

Authority: 42 U.S.C. 7412(r), 7601(a)(1), 7661–7661f.

§ 68.130 Tables 1 and 2 [Amended]

2. In § 68.130 List of substances, Table 1 is amended by revising the listing in the column "Chemical name" from "Hydrochloric acid (conc 30% or greater)" to "Hydrochloric acid (conc 37% or greater)."

3. In § 68.130 List of substances, Table 2 is amended by revising the listing in the column "Chemical name" from "Hydrochloric acid (conc 30% or greater)" to "Hydrochloric acid (conc 37% or greater)," and by adding a note "d" between note "c" and "e" at the end of the table to read as follows:

"d Toxicity of hydrogen chloride, potential to release hydrogen chloride, and history of accidents."

Appendix A of Part 68 [Amended]

4. Appendix A of Part 68 is amended by revising the listing in the column "Chemical name" from "Hydrochloric acid (conc 30% or greater)" to "Hydrochloric acid (conc 37% or greater)."

[FR Doc. 97–22511 Filed 8–22–97; 8:45 am]

BILLING CODE 6560–50–P

federal register

Tuesday
January 6, 1998

Part IV

Environmental Protection Agency

40 CFR Part 68

List of Regulated Substances and Thresholds for Accidental Release Prevention; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 68

[FRL–5940–4]

RIN 2050–AE35

List of Regulated Substances and Thresholds for Accidental Release Prevention; Amendments

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is modifying the rule listing regulated substances and threshold quantities under section 112(r) of the Clean Air Act as amended. EPA is deleting the category of Division 1.1 explosives (as listed by DOT) from the list of regulated substances. Regulated flammable substances in gasoline used as fuel and in naturally occurring hydrocarbon mixtures prior to initial processing are exempted from threshold quantity determinations, and the provision for threshold determination of flammable substances in a mixture is clarified. The definition of stationary source is modified to clarify the exemption of transportation and storage incident to transportation and to clarify that naturally occurring hydrocarbon reservoirs are not stationary sources or parts of stationary sources. In addition, EPA is clarifying that the Chemical Accident Prevention Provisions do not apply to sources located on the Outer Continental Shelf. EPA believes these changes will better focus accident prevention activities on stationary sources with high hazard operations and reduce duplication with other similar requirements.

DATES: This rule is effective January 6, 1998.

ADDRESSES: Docket: The docket for this rulemaking is A–96–08. This rule amends a final rule, the docket for which is A–91–74. The docket may be inspected between 8:00 a.m. and 5:30 p.m., Monday through Friday, at EPA's Air Docket, Room M1500, Waterside Mall, 401 M St., SW, Washington, DC 20460; telephone (202) 260–7548. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Vanessa Rodriguez, Chemical Engineer, (202) 260–7913, Chemical Emergency Preparedness and Prevention Office, U.S. Environmental Protection Agency, MC–5101, 401 M St. SW, Washington, DC 20460, or the Emergency Planning and Community Right-to-Know Hotline at 1–800–424–9346.

SUPPLEMENTARY INFORMATION:

Regulated Entities

Entities potentially affected by this action are those stationary sources that have more than a threshold quantity of a regulated substance in a process. Regulated categories and entities include:

Category	Examples of regulated entities
Chemical Manufacturers	Industrial organics & inorganics, paints, pharmaceuticals, adhesives, sealants, fibers.
Petrochemical	Refineries, industrial gases, plastics & resins, synthetic rubber.
Other Manufacturing	Electronics, semiconductors, paper, fabricated metals, industrial machinery, furniture, textiles.
Agriculture	Fertilizers, pesticides.
Public Sources	Drinking and waste water treatment works.
Utilities	Electric and Gas Utilities.
Others	Oil and gas exploration and production, natural gas processing, food and cold storage, propane retail, warehousing and wholesalers.
Federal Sources	Military and energy installations.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this action. Other types of entities not listed in the table also could be affected. To determine whether a stationary source is affected by this action, carefully examine the provisions of today's notice. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding FOR FURTHER INFORMATION CONTACT section.

The following outline is provided to aid in reading this preamble:

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I. Introduction and Background

A. Statutory Authority

This final rule is being issued under sections 112(r) and 301 of the Clean Air Act (CAA or Act) as amended.

B. Regulatory History

The CAA, section 112(r), requires EPA to promulgate an initial list of at least 100 substances ("regulated substances") that, in the event of an accidental release, are known to cause or may be reasonably expected to cause death, injury, or serious adverse effects to human health and the environment. The CAA also requires EPA to establish a threshold quantity for each chemical at the time of listing. Stationary sources that have more than a threshold quantity of a regulated substance are subject to accident prevention regulations promulgated under CAA section 112(r)(7), including the requirement to develop risk management plans.

On January 31, 1994, EPA promulgated the list of regulated substances and thresholds that identify stationary sources subject to the accidental release prevention regulations (59 FR 4478) (the "List Rule"). The listed substances included 77 acutely toxic substances, 63 flammable gases and volatile flammable liquids, and Division 1.1 high explosive substances as listed by the United States Department of Transportation (DOT) in 49 CFR 172.101. EPA subsequently promulgated a rule requiring owners

and operators of stationary sources with listed substances above their threshold quantities to develop programs addressing accidental releases and to make publicly available risk management plans ("RMPs") summarizing these programs (61 FR 31668, June 20, 1996) (the "RMP Rule"). For further information on these regulations, section 112(r), and related statutory provisions, see these notices. These rules can be found in 40 CFR part 68, "Chemical Accident Prevention Provisions," and collectively are referred to as the accidental release prevention regulations.

C. List Rule Litigation

The American Petroleum Institute (API) and the Institute of Makers of Explosives (IME) filed petitions for judicial review of the List Rule (American Petroleum Institute v. EPA, No. 94–1273 (D.C. Cir.) and consolidated cases). On March 28, 1996, EPA made available for public comment under CAA section 113(g) proposed settlement agreements with API and IME (61 FR 13858, March 28, 1996). Consistent with these agreements, EPA proposed amendments to the List Rule on April 15, 1996 (61 FR 16598). On June 20, 1996, EPA promulgated a stay of certain provisions of the List Rule that were affected by the proposed amendments (61 FR 31730). EPA is today taking final action on the amendments proposed in April 1996.

II. Discussion of the Final Rule and Public Comments

In this final rule, EPA is taking the following actions to amend the List Rule: delisting explosives; exempting from threshold determination regulated flammable substances in gasoline and in naturally occurring hydrocarbon mixtures prior to initial processing; clarifying the provision for threshold determination of flammable substances in mixtures to exempt mixtures that do not have a National Fire Protection Association (NFPA) flammability hazard rating of 4; modifying the definition of stationary source to clarify the exemption of transportation and storage incident to transportation and to clarify that naturally occurring hydrocarbon reservoirs are not stationary sources or parts of stationary sources; and clarifying that the chemical accident prevention provisions do not apply to sources located on the Outer Continental Shelf ("OCS sources"). These amendments were proposed on April 15, 1996. EPA received 37 letters commenting on the proposal. Major comments are discussed below. Summaries of all comments and the Agency's responses can be found in the summary and response to comments document in the docket.

A. Explosives

EPA is amending the List Rule to delete the category of high explosives from the list of regulated substances. Explosives were initially listed because of their potential to cause offsite effects from blast waves. In addition, EPA believed that there existed potential gaps in emergency planning and response communication that made risk management planning appropriate for sources with explosives. In accordance with the Settlement Agreement, IME has developed and will implement safety practices that will provide additional information and enhance the coordination between explosives facilities and the emergency planners and responders. As discussed in the preamble to the proposed rule of April 15, 1996, EPA concluded that current regulations and current and contemplated industry practices promote safety and accident prevention in storage, handling, transportation, and use of explosives. As a result, these regulations and practices adequately protect the public and the environment from the hazards of accidents involving explosives. The Agency believes these actions effectively close the remaining gap in emergency planning and response communications. Therefore, EPA is taking final action to delist explosives from the list of regulated substances under section 112(r).

EPA received six comment letters on the proposal to delist explosives. All the commenters supported EPA's proposal, citing current regulations, current and contemplated industry practices, and the regulatory burden imposed by listing explosives.

B. Regulated Flammable Substances in Gasoline and in Naturally Occurring Hydrocarbon Mixtures

EPA is taking final action to provide specific exemptions from threshold determination for regulated flammable substances in gasoline used as fuel for internal combustion engines and for regulated substances in naturally occurring hydrocarbon mixtures prior to initial processing in a petroleum refining process unit or a natural gas processing plant. These exemptions reflect EPA's original intent to exempt flammable mixtures that do not meet the criteria for a National Fire Protection Association (NFPA) flammability hazard rating of 4 and clarify the regulatory status of gasoline and naturally occurring hydrocarbon mixtures. Naturally occurring hydrocarbon mixtures would include any or any combination of the following: natural gas condensate, crude oil, field gas, and produced water. This rule includes definitions of these substances as well as definitions of natural gas processing plant and petroleum refining process unit.

EPA is making minor changes to the definitions proposed for natural gas processing plant and petroleum refining process unit. The North American Industrial Classification System (NAICS) code has been added to the definition for natural gas processing plant in this final rule. In addition, part of the proposed definition has been dropped, because it included the term being defined and, as a result, potentially could cause confusion. The NAICS code also has been added to the definition of petroleum refining process unit. The proposed definition of petroleum refining process unit included the Standard Industrial Classification (SIC) code (which is still cited in the definition); however, SIC codes have been replaced by NAICS codes.

EPA received 12 letters in support of the gasoline exemption. No comments were submitted opposing this exemption. Several of the commenters who supported the exemption also suggested broadening the exemption to include blendstocks, natural gasolines, and other fuels. Several suggestions were made for clarifying the gasoline exemption.

EPA does not believe the exemption should be broadened. Individual flammable substances that do not meet the criteria for NFPA 4 for flammability were not considered for listing as flammables in development of the list of regulated substances. Although substances such as blendstocks and natural gasoline are not specifically exempted, any flammable mixtures, including blendstocks and natural gasoline, that do not meet the criteria for an NFPA rating of 4 for flammability are exempt from threshold determination (see Clarification of Threshold Determination of Regulated Flammable Substances in Mixtures, discussed below). EPA believes that substances and mixtures that meet the criteria for NFPA 4, including blendstocks and fuels, should be covered by the rule, regardless of their use. EPA believes such substances have the same intrinsic hazards whether they are used as gasoline blendstocks, as fuels, or for other purposes. EPA's analysis indicates that risks associated with the storage and handling of flammable substances are a function of the properties of the materials, not their end use. EPA is

exempting gasoline because it does not meet the NFPA 4 criteria, and EPA believes it does not represent a significant threat to the public of vapor cloud explosions.

EPA received 16 letters supporting the exemption of naturally occurring hydrocarbons prior to initial processing. One commenter suggested modifying the exemption to incorporate site-specific factors because conditions conducive to vapor cloud explosions might exist at some facilities with exempted flammable substances, particularly in the case of oil and gas production facilities located adjacent to chemical production facilities. EPA recognizes that there may be cases where a facility may not be subject to the RMP requirements because of this exemption, but where the potential for vapor cloud explosions may exist. Neither Congress nor EPA intended the List Rule to capture every substance that may pose a hazard in particular circumstances. Instead, the statute required EPA to select the chemicals posing the greatest risk of serious effects from accidental releases. To implement these criteria, EPA focused primarily on chemicals that posed the most significant hazards because site-specific factors vary too greatly to be considered at the listing stage of regulation. EPA believes the hazards of naturally occurring hydrocarbon mixtures prior to entry into a natural gas processing plant or petroleum refining process unit do not warrant regulation. The general duty clause of section 112(r)(1) would apply when site-specific factors make an unlisted chemical extremely hazardous. Also, the particular risk cited by the commenter probably would be addressed by the RMP Rule even with the exemption as promulgated today. In the case of a chemical facility located adjacent to an oil and gas production facility, the owner or operator of the chemical facility is likely to have processes covered due to other regulated substances and would have to consider site-specific conditions such as the presence of an adjacent oil and gas production facility. Therefore, it is inappropriate to condition this exemption on site-specific factors.

C. Clarification of Threshold Determination of Regulated Flammable Substances in Mixtures

To clarify threshold determination for regulated flammable substances in mixtures, EPA is taking final action to provide that, for mixtures that have one percent or greater concentration of a regulated flammable substance, the entire weight of the mixture shall be treated as the regulated substance unless the owner or operator can demonstrate that the mixture does not have an NFPA flammability hazard rating of 4, as defined in the NFPA Standard System for the Identification of Fire Hazards of Materials, NFPA 704–1996.

In its proposed rule, to define NFPA 4, EPA cited and proposed to incorporate by reference NFPA 704, Standard System for the Identification of Fire Hazards of Materials (1990 edition). For the definition and determination of boiling point and flash point, EPA cited and proposed to incorporate by reference NFPA 321, Standard on the Basic Classification of Flammable and Combustible Liquids (1991 edition). In this final rule, EPA is updating these references and incorporating by reference the 1996 edition of NFPA 704 and the 1996 edition of NFPA 30, Flammable and Combustible Liquids Code, which replaces NFPA 321.

Nine comments were submitted supporting this clarification. No opposing comments were submitted.

D. Definition of Stationary Source

EPA is promulgating the amendments to the definition of stationary source that were proposed on April 15, 1996. First, EPA is clarifying that the exemption for regulated substances in transportation, or in storage incident to such transportation, is not limited to pipelines. In addition, EPA is modifying the definition of stationary source to clarify that naturally occurring hydrocarbon reservoirs are not stationary sources or parts of stationary sources. Finally, EPA is modifying the definition of stationary source to clarify that exempt transportation shall include, but not be limited to, transportation activities subject to regulation or oversight under 49 CFR parts 192, 193, or 195, as well as transportation subject to natural gas or hazardous liquid programs for which a state has in effect a certification under 49 U.S.C. section 60105.

EPA considers the transportation exemption to include storage fields for natural gas where gas taken from pipelines is stored during non-peak periods, to be returned to the pipelines when needed. Such storage fields include, but are not limited to, depleted oil and gas reservoirs, aquifers, mines, and caverns (e.g., salt caverns). For purposes of this regulation, this type of storage is incident to transportation and, therefore, is not subject to the RMP rule. The transportation exemption also applies to liquefied natural gas (LNG) facilities subject to oversight or regulation under 49 CFR parts 192, 193, or 195, or a state natural gas or hazardous liquid program for which the state has in effect a certification to DOT under 49 U.S.C. section 60105. These facilities include those used to liquefy natural or synthetic gas or used to transfer, store, or vaporize LNG in conjunction with pipeline transportation.

EPA believes there still may be potential for confusion regarding the jurisdiction and regulatory responsibility of EPA and DOT for pipelines and for transportation containers at stationary sources. "Transportation in commerce" is defined by DOT pursuant to Federal Hazardous Materials Transportation Law (Federal HAZMAT Law, 49 U.S.C. sections 5107–5127). As a result of continued questions regarding the scope of Federal HAZMAT Law and the applicability of the regulations issued thereunder, the DOT is currently working to better delineate and more clearly define the applicability of its regulations. DOT currently contemplates clarifying its jurisdiction through the rulemaking process. As a result, there may be a future need for EPA to further amend the definition of stationary source to better comport with DOT clarifications or actions. The Agency will continue to work closely with DOT to minimize confusion regarding transportation containers and will coordinate with DOT to ensure that compatible interpretations about regulatory coverage are provided to the regulated community.

EPA received 15 letters in support of the exemption of transportation activities from the definition of stationary source. No one opposed this exemption. A number of commenters, however, believed the modifications would not eliminate overlap and confusion between EPA and DOT rules. A number of commenters also favored exempting from the stationary source definition transportation containers no longer under active shipping papers and transportation containers connected to equipment for purposes of temporary storage, loading, or unloading. Some commenters stated that EPA would be undermining DOT's authority by regulating activities that are under DOT jurisdiction. Four commenters recommended exempting all containers that are suitable for transportation.

EPA developed the transportation exemptions discussed here in consultation with DOT. EPA's regulations do not supersede or limit DOT's authorities and, therefore, are in compliance with CAA section 310. EPA believes these provisions are consistent with other EPA regulations, such as the Emergency Planning and Community

Right-to-Know Act (EPCRA) regulations under parts 355 and 370. EPA disagrees that suitability for transportation should be the criterion for determining whether a container should be considered part of the stationary source. For example, EPA believes that a railroad tank car containing a regulated substance could be considered a stationary source or part of a stationary source, even though the tank car is "suitable for transportation." Such a tank car could remain at one location for a long period of time, serving as a storage container, and could pose a hazard to the community. EPA considers a container to be in transportation as long as it is attached to the motive power that delivered it to the site (e.g., a truck or locomotive). If a container remains attached to the motive power that delivered it to the site, even if a facility accepts delivery, it would be in transportation, and the contents would not be subject to threshold determination. As stated earlier, EPA will continue to work with DOT to avoid regulatory confusion.

EPA agrees with commenters who stated that active shipping papers may not be a suitable criterion for determining whether a container is in transportation. EPA is aware that shipping papers are not always generated, nor are they required under DOT rules. Therefore, EPA has modified the definition of stationary source to remove the reference to active shipping papers. EPA also has modified the definition to remove the reference to temporary storage. This reference may have been confused with storage incident to transportation.

EPA has received questions regarding the statement in the stationary source definition that properties shall not be considered contiguous solely because of a railroad or gas pipeline right-of-way. In response to these questions, EPA is clarifying this statement by deleting the word "gas." EPA always intended that neither a railroad right-of-way nor any pipeline right-of-way should cause properties to be considered contiguous.

E. Applicability to Outer Continental Shelf

EPA is providing an applicability exception for sources on the outer continental shelf (OCS sources) to clarify that Part 68 does not apply to these sources. This exception is consistent with CAA section 328, which precludes the applicability of EPA CAA rules to such sources when such rules are not related to attaining or maintaining ambient air quality standards or to the "prevention of significant deterioration" provisions of the CAA. Eleven commenters supported this exception, and no one opposed it.

III. Summary of Revisions to the Rule

EPA is amending several sections of part 68 of title 40 of the Code of Federal Regulations.

In § 68.3, the definition of stationary source is revised. The revised definition specifically states that naturally occurring hydrocarbon reservoirs are not stationary sources or parts of stationary sources. The definition states that exempt transportation includes, but is not limited to, transportation activities subject to oversight or regulation under 49 CFR parts 192, 193, or 195, as well as transportation subject to natural gas or hazardous liquid programs for which a state has in effect a certification under 49 U.S.C. section 60105. In addition, the agency has made non-substantive wording changes to improve the clarity of this definition.

Several new definitions are added for § 68.3, for condensate, crude oil, field gas, natural gas processing plant, petroleum refining process unit, and produced water.

Section 68.10 is amended to clarify that part 68 does not apply to OCS sources.

Several revisions are made to §68.115 on threshold determination. Section 68.115(b)(2) is modified to state that the entire weight of the mixture containing a regulated flammable substance shall be treated as the regulated substance unless the owner or operator can demonstrate that the mixture does not have an NFPA flammability hazard rating of 4. Another modification to § 68.115(b)(2) exempts from threshold determination regulated flammable substances in gasoline used as fuel in internal combustion engines. Regulated substances in naturally occurring hydrocarbon mixtures (including condensate, crude oil, field gas, and produced water), prior to entry into a natural gas processing plant or a petroleum refining process unit, also are exempt from threshold determination. Section 68.115(b)(3), on concentrations of a regulated explosive substance in a mixture, is deleted, and §§68.115(b)(4), 68.115(b)(5), and 68.115(b)(6) are redesignated as §§68.115(b)(3), 68.115(b)(4), and 68.115(b)(5), respectively.

Section 68.130 is modified by the deletion of (a), explosives listed by DOT as Division 1.1. Section 68.130(b) is redesignated as §§68.130(a), and §§ 68.130(c) as 68.130(b).

IV. Judicial Review

Under section 307(b)(1) of the Clean Air Act (CAA), judicial review of the actions taken by this final rule is available only on the filing of a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit within 60 days of today's publication of this action. Under section 307(b)(2) of the CAA, the requirements that are subject to today's notice may not be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements.

V. Required Analyses

A. Executive Order 12866

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must judge whether the regulatory action is "significant," and therefore subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal government or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

It has been determined that this rule is not a "significant regulatory action" under the terms of Executive Order 12866 and, therefore, is not subject to OMB review.

B. Regulatory Flexibility

EPA has determined that it is not necessary to prepare a regulatory flexibility analysis in connection with this final rule. EPA has also determined that this rule will not have a significant negative economic impact on a substantial number of small entities. This final rule will not have a significant negative impact on a substantial number of small entities because it reduces the number of substances that would be used to identify stationary sources for regulation and provides exemptions that will reduce the number of stationary sources subject to the accidental release prevention requirements.

C. Paperwork Reduction

This rule does not include any information collection requirements for OMB to review under the provisions of the Paperwork Reduction Act.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation of why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. Today's rule will reduce the number of sources subject to part 68. Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA. For the same reason, EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments.

E. Submission to Congress and the General Accounting Office

Under 5 U.S.C. 801(a)(1)(A) as added by the Small Business Regulatory Enforcement Fairness Act of 1996, EPA submitted a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the General Accounting Office prior to publication of the rule in today's **Federal Register**. This rule is not a "major rule" as defined by 5 U.S.C. 804(2).

F. National Technology Transfer and Advancement Act

Under section 12(d) of the National Technology Transfer and Advancement Act ("NTTAA"), the Agency is required to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, business practice, etc.) which are developed or adopted by voluntary consensus standard bodies. Where available and potentially applicable voluntary consensus standards are not used by EPA, the Act requires the Agency to provide Congress, through the Office of Management and Budget, an explanation of the reasons for not using such standards.

EPA developed its list of regulated flammable substances for this rule based on analysis of the hazards of flammable substances conducted in a review of the EPCRA section 302 list. As part of this analysis, EPA identified and evaluated existing listing and classification systems, including listing and classification systems developed for voluntary consensus standards. This final rule incorporates, by reference, the use of a voluntary consensus standard to identify the chemicals which are covered according to their flammability, namely NFPA 704, "Standard System for the Identification of the Hazards of Materials for Emergency Response." EPA identified no other potentially applicable voluntary consensus standards.

List of Subjects in 40 CFR Part 68

Environmental protection, Chemicals, Chemical accident prevention, Clean Air Act, Extremely hazardous substances, Hazardous substances, Intergovernmental relations, Reporting and recordkeeping requirements.

Dated: December 18, 1997.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, title 40, chapter I, subchapter C, part 68 of the Code of Federal Regulations is amended as follows:

PART 68—CHEMICAL ACCIDENT PREVENTION PROVISIONS

The authority citation for part 68 continues to read as follows:

Authority: 42 U.S.C. 7412(r), 7601(a)(1), 7661–7661f.

Subpart A—General

2. Section 68.3 is amended by adding the following definitions in alphabetical order and revising the definition of "stationary source" to read as follows:

§ 68.3 Definitions.

* * * * *

Condensate means hydrocarbon liquid separated from natural gas that condenses due to changes in temperature, pressure, or both, and remains liquid at standard conditions.

* * * * *

Crude oil means any naturally occurring, unrefined petroleum liquid.

* * * * *

Field gas means gas extracted from a production well before the gas enters a natural gas processing plant.

* * * * *

Natural gas processing plant (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both, classified as North American Industrial Classification System (NAICS) code 211112 (previously Standard Industrial Classification (SIC) code 1321).

* * * * *

Petroleum refining process unit means a process unit used in an establishment primarily engaged in petroleum refining as defined in NAICS code 32411 for petroleum refining (formerly SIC code 2911) and used for the following: Producing transportation fuels (such as gasoline, diesel fuels, and jet fuels), heating fuels (such as kerosene, fuel gas distillate, and fuel oils), or lubricants; Separating petroleum; or Separating, cracking, reacting, or reforming intermediate petroleum streams. Examples of such units include, but are not limited to, petroleum based solvent units, alkylation units, catalytic hydrotreating, catalytic hydrorefining, catalytic hydrocracking, catalytic reforming, catalytic cracking, crude distillation, lube oil processing,

hydrogen production, isomerization, polymerization, thermal processes, and blending, sweetening, and treating processes. Petroleum refining process units include sulfur plants.

* * * * *

Produced water means water extracted from the earth from an oil or natural gas production well, or that is separated from oil or natural gas after extraction.

* * * * *

Stationary source means any buildings, structures, equipment, installations, or substance emitting stationary activities which belong to the same industrial group, which are located on one or more contiguous properties, which are under the control of the same person (or persons under common control), and from which an accidental release may occur. The term stationary source does not apply to transportation, including storage incident to transportation, of any regulated substance or any other extremely hazardous substance under the provisions of this part. A stationary source includes transportation containers used for storage not incident to transportation and transportation containers connected to equipment at a stationary source for loading or unloading. Transportation includes, but is not limited to, transportation subject to oversight or regulation under 49 CFR parts 192, 193, or 195, or a state natural gas or hazardous liquid program for which the state has in effect a certification to DOT under 49 U.S.C. section 60105. A stationary source does not include naturally occurring hydrocarbon reservoirs. Properties shall not be considered contiguous solely because of a railroad or pipeline right-of-way.

* * * * *

3. Section 68.10 is amended by adding a paragraph (f) to read as follows:

§ 68.10 Applicability.

* * * * *

(f) The provisions of this part shall not apply to an Outer Continental Shelf ("OCS") source, as defined in 40 CFR 55.2.

Subpart F—Regulated Substances for Accidental Release Prevention

4. Section 68.115 is amended by revising paragraph (b) introductory text and paragraph (b)(2); removing paragraph (b)(3); and by redesignating paragraphs (b)(4) through (b)(6) as (b)(3) through (b)(5) to read as follows:

§ 68.115 Threshold determination.

* * * * *

(b) For the purposes of determining whether more than a threshold quantity of a regulated substance is present at the stationary source, the following exemptions apply:

* * * * *

(2) *Concentrations of a regulated flammable substance in a mixture.* (i) *General provision.* If a regulated substance is present in a mixture and the concentration of the substance is below one percent by weight of the mixture, the mixture need not be considered when determining whether more than a threshold quantity of the regulated substance is present at the stationary source. Except as provided in paragraph (b)(2) (ii) and (iii) of this section, if the concentration of the substance is one percent or greater by weight of the mixture, then, for purposes of determining whether a threshold quantity is present at the stationary source, the entire weight of the mixture shall be treated as the regulated substance unless the owner or operator can demonstrate that the mixture itself does not have a National Fire Protection Association flammability hazard rating of 4. The demonstration shall be in accordance with the definition of flammability hazard rating 4 in the NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response, National Fire Protection Association, Quincy, MA, 1996. Available from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269–9101. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be inspected at the Environmental Protection Agency Air Docket (6102), Attn: Docket No. A–96–O8, Waterside Mall, 401 M. St. SW., Washington D.C.; or at the Office of Federal Register at 800 North Capitol St., NW, Suite 700, Washington, D.C. Boiling point and flash point shall be defined and determined in accordance with NFPA 30, Flammable and Combustible Liquids Code, National Fire Protection Association, Quincy, MA, 1996. Available from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269–9101. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be inspected at the Environmental Protection Agency Air Docket (6102), Attn: Docket No. A–96–O8, Waterside Mall, 401 M. St. SW., Washington D.C.; or at the Office of Federal Register at 800 North Capitol St., NW, Suite 700, Washington, D.C. The owner or operator shall document the National Fire Protection Association flammability hazard rating.

(ii) *Gasoline.* Regulated substances in gasoline, when in distribution or related storage for use as fuel for internal combustion engines, need not be considered when determining whether more than a threshold quantity is present at a stationary source.

(iii) *Naturally occurring hydrocarbon mixtures.* Prior to entry into a natural gas processing plant or a petroleum refining process unit, regulated substances in naturally occurring hydrocarbon mixtures need not be considered when determining whether more than a threshold quantity is present at a stationary source. Naturally occurring hydrocarbon mixtures include any combination of the following: condensate, crude oil, field gas, and produced water, each as defined in § 68.3 of this part.

* * * * *

§ 68.130 [Amended]

5. Section 68.130 is amended by removing paragraph (a) and redesignating paragraphs (b) and (c) as paragrpahs (a) and (b). The tables to the section remain unchanged.

[FR Doc. 98–267 Filed 1–5–98; 8:45 am]
BILLING CODE 6560–50–P

Appendix B
(Reserved)

Appendix C
PART 68 CONTACT INFORMATION

APPENDIX C: PART 68 CONTACT INFORMATION

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Region 1	US EPA Region 1 Office of Environmental Stewardship (SPP) JFK Federal Building One Congress St. Boston, MA. 02203-2211 (617) 565-9232 (617) 565-4939 FAX Email: dinardo.ray@epa.gov		
Connecticut			Glen Daraskevich Small Business Assistance Program Department of Environmental Protection Environmental Quality Division 79 Elm St. Hartford, CT 06106 860-424-3545 fax 860-424-4063 (S) 800-760-7036 glen.daraskevich@po.state.ct.us
Maine			Brian Kavanah Office of Pollution Prevention Station 17 State House Augusta, ME 04333 207-287-6188 fax 207-287-7826 (S) 800-789-9802
Massachusetts			George Frantz Office of Technical Assistance Exec. Office of Environmental. Affairs 100 Cambridge St., Suite 2109 Boston, MA 02202 617-727-3260, ext. 631 fax 617-727-3827 george.frantz@state.ma.us

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
New Hampshire			Rudolph Cartier, Jr. Air Resources Division Department of Environmental Services 64 North Main Street Caller Box 2033 Concord, NH 03302-2033 603-271-1379 FAX 603-271-1381 (S) 800-837-0656 cartier@desarsb.mr.com
Rhode Island			Pam Annarummo Dept. of Environmental Management Office of Technical & Customer Assistance 235 Promenade Street Providence, RI 02908 401-277-66822, ext. 7204 fax 401-277-3810
Vermont			Judy Mirro VT Environmental Assistance Division Laundry Building 103 S. Main St. Waterbury, VT 05671 802-241-3745 fax 802-241-3273
Region 2	US EPA Region 2 Emergency Response and Remedial Division (MS211) 2890 Woodbridge Avenue Edison, NJ 08837-3679 (732) 321-6620 (732) 321-4425 FAX Email: ulshoefer.john@epa.gov		
New Jersey		Bureau of Chemical Release Information and Prevention 22 South Clinton Avenue P.O. Box 424 Trenton, N.J. 08625-0424 609-633-7289 phone 609-633-7031 fax sschiffman@dep.state.nj.us	Chuck McCarty Office Permit Information and Assistance NJ DEPE 401 East State Street CN 423 - 3rd Floor Trenton, NJ 08625-0423 609-292-3600 fax 609-777-1330

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
New York			Marian Mudar Environmental Program Manager NYS Env. Facil. Corp. 50 Wolf Rd. - Room 598 Albany, NY 12205 518-457-9135 fax 518-485-8494 (S) 800-780-7227
Puerto Rico			Maria L. Rivera PREQB-SBAP IIC-91 Box 9197 Vega Alta, PR 00692-9607 787-767-8025, ext. 296 fax 787-756-5906
Virgin Islands			Marylyn Stapleton Suite 231 8000 Nisky Center Charlotte Amalie St. Thomas, V.I. 00802 809-777-4577 fax 809-775-5706
Region 3	US EPA Region 3 CEPP and Site Assessment Section (3HS33) 1650 Arch Street Philadelphia, PA 19103-2029 (215)-814-3033 (215)-814-3254 FAX Email: shabazz.mikal@epamail.epa.gov		
Delaware			Bob Barrish DE DNREC 715 Grantham Lane New Castle, DE 19720 302-323-4542 fax 302-323-4561

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
District of Columbia			Olivia Achuko ERA/ARMD 2100 M.L. King Ave., SE Washington, DC 20020 202-645-6093, ext. 3071 fax 202-645-6102
Maryland			Linda Moran Small Business Assistance Program Air & Radiation Mgmt. Adm. MD Department of the Environment 2500 Broening Hwy. Baltimore, MD 21224 410-631-4158 fax 410-631-3896 (N) 800-433-1247
Pennsylvania			Cecily Beall PRC Env. Management Inc. 6th Floor 1800 JFK Blvd. Philadelphia, PA 19103 215-656-8709 fax 215-972-0484 (S) 800-722-4743 beallc@prcemi.com
Virginia			Richard Rasmussen VA DEQ/Air Division Small Business Assistance Program PO Box 10009 Richmond, VA 23240 804-698-4394 fax 804-698-4501 (S) 800-592-5482 rgrasmusse@deq.state.va.us
West Virginia			Fred Durham WV Office of Air Quality Air Program Annex 1558 Washington St. East Charleston, WV 25302 304-558-1217 fax 304-558-1222 (S) 800-982-2472

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Region 4	US EPA Region 4 Air Pesticides and Toxics Management Division Atlanta Federal Center 61 Forsyth Street, SW Atlanta, GA 30303 (404) 562-9121 (404) 562-9095 FAX Email: patmon.michelle@epa.gov		
Alabama			James Moore AL DEM Air Division PO Box 301463 Montgomery, AL 36130-1463 334-271-7861 fax 334-271-7950 (N) 800-553-2336
Florida		Eve Rainy State of Florida Dept. of Community Affairs Division of Emergency Management 2555 Shumard Oak Boulevard Tallahassee, Fla. 32399-2100 (850)413-9914 phone (850) 488-1739 fax eve.rainey@DCA.STATE.FL.US Beth Hardin Division of Air Resources and Management Florida Department of Environmental Regulation 2600 Blair Stone Road Tallahassee, Fla. 32399-2400 (850)921-9549 phone (850) 922-6979 fax Hardin_E@dep.state.fl.us	Elsa Bishop Division of Air Res. Mgmt. FL Dept. of Env. Protection 2600 Blair Stone Rd. MS5500 Tallahassee, FL 32399-2400 904-488-0114 fax 904-922-6979 (S) 800-722-7457

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Georgia		Kent Howell Georgia Dept. Of Natural Resources Environmental Protection Division 7 M.L. King Jr. Drive, Suite 139 Atlanta, Ga. 30334 (404) 656-6905 phone (404) 657-7893 fax kent_howell@mail.dnr.state.ga.us	Anita Dorsey-Word DNR/EPD/APB Suite 120 4244 Intl. Parkway Atlanta, GA 30354 404-362-4842 fax 404-362-2534 anita_dorsey-word@mail.dnr.state.ga.us
Kentucky			Gregory C. Copley Director, BEAP University of Kentucky 227 Bus. & Eco. Bldg. Lexington, KY 40506-0034 606-257-1131 fax 606-257-1907 (N) 800-562-2327 gccopl1@pop.uky.edu
Mississippi		Danny Jackson Mississippi Dept. of Environmental Quality Office of Pollution Control, Air Division P.O. Box 10385 Jackson, Ms. 39289-0385 (601) 961-5225 phone (601) 961-5725 fax Jackson_Danny@deq.state.ms.us	Danny Jackson Air Quality Office of Policy Control/DEQ PO Box 10385 Jackson, MS 39289-0385 601-961-5171 fax 601-961-5742
North Carolina		Mike Chapman Air Quality Section North Carolina Dept of Environment, Health and Resources P.O. Box 29580 Raleigh, N.C. 27626-0580 (919) 715-3467 phone (919) 733-1812 fax micheal_chapman@aq.ehnr.state.nc.us	Fin Johnson Dept. of Env. Health & Nat. Resources PO Box 29583 Raleigh, NC 27626 919-733-1267 fax 919-715-6794 fin_johnson@owr.ehnr.state.nc.us

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
South Carolina		Rhonda B. Thompson Bureau of Air Quality Control South Carolina Department of Health and Environmental Health 2600 Bull Street Columbia, S.C. 29201 (803) 734-4750 phone (803) 734-4556 fax thompsrb@columb31.dhec.state.sc.us	Chad Pollock SC DHEC EQC Administration 2600 Bull Street Columbia, SC 29201 803-734-2765 fax 803-734-9196 (N) 800-819-9001 pollocrc@columb30.dhec.state.sc.us
Tennessee			Linda Sadler Small Business Assist. Program 8th Floor L&C Annex 401 Church St. Nashville, TN 37243 615-532-0779 fax 615-532-0614 (S) 800-734-3619
Region 5	US EPA Region 5 Superfund Division (SC6J) 77 W. Jackson Blvd. Chicago, IL 60604 (312) 886-4061 (312) 886-6064 FAX Email: mayhugh.robert@epa.gov		
Illinois			Mark Enstrom Ill. Dept. of Commerce & Community Affairs 620 East Adams St. S-3 Springfield, IL 62701 217-524-0169 fax 217-785-6328 mestrom@mhd084rl.state.il.us
Indiana			Cheri Storms IDEM/OPP&TA/VOC Room 1320 100 N. Senate PO Box 6015 Indianapolis, IN 46206-6015 317-233-1041 fax 317-233-5627 cstor@opn.dem.state.in.us

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Michigan			Dave Fiedler Environmental Services Division MI DEQ PO Box 30457 Lansing, MI 48909 517-373-0607 fax 517-335-4729 (S) 800-662-9278
Minnesota			Barbara Conti MPCA/AQPD/SBAP 520 Lafayette Rd. St. Paul, MN 55155-4194 612-297-7767 fax 612-297-7709 (N) 800-657-3938 barbara.conti@pca.state.mn.us
Ohio			Risk Carleski OH EPA Division of Air Pollution Control 1600 Watermark Dr. Columbus, OH 43215 614-728-1742 fax 614-644-3681 richard_carleski@central.epa.ohio.gov
Wisconsin			Pam Christenson WI Clean Air Assistance Program Department of Commerce, 9th Floor 123 W. Washington Ave Madison, WI 53703 608-267-9214 fax 608-267-0436 (N) 800-435-7287 pchriste@mail.state.wi.us
Region 6	US EPA Region 6 Superfund Division (6SF-RP) 1445 Ross Avenue Dallas, TX 75202-2733 (214) 665-2292 (214) 665-7447 FAX Email: mason.steve@epa.gov		

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Arkansas			Robert E. Graham AR DPE PO Box 8913 Little Rock, AR 72219-8913 501-682-0708 fax 501-562-0297
Louisiana			Vic Tompkins LA Dept. of Env. Quality (Air) 7290 Bluebonnet P.O. Box 82135 Baton Rouge, LA 70884-2135 504-765-2453 FAX 504-765-0921 (S) 800-259-2890 vic_t@deq.state.la.us
New Mexico			Cecilia Williams Lanny Weaver NM ED/AQB Harold Runnels Bldg. Santa Fe, NM 87502 505-827-0042 (cwilliams) 505-827-0043 (lweaver) (S) 800-810-7227
Oklahoma			Alwin Ning OK DEQ/SBAP 1000 N.E. 10th St. Oklahoma City, OK 73117-1212 405-271-1400 fax 405-271-1317
Texas			Kerry Drake Small Business Tech. Asst. Program PO Box 13087 Austin, TX 78711-3087 512-239-1112 fax 512-239-1065 (S) 800-447-2827 kdrake@tnrcc.state.tx.us

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Region 7	US EPA Region 7 Air, RCRA, and Toxics Division (ARTD/TSPP) 726 Minnesota Ave. Kansas City, KS 66101 (913) 551-7876 (913) 551-7065 FAX Email: smith.marka@epa.gov		
Iowa			Somnath Dasgupta John Konefes IA Waste Reduction Center Unv. Of Northern Iowa 75 Biol. Res. Comp. Cedar Falls, IA 50614-0185 319-273-2079 fax 319-273-2926 (S) 800-422-3109 dasgupta@uni.edu
Kansas			Frank Orzulak Director of Continuing Education Continuing Education Bldg. U. of Kansas Lawrence, KS 66045-2608 913-864-3978 fax 913-864-5827 (S) 800-578-8898 forzulak@fulcon.cc.ukans.edu
Missouri			Byron Shaw DNR Technical Assistance Program Jefferson State Office Building PO Box 176 Jefferson City, MS 65102 314-526-5352 fax 314-526-5808

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Nebraska			Dan Eddinger Public Advocate Dept. of Environmental Quality PO Box 98922 Lincoln, NE 68509-8922 402-471-3413 fax 402-441-2909 dedding@juno.com
Region 8	US EPA Region 8 Ecosystems Protection and Remediation (8EPR-ER) One Denver Place 999-18th Street, Suite 500 Denver, CO 80202-2405 (303) 312-6760 (303) 312-6071 FAX Email: benoy.barbara@epa.gov		
Colorado			Nick Melliadis Air Pollution Control Division Dept. of Public Health & the Environment 4300 Cherry Creek Drive - South Denver, CO 80222-1530 303-692-3175 fax 303-782-5493 (N) 800-333-7798 nick.melliadis@state.co.us
Montana			Adel Johnson Dept. Of Environmental Quality Air Quality Division Metcalf Bldg. 1520 E. 6th Ave. Helena, MT 59620-0501 406-444-4194 fax 406-444-5275 (S) 800-433-8773

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
North Dakota			Tom Bachman ND Dept. of Health Division of Environmental Engineering 1200 Missouri Ave. PO Box 5520 Bismark, ND 58506-5520 701-328-5188 fax 701-328-5200 (S) 800-755-1625
South Dakota			Bryan Gustafson Dept. Env. & Nat. Resources Joe Foss Bldg. 523 East Capital Ave. Pierre, SD 57501 605-773-3351 fax 605-773-6035
Utah			Frances Bernards UT DEQ Div. of Air Quality PO Box 144820 Salt Lake City, UT 84114-4820 801-536-4056 fax 801-536-4099 (S) 800-270-4440 fbernard@deq.state.ut.us
Wyoming			Charles Raffelson Dept. of Env. Quality Div. of Air Quality 122 W. 25th Street Cheyenne, WY 82002 307-777-7391 fax 307-777-5616 craffe@missc.state.wy.us
Region 9	US EPA Region 9 Superfund Division (SFD-5) 75 Hawthorne Street San Francisco, CA 94105 (415) 744-2320 (415) 744-1916 FAX		

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Arizona			Greg Workman DEQ/Customer Service 3033 N. Central Ave. Phoenix, AZ 85012 602-207-4337 fax 602-207-4872 (S) 800-234-5677 (x4337) workman.gregory@ev.state.az.us
California			Peter Venturini CA EPA - Air Resource Board Stationary Source 2020 L Street Sacramento CA, 95814-4219 916-445-5023 fax 916-445-5023
Guam			
Hawaii			Robert Tam HI Department of Health Clean Air Branch 919 Ala Moana Blvd. Honolulu, HI 96814 808-586-4200 fax 808-586-4370
Nevada			David Cowperthwaite Small Business Program Manger Div. Of Env. Protection 333 West Nye Lane Carson City, NV 89710 702-687-4670 x3118 fax 702-687-5856 (S) 800-992-0900 x4670
Region 10	US EPA Region 10 Emergency Response & Site Cleanup Unit (ECL-116) Office of Environmental Cleanup U.S. EPA Region 10 1200 Sixth Ave. Seattle, WA 98101 206-553-0285		

Region or State	Regional Office	Implementing Agency	Small Business Assistance (S) = State only toll free (N) = National Toll free
Alaska			Scott Lytle Alaska Department of Env. Conservation 555 Cordova St. Anchorage, AK 99501-2617 907-269-7571 fax 907-269-7600 (S) 800-510-2332 slytle@envircon.state.ak.us
Idaho			Doug McRoberts IDEQ/PL&E Statehouse Mail 1410 North Hilton Boise, ID 83706-1290 208-373-0497 fax 208-373-0169 dmcrober@deq.state.id.us
Oregon			Terry Obteshka ODEQ Air Quality Division 811 S.W. 6th Ave. Portland, OR 97204-1390 503-229-6147 fax 503-229-5675 (S) 800 452-4011 terry.obteshka@state.or.us
Washington			Bernard Brady Department of Ecology PO Box 47600 Olympia, WA 98504-7600 360-407-6803 fax 360-407-6802 bbra461@ecy.wa.gov

Appendix D
OSHA Contacts

APPENDIX D: OSHA CONTACTS

Region or State	Regional Office	Consultive Program	State Plan States
Region 1	JFK Federal Building Room E340 Boston, MA 02203 phone: (617) 565-9860 fax: (617) 565-9827		
Connecticut		Connecticut Department of Labor Division of Occupational Safety & Health 38 Wolcott Hill Road Wethersfield, Connecticut 06109 (203) 566-4550 (203) 566-6916 FAX steve.wjeeter@ct-ce-wethrsfld.osha.gov E-mail	Department of Labor 200 Folly Brook Boulevard Wethersfield, CT 06109 Program Director's Office Steven Wheeler phone: (860) 566-4550 fax: (860) 566-6916 James P. Butler, Commissioner (860) 566-5123 (f) (860) 566-1520
Maine		Division of Industrial Safety Maine Bureau of Labor State House Station #82 Augusta, Maine 04333 (207) 624-6460 (207) 624-6449 FAX david.e.wacker@state.me.us E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
Massachusetts		Commonwealth of Massachusetts Dept. of Labor & Industries 1001 Watertown Street West Newton, Massachusetts 02165 (617) 727-3982 (617) 727-4581 FAX jlamalva@N218.osha.gov E-mail	
New Hampshire		New Hampshire Department of Health Division of Public Health Services 6 Hazen Drive Concord, New Hampshire 03301-6527 (603) 271-2024 (603) 271-2667 FAX jake@nh7cl.mv.com E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
Rhode Island		Rhode Island Department of Health Division of Occupational Health 3 Capital Hill Providence, Rhode Island 02908 (401) 277-2438 (401) 277-6953 FAX oshacon@ids.net E-mail	
Vermont		Division of Occupational Safety & Health Vermont Department of Labor and Industry National Life Building, Drawer 20 Montpelier, Vermont 05602-3401 (802) 828-2765 (802) 828-2748 FAX web@labor.lab.state.vt.us E-mail	Department of Labor and Industry National Life Building - Drawer 20 120 State Street Montpelier, VT 05620 Robert McLeod, Project Manager phone: (802) 828-2765 fax: (802) 828-2195 Steve Jansen, Commissioner (802) 828-2288 (f) (802) 828-2748
Region 2	201 Varick Street Room 670 New York, NY 10014 phone: (212) 337-2378 fax: (212) 337-2371		

Region or State	Regional Office	Consultive Program	State Plan States
New Jersey		Department of Labor Div. of Publi Safety and Occupational Safety and Health 225 E. State Street, 8th Floor West P.O. Box 953 Trenton, NJ 08625-0953 609-292-3923 609-292-4409 FAX carol.farley@nj-c-trenton.osha.gov E-mail	
New York		Division of Safety and Health State Office Campus Building 12, Room 130 Albany, New York 12240 (518) 457-1169 (518) 457-3454 FAX james.rush@ny-ce-albany.osha.gov E-mail	Department of Labor W. Averell Harriman State Office Building - 12, Room 500 Albany, NY 12240 Richard Cuculo, Program Director phone: (518) 457-3518 fax: (518) 457-6908 James McGowan, Commissioner (518) 457-2741 (f) (518) 457-6908

Region or State	Regional Office	Consultive Program	State Plan States
Puerto Rico		Occupational. Safety and Health Office Dept. of Labor & Human Resources, 21st Floor 505 Munoz Rivera Avenue Hato Rey, Puerto Rico 00918 (809) 754-2188 (809) 767-6051 FAX	Department of Labor and Human Resources Prudencio Rivera Martinez Building 505 Munoz Rivera Avenue Hato Rey, Puerto Rico 00918 Cesar J. Almodovar-Marchany, Secretary phone: (787) 754-2119 fax: (787) 753-9550 Assistant Secretary's Office Ana Lopez phone: (787) 754-2119 or 2171 fax: (787) 767-6051
Virgin Islands		Division of Occupational Safety and Health Virgin Islands Department of Labor 3021 Golden Rock Christiansted St. Croix, Virgin Island 00840 (809) 772-1315 (809) 772-4323 FAX	Department of Labor 2131 Hospital Street Box 890, Christiansted St. Croix, Virgin Islands 00820-4666 Raymond Williams, Program Director phone: (809) 772-1315 fax: (809) 772-4323

Region or State	Regional Office	Consultive Program	State Plan States
Region 3	Gateway Building Suite 2100 3535 Market Street Philadelphia, PA 19104 phone: (215) 596-1201 fax: (215) 596-4872		
Delaware		Delaware Department of Labor Division of Industrial Affairs Occupational Safety and Health 4425 Market Street Wilmington, Delaware 19802 (302) 761-8219 (302) 761-6601 FAX Hrznadel@state.de.us E-mail	
District of Columbia		DC Department of Employment Services Office of Occupational Safety and Health 950 Upshur Street, N.W. Washington, D.C. 20011 (202) 576-6339 (202) 576-7282 FAX jcates@n217.osha.gov	

Region or State	Regional Office	Consultive Program	State Plan States
Maryland		Division of Labor and Industry 312 Marshall Avenue, Room 600 Laurel, MD 20707 410-880-4970 410-880-6369 FAX	Division of Labor and Industry Dept. of Licensing and Regulation 1100 North Eutaw Street, Room 613 Baltimore, MD 21201-2206 John P. O'Conner, Commissioner phone: (410) 767-2215 fax: (410) 767-2003 Ileana O'Brien, Deputy Commissioner phone: (410) 767-2992 fax: (410) 767-2003
Pennsylvania		Indiana University of Pennsylvania Safety Sciences Department 205 Uhler Hall Indiana, Pennsylvania 15705-1087 (412) 357-2561 (412) 357-2385 FAX rchriste@grove.iup.edu E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
Virginia		Virginia Department of Labor and Industry Occupational Safety and Health Training and Consultation 13 South 13th Street Richmond, Virginia 23219 (804) 786-6359 (804) 786-8418 FAX njakubecdoli@sprintmail.com E-mail	Department of Labor and Industry Powers-Taylor Building 13 South 13th Street Richmond, VA 23219 Theron Bell, Commissioner phone: (804) 786-2377 fax: (804) 371-6524 Charles Lahey, Deputy Commissioner phone: (804) 786-2383 fax: (804) 371-6524
West Virginia		West Virginia Department of Labor Capitol Complex Building #3 1800 East Washington Street, Room 319 Charleston, West Virginia 25305 (304) 558-7890 (304) 558- 3797 FAX	
Region 4	61 Forsyth Street, SW Atlanta, GA 30303 phone: (404) 562-2300 fax: (404) 562-2295		

Region or State	Regional Office	Consultive Program	State Plan States
Alabama		Safe State Program University of Alabama 432 Martha Parham West PO Box 870388 Tuscaloosa, Alabama 35487 (205) 348-3033 (205) 348-3049 FAX bweems@ua.edu E-mail	
Florida		Florida Dept. of Labor and Employment Security 7(c)(1) Onsite Consultation Prog. Div. of Safety 2002 St. Augustine Road, Building E, Suite 45 Tallahassee, Florida 32399 (850) 922-8955 (904) 922-4538 FAX brettcreco@safetyfl.org E-mail	
Georgia		Onsite Consultation Program Georgia Institute of Technology O'Keefe Building, Room 22 Atlanta, Georgia 30332 (404) 894-2646 (404) 894-8275 FAX paul.middendorf@gtri.gatech.edu E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
Kentucky		Division of Education and Training Kentucky Labor Cabinet 1049 U.S. Highway 127 South Frankfort, Kentucky 40601 (502) 564-6895 (502) 564-4769 FAX arussell@mail.lab.state.ky.gov E-mail	Labor Cabinet 1047 U.S. Highway 127 So., Suite 2 Frankfort, Kentucky 40601 Joe Norsworthy, Secretary phone (502) 564-3070 fax: (502) 564-5387 Steven A. Forbes, Fed/State Coordinator phone: (502) 564-2300 fax: (502) 564-1682
Mississippi		Mississippi State University Center for Safety and Health 2906 North State Street, Suite 201 Jackson, Mississippi 39216 (601) 987-3981 (601) 987-3890 FAX Kelly@n198.osha.gov E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
North Carolina		Bureau of Consultative Services North Carolina Dept. of Labor 319 Chapanoke Road, Suite 105 Raleigh, North Carolina 27603-3432 (919) 662-4644 (919) 662-4671 FAX wjoyner@dol.state.nc.us E-mail	Department of Labor 319 Chapanoke Road Raleigh, NC 27603 Harry Payne, Commissioner phone: (919) 662-4585 fax: (919) 662-4582 Charles Jefress, Deputy Commissioner phone (919) 662-4585 fax: (919) 662-4582
South Carolina		South Carolina Department of Labor Licensing and Regulation 3600 Forest Drive PO Box 11329 Columbia, South Carolina 29204 (803) 734-9614 (803) 734-9741 FAX scoshaovp@infoave.net E-mail	Department of Labor, Licensing, and Regulation Koger Office Park, Kingstree Building 110 Centerview Drive PO Box 11329 Columbia, SC 29210 William Lybrand, Program Director phone: (803) 734-9594 fax: (803) 734-9772 Lewis Gossett, Director (803) 896-4300 (f) (803) 896-4393

Region or State	Regional Office	Consultive Program	State Plan States
Tennessee		OSHA Consultative Services Tennessee Department of Labor 710 James Robertson Parkway, 3rd Floor Nashville, Tennessee 37243-0659 (615) 741-7036 (615) 532-2997 FAX mike.maenza@tn-c-nashville.osha.gov E-mail	Department of Labor 710 James Robertson Parkway Nashville, TN 37243 David R. Inman, Program Director phone: (615) 741-2793 fax: (615) 741-3325 Alphonso R. Bodie, Commissioner (615) 741-2582 (f) (615) 741-5078
Region 5	230 South Dearborn Street Room 3244 Chicago, IL 60604 phone: (312) 353-2220 fax: (312) 353-7774		
Illinois		Industrial Service Division Department of Commerce & Community Affairs State of Illinois Center, Suite 3-400 100 West Randolph Street Chicago, Illinois 60601 (312) 814-2337 (312) 814-7238 FAX sfryzel@commerce.state.il.us E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
Indiana		Bureau of Safety, Education and Training Division of Labor, Room W195 402 West Washington Indianapolis, Indiana 46204 (317) 232-2688 (317) 232-0748 FAX Jon.mack@nin-ce-indianpls.osha.gov E-mail	Department of Labor State Office Building 402 West Washington Street, Room W195 Indianapolis, IN 46204 Timothy Joyce, Commissioner phone: (317) 232-2378 fax: (317) 233-3790 John Jones, Deputy Commissioner phone: (317) 232-3325 fax: (317) 233-3790
Michigan		Michigan Dept of Public Health Division of Occupational Health 3423 North Martin Luther King Boulevard Lansing, Michigan 48909 (517) 335-8250 (517) 335-8010 FAX john.peck@cis.state.mi.us E-mail	Department of Consumer and Industry Services North 3423 No. Martin Luther King Boulevard PO Box 30649 Lansing, MI 48909 Kathleen M. Wilbur, Director phone: (517) 373-7230 fax: (517) 373-2129 Douglas E. Earle, Program Director for Safety and Health phone: (517) 322-1814 fax: (517) 335-8010

Region or State	Regional Office	Consultive Program	State Plan States
Minnesota		Department of Labor and Industry 443 LaFayette Road Saint Paul, Minnesota 55155 (612) 297-2393 (612) 297-1953 FAX james.collins@state.mn.us E-mail	Department of Labor and Industry 443 Lafayette Road St. Paul, MN 55155 Gretchen B. Maglich, Commissioner phone: (612) 296-2342 fax: (612) 282-5405 Roslyn Wade, Assistant Commissioner phone: (612) 296-6529 fax: (612) 282-5405
Ohio		Bureau of Employment Services 145 S. Front Street Columbus, Ohio 43216 (614) 644-2246 (614) 644-3133 FAX owen@n222.osha.gov E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
Wisconsin		Wisconsin (Health) Wisconsin Department of Health and Human Services Section of Occupational Health, Room 112 1414 East Washington Avenue Madison, Wisconsin 53703 (608) 266-8579 (608) 266-9711 FAX Wisconsin (Safety) Wisconsin Department of Industry Labor and Human Relations Bureau of Safety Inspections 401 Pilot Court, Suite C Waukesha, Wisconsin 53188 (414) 521-5063 (414) 521-8614 FAX L1163@n215.osha.gov E-mail	
Region 6	525 Griffin Street Room 602 Dallas, TX 75202 phone: (214) 767-4731 fax: (214) 767-4137		

Region or State	Regional Office	Consultive Program	State Plan States
Arkansas		OSHA Consultation Arkansas Department of Labor 10421 West Markham Little Rock, Arkansas 72205 (501) 682-4522 (501) 682-4532 FAX clark@n237.osha.gov E-mail	
Louisiana		7(c)(1) Consultation Program Louisiana Department of Labor Post Office Box 94094 Baton Rouge, Louisiana 70804 (504) 342-9601 (504) 342-5158 FAX oshacons@eatel.net E-mail	
New Mexico		New Mexico Environment Dept Occupational Health and Safety Bureau 525 Camino de Los Marquez, Suite 3 PO Box 26110 Santa Fe, New Mexico 87502 (505) 827-4230 (505) 827-4422 FAX deborah@n023.osha.gov E-mail	Environment Department 1190 St. Francis Drive PO Box 26110 Santa Fe, New Mexico 87502 Mark E. Weilder, Secretary phone: (505) 827-2850 fax: (505) 827-2836 Sam A. Rogers, Chief phone: (505) 827-4230 fax: (505) 827-2836

Region or State	Regional Office	Consultive Program	State Plan States
Oklahoma		Oklahoma Department of Labor OSHA Division 4001 North Lincoln Boulevard Oklahoma City, Oklahoma 73105-5212 (405) 528-1500 (405) 528-5751 FAX leslie@n238.osha.gov E-mail	
Texas		Workers' Health and Safety Division Workers' Compensation Commission Southfield Building 4000 South I H 35 Austin, Texas 78704 (512) 440-3854 (512) 440-3831 FAX margaret.nugent@mail.capnet.state.tx.us	
Region 7	City Center Square 1100 Main Street Suite 800 Kansas City, Missouri 64105 phone: (816) 426-5861 fax: (816) 426-2750		

Region or State	Regional Office	Consultive Program	State Plan States
Iowa		7(c)(1) Consultation Program Iowa Bureau of Labor 1000 East Grand Avenue Des Moines, Iowa 50319 (515) 281-5352 (515) 281-4831 FAX	Division of Labor Services 1000 E. Grand Avenue Des Moines, Iowa 50319 Mary L. Bryant, Administrator phone: (515) 281-3469 fax: (515) 281-7995 Byron K. Orton, Commissioner (515) 281-3447 (f) (515) 242-5144
Kansas		Dept. of Human Resources 512 South West 6th Street Topeka, Kansas 66603 (913) 296-7476 (913) 296-1775 FAX rudy.leutzinger@ks-ce-topeka.gov E-mail	
Missouri		Division of Labor Standards Dept. of Labor & Industrial Relations 3315 West Truman Boulevard P.O. Box 449 Jefferson City, Missouri 65109 (573) 751-3403 (573) 751-3721 FAX rsimmons@services.state.mo.us E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
Nebraska		Division of Safety Labor & Safety Standards Nebraska Department of Labor State Office Building, Lower Level 301 Centennial Mall, South Lincoln, Nebraska 68509-5024 (402) 471-4717 (402) 471-5039 FAX amy@n214.osha.gov E-mail	
Region 8	1999 Broadway Suite 1690 Denver, CO 80202 phone: (303) 844-1600 fax: (303) 844-1616		
Colorado		Colorado State University Occupational Safety and Health Section 115 Environmental Health Building Fort Collins, Colorado 80523 (303) 491-6151 (303) 491-7778 FAX jdsand@lamar.colostate.edu E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
Montana		Montana Dept. of Labor and Industry Bureau of Safety PO Box 1728 Helena, Montana 59624-1728 (406) 444-6418 (406) 444-4140 FAX dfolsom@mt.gov E-mail	
North Dakota		Division of Environmental Engineering 1200 Missouri Avenue, Room 304 Bismarck, North Dakota 58506-5520 (701) 328-5188 (701) 328-5200 FAX ccmail.lhuber@ranch.state.nd.us E-mail	

Region or State	Regional Office	Consultive Program	State Plan States
South Dakota		Engineering Extension Onsite Technical Division South Dakota State University Box 510 West Hall 907 Harvey Dunn Street Brookings, South Dakota 57007 (605) 688-4101 (605) 688-6290 FAX scoshaovp@infoave.net E-mail	
Utah		Utah Industrial Commission Consultation Services 160 East 300 South Salt Lake City, Utah 84114-6650 (801) 530-6868 (801) 530-6992 FAX icmain.nandetso@state.ut.us E-mail	Labor Commission 160 East 300 South, 3rd Floor PO Box 146650 Salt Lake City, UT 84114-6650 Jay W. Bagley, Administrator phone: (801) 530-6898 fax: (801) 530-7606 R. Lee Ellertson, Commissioner (801) 530-6898 (f) (801) 530-6880

Region or State	Regional Office	Consultive Program	State Plan States
Wyoming		Wyoming Department of Employment Workers' Safety and Compensation Division Herschler Building, 2 East 122 West 25th Street Cheyenne, Wyoming 82002 (307) 777-7786 (307) 777-3646 FAX	Department of Employment Worker's Safety and Compensation Div. Herschler Building, 2nd Floor East 122 West 25th Street Cheyenne, WY 82002 Stephan R. Foster, Safety Administrator phone: (307) 777-7786 fax: (307) 777-5850
Region 9	71 Stevenson Street Room 420 San Francisco, CA 94105 phone: (415) 975-4310 fax: (415) 744-4319		
Arizona		Consultation and Training Industrial Commission of Arizona Division of Occupational Safety & Health 800 West Washington Phoenix, Arizona 85007 (602) 542-5795 (602) 542-1614 FAX henry@n245.osha.gov E-mail	Industrial Commission 800 W. Washington Phoenix, AZ 85007 Derek Mullins, Program Director phone: (602) 542-5795 fax: (602) 542-1614 Larry Etchechury, Director (602) 542-5796 (f) (602) 542-1614

Region or State	Regional Office	Consultive Program	State Plan States
California		CAL/OSHA Consultation Service Department of Industrial Relations Room 1260 45 Freemont Street San Francisco, CA 94105 (415) 972-8515 (415) 972-8513 FAX DCBare@hq.dir.ca.gov E-mail	Department of Industrial Relations 45 Freemont Street San Francisco, CA 94105 Dr. John Howard, Chief phone: (415) 972-8500 fax: (415) 972-8513 John Duncan, Director (415) 972-8835 (f) (415) 972-8848
Guam		OSHA Onsite Consultation Dept. of Labor, Government of Guam PO Box 9970 Tamuning, Guam 96931 (671) 475-0136 (671) 477-2988 FAX	
Hawaii		Consultation & Training Branch Dept of Labor and Industrial Relations 830 Punchbowl Street Honolulu, Hawaii 96813 (808) 586-9100 (808) 586-9099 FAX	Department of Labor and Industrial Relations 830 Punchbowl Street Honolulu, HI 96813 Loraine H Akiba, Director phone: (808) 586-8844 fax: (808) 586-9099 Jennifer Shishido, Administrator phone: (808) 586-9116 fax: (808) 586-9104

Region or State	Regional Office	Consultive Program	State Plan States
Nevada		Division of Preventive Safety Department of Industrial Relations, Suite 106 2500 West Washington Las Vegas, Nevada 89106 (702) 486-5016 (702) 486-5331 FAX dalton.hooks@nv-ce-lasvegas.osha.gov E-mail	Division of Industrial Relations 400 West King Street Carson City, Nevada 97502 Ron Swirczek, Administrator phone(702) 687-3032 fax: (702) 687-6305 Danny Evans, Assistant Administrator phone: (702) 687-3250 fax: (702) 687-6150
Region 10	1111 Third Avenue Suite 715 Seattle, Washington 98101-3212 phone: (206) 553-5930 fax: (206) 553-6499		
Alaska		ADOL/OSHA Division of Consultation 3301 Eagle Street P.O. Box 107022 Anchorage, Alaska 99510 (907) 269-4957 (907) 269-4950 FAX timothybundy@labor.state.ak.us E-mail	Department of Labor 1111 W. 8th Street, Room 306 Juneau, AK 99801 Alan W. Dwyer, Program Director phone: (907) 465-4855 fax: (907) 465-3584 Tom Cashen, Commissioner (907) 465-2700 (f) (907) 465-2784

Region or State	Regional Office	Consultive Program	State Plan States
Idaho		Boise State University, Dept. of Health Studies 1910 University Drive, ET-338A Boise, Idaho 83725 (208) 385-3283 (208) 385-4411 FAX lstokes@bsu.idbsu.edu E-mail	
Oregon		Department of Consumer and Business Services Oregon Occupational Safety and Health Division 350 Winter Street NE, Room 430 Salem, Oregon 97310 (503) 378-3272 (800) 922-2689 TOLL FREE (503) 378-5729FAX steve.g.beech@state.or.us or consult.web@state.or.us E-mail	Occupational Safety and Health Division Dept. of Consumer & Business Services 350 Winter Street, NE, Room 430 Salem, OR 97310 Peter Deluca, Administrator phone: (503) 378-3272 fax: (503) 378-4538 David Sparks, Deputy Adminsistrator phone: (503) 378-3272 fax: (503) 378-4538

Region or State	Regional Office	Consultive Program	State Plan States
Washington		Washington Dept of Labor and Industries Division of Industrial Safety and Health PO Box 44643 Olympia, Washington 98504 (360) 902-5443 (360) 902-5459 FAX jame235@lni.wa.gov E-mail	Department of Labor and Industries General Administration Building PO Box 44001 Olympia, WA 980504-4001 Gary Moore, Director phone: (360) 902-4200 fax: (360) 902-4202 Michael Silverstein, Assistant Director phone: (360) 902-5495 fax: (360) 902-5529

APPENDIX E
TECHNICAL ASSISTANCE

October 27, 1998

APPENDIX E: TECHNICAL ASSISTANCE

WHERE CAN I GET HELP?

This appendix provides points of contact for the resources that are available to facilities in complying with 40 CFR part 68 from EPA, OSHA, and several other entities involved in process safety and risk management issues. For specific points of contact for EPA regional offices, RMP implementing agencies, and Clean Air Act small business assistance programs, refer to Appendix C. For specific points of contact for OSHA regional offices, OSHA state consultative programs, and OSHA state plan states, refer to Appendix D.

U.S. ENVIRONMENTAL PROTECTION AGENCY

Chemical Emergency Preparedness and Prevention Office
401 M Street, SW
Washington, DC 20460
(202) 260-8600
www.epa.gov/swercepp

CEPPO administers the RMP program at the national level. The CEPPO homepage on the Internet provides access to downloadable versions of numerous risk management program documents, many of which are also available upon request from the National Center for Environmental Publications and Information see below.

EPCRA/Superfund/RCRA/CAA Hotline
Toll-Free: (800) 424-9346
Local: (703) 412-9810
TDD: (800) 553-7672
TDD Local: (703) 412-3323
Monday - Friday, 9:00 am - 6:00 pm EST
www.epa.gov/epaoswer/hotline/index.htm
Questions or comments: epahotline@bah.com

EPA's RCRA, Superfund, and EPCRA Hotline is a publicly accessible service that provides up-to-date information on EPA programs. The Hotline responds to factual questions on a variety of federal EPA regulations, including those developed under Clean Air Act section 112(r). The Hotline also responds to requests for individual copies of documents.

National Center for Environmental Publications and Information
P.O. Box 42419

Cincinnati, OH 45242
Phone: (800) 490-9198
Fax: (513) 489-8695
www.epa.gov/ncepihom/

Orders must be limited to five titles per two-week period, one complimentary copy of each in-stock publication. As supplies are depleted you will be referred to the National Technical Information Service (NTIS), the Government Printing Office (GPO), or the Educational Resource Information Center (ERIC) to obtain your documents at cost.

National Technical Information Service
Technology Administration
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
Phone: (800) 553-6847 (toll-free)
Phone: (703) 487-4650 (local)
Monday - Friday, 8:00 am - 8:00 pm EST
Fax: (703) 321-8547 (verify receipt at (703) 487-4679)
www.ntis.gov/
E-Mail: orders@ntis.fedworld.gov

The National Technical Information Service is the official resource for government-sponsored U.S. and worldwide scientific, technical, engineering, and business-related information. Documents not available through the EPA Hotline are often available from NTIS. You can place your order by telephone, mail, fax, or e-mail. NTIS also offers online ordering for products added to the NTIS collection within the last 90 days using NTIS OrderNow.

EPA Small Business Assistance Program
www.epa.gov/ttn/sbap/

The Clean Air Act Amendments of 1990 requires that all States develop a program to assist small businesses in meeting the requirements of the Act. EPA has established its own Small Business Assistance Program (SBAP) to provide technical assistance to these State small business programs. This site has been developed to allow State and EPA programs to share information about their small business assistance materials and activities.

EPA Small Business Hotline
Small Business Ombudsman Office
(800) 368-5888

Office of Air Quality Planning and Standards

www.epa.gov/oar/oaqps/

The Office of Air Quality Planning and Standards administers EPA's operating permit program. Permits incorporate terms and conditions to assure that the source complies with all applicable requirements. The RMP regulations are considered to be an applicable requirement.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA administers the Process Safety Management Standard (29 CFR 1910.119), which mandates actions similar to that of EPA's prevention program. In about half of the states (see Appendix D), OSHA programs are run by state agencies.

Office of Information and Consumer Affairs
U.S. Department of Labor
Room N3647
200 Constitution Avenue, NW
Washington, DC 20210
(202) 523-8151
www.osha.gov

OSHA Process Safety Management Homepage
www.osha-slc.gov/SLTC/ProcessSafetyManagement/index.html

The PSM homepage on the Internet provides access to downloadable versions of numerous process safety management documents.

OSHA Consultation Services
www.osha.gov/oshprogs/consult.html

Using a free consultation service largely funded by OSHA, employers can find out about potential hazards at their worksites, improve their occupational safety and health management systems, and even qualify for a one-year exemption from routine OSHA inspections. Primarily targeted for smaller businesses, this safety and health consultation program is completely separate from the OSHA inspection effort.

OSHA Office of Training & Education
Head Registrar
OSHA Training Institute
Des Plaines, Illinois
(847) 297-4913
www.osha-slc.gov/Training/index.html

The OSHA Office of Training and Education offers short-term training through the OSHA Training Institute. The Office also administers the OSHA Training Institute Education Centers program, in which designated nonprofit organizations in each federal region offer the most frequently requested courses for the private sector and other Federal agency staff.

OSHA Voluntary Protection Program (VPP)
Division of Voluntary Programs
(202) 219-7266
www.osha.gov/oshprogs/vpp/osha2.html

OSHA Voluntary Protection Programs are designed to recognize and promote effective safety and health management. In the VPP, management, labor, and OSHA establish a cooperative relationship at a workplace that has implemented a strong program.

OSHA Publications Office
Room N3101
Washington, DC 20210
(202) 523-9667

The Publications Office provides single copies of various documents.

OSHA Computerized Information System
www.osha-slc.gov/

This site provides links to OSHA Standards and related documents, including OSHA Regulations, Federal Register notices, Interpretations and Compliance Letters, OSHA Regulations (preambles to final rules), Review Commission decisions, Congressional Testimony, OSHA Directives and Fact Sheets, Memorandums of Understanding.

OSHA CD-ROM
Windows and Macintosh dual platform
U.S. Government Printing Office
Stock # 729-013-00000-5
Phone: (202) 512-1800
Fax: (202) 512-2250
Price: $38/year (four quarterly releases), $15 (single copy)

This CD-ROM contains electronic copy of the text of all OSHA regulations, selected documents, and technical information from the OSHA Computerized Information System.

OTHER ORGANIZATIONS

Association of Metropolitan Sewerage Agencies
1000 Connecticut Avenue, NW, Suite 410
Washington D.C. 20036-5302
Phone: (202) 833-AMSA
Fax: (202) 833-4657
http://www.amsa-cleanwater.org/

American Water Works Association
6666 Quincy Ave.
Denver, CO 80235
(303) 794-7711
www.awwa.org/

AWWA has prepared a model risk management program for its members.

Chlorine Institute
Publications Coordinator
2001 L St. NW, Suite 506
Washington, DC 20005
(202) 223-7225
www.cl2.com

The Chlorine Institute has developed a model risk management program for chlorine handlers. It also publishes guidance documents related to chlorine handling and storage.

Compressed Gas Association
Publications Department
1725 Jefferson Davis Highway, Suite 1004
Arlington, VA 22202-4102
(703) 412-0900

The Compressed Gas Association publishes a number of documents on the handling of compressed gases, including ammonia and sulfur dioxide.

Water Environment Federation
601 Wythe St.
Alexandria, VA
(703) 684-2400
www.wef.org

The Water Environment Federation publishes a number of documents on water treatment, including operating and maintenance manuals for WWWs.

American Institute of Chemical Engineers
345 E. 47th St.
New York, NY 10017-2395
(212) 705-7338
www.aiche.org/

Center for Chemical Process Safety
345 E. 47th St., 12th Fl.
New York, NY 10017-2395
(212) 705-7319
www.aiche.org/docs/research/ccps.htm

AIChExpress Service Center
(800) AIC-HEME (242-4363)
Monday - Friday, 9:00 am - 5:00 pm EST
E-Mail: xpress@aiche.org

AIChE prints a Continuing Education catalog for its educational and training programs and an annual Publications Catalog from which documents can be purchased.

Small Business Administration (SBA)
409 Third Street, SW
Washington, DC 20416
(800) 827-5722
www.sba.gov/

SBA was created to help America's entrepreneurs form successful small enterprises. SBA's program offices in every state offer financing, training and advocacy for small firms. In addition, the SBA works with thousands of lending, educational, and training institutions nationwide.

U.S. Government Printing Office
Superintendent of Documents
Washington, DC 20402
(202) 783-3238
www.gpo.gov/su_docs/index.html

GPO Access User Support Team
E-mail: gpoaccess@gpo.gov
Phone: (202) 512-1530 (local)
Phone: (888) 293-6498 (toll-free)
Fax: (202) 512-1262

APPENDIX F
OSHA GUIDANCE ON PSM

APPENDIX F
OSHA GUIDANCE ON PSM

The following text is taken directly from OSHA's non-mandatory appendix C to the PSM standard (29 CFR 1910.119). The only change has been to rearrange the sections to track the order of part 68.

PROCESS SAFETY INFORMATION

Complete and accurate written information concerning process chemicals, process technology, and process equipment is essential to an effective process safety management program and to a process hazards analysis. The compiled information will be a necessary resource to a variety of users including the team that will perform the process hazards analysis; those developing the training programs and the operating procedures; contractors whose employees will be working with the process; those conducting the pre-startup reviews; local emergency preparedness planners; and insurance and enforcement officials.

The information to be compiled about the chemicals, including process intermediates, needs to be comprehensive enough for an accurate assessment of the fire and explosion characteristics, reactivity hazards, the safety and health hazards to workers, and the corrosion and erosion effects on the process equipment and monitoring tools. Current material safety data sheet (MSDS) information can be used to help meet this requirement, which must be supplemented with process chemistry information including runaway reaction and over pressure hazards if applicable.

Process technology information will be a part of the process safety information package and it is expected that it will include diagrams as well as employer established criteria for maximum inventory levels for process chemicals; limits beyond which would be considered upset conditions; and a qualitative estimate of the consequences or results of deviation that could occur if operating beyond the established process limits. Employers are encouraged to use diagrams which will help users understand the process.

A block flow diagram is used to show the major process equipment and interconnecting process flow lines and show flow rates, stream composition, temperatures, and pressures when necessary for clarity. The block flow diagram is a simplified diagram.

Process flow diagrams are more complex and will show all main flow streams including valves to enhance the understanding of the process, as well as pressures and temperatures on all feed and product lines within all major vessels, in and out of headers and heat exchangers, and points of pressure and temperature control. Also, materials of construction information, pump capacities and pressure heads, compressor horsepower and vessel design pressures and temperatures are shown when necessary for clarity. In addition, major components of control loops are usually shown along with key utilities on process flow diagrams.

Piping and instrument diagrams (P&IDS) may be the more appropriate type of diagrams to show some of the above details and to display the information for the piping designer and engineering staff. The P&IDS are to be used to describe the relationships between equipment and instrumentation as well as other relevant information that will enhance clarity. Computer software programs which do P&IDS or other diagrams useful to the information package, may be used to help meet this requirement.

The information pertaining to process equipment design must be documented. In other words, what were the codes and standards relied on to establish good engineering practice. These codes and standards are

published by such organizations as the American Society of Mechanical Engineers, American Petroleum Institute, American National Standards Institute, National Fire Protection Association, American Society for Testing and Materials, National Board of Boiler and Pressure Vessel Inspectors, National Association of Corrosion Engineers, American Society of Exchange Manufacturers Association, and model building code groups. In addition, various engineering societies issue technical reports which impact process design. For example, the American Institute of Chemical Engineers has published technical reports on topics such as two phase flow for venting devices. This type of technically recognized report would constitute good engineering practice.

For existing equipment designed and constructed many years ago in accordance with the codes and standards available at that time and no longer in general use today, the employer must document which codes and standards were used and that the design and construction along with the testing, inspection and operation are still suitable for the intended use. Where the process technology requires a design which departs from the applicable codes and standards, the employer must document that the design and construction is suitable for the intended purpose.

PROCESS HAZARD ANALYSIS

A process hazard analysis (PHA), sometimes called a process hazard evaluation, is one of the most important elements of the process safety management program. A PHA is an organized and systematic effort to identify and analyze the significance of potential hazards associated with the processing or handling of highly hazardous chemicals. A PHA provides information which will assist employers and employees in making decisions for improving safety and reducing the consequences of unwanted or unplanned releases of hazardous chemicals.

A PHA is directed toward analyzing potential causes and consequences of fires, explosions, releases of toxic or flammable chemicals and major spills of hazardous chemicals. The PHA focuses on equipment, instrumentation, utilities, human actions (routine and non-routine), and external factors that might impact the process. These considerations assist in determining the hazards and potential failure points or failure modes in a process.

The selection of a PHA methodology or technique will be influenced by many factors including the amount of existing knowledge about the process. Is it a process that has been operated for a long period of time with little or no innovation and extensive experience has been generated with its use? Or, is it a new process or one which has been changed frequently by the inclusion of innovative features? Also, the size and complexity of the process will influence the decision as to the appropriate PHA methodology to use. All PHA methodologies are subject to certain limitations. For example, the checklist methodology works well when the process is very stable and no changes are made, but it is not as effective when the process has undergone extensive change. The checklist may miss the most recent changes and consequently the changes would not be evaluated. Another limitation to be considered concerns the assumptions made by the team or analyst. The PHA is dependent on good judgment and the assumptions made during the study need to be documented and understood by the team and reviewer and kept for a future PHA.

The team conducting the PHA need to understand the methodology that is going to be used. A PHA team can vary in size from two people to a number of people with varied operational and technical backgrounds. Some team members may only be a part of the team for a limited time. The team leader needs to be fully knowledgeable in the proper implementation of the PHA methodology that is to be used and should be

impartial in the evaluation. The other full or part time team members need to provide the team with expertise in areas such as process technology, process design, operating procedures and practices, including how the work is actually performed, alarms, emergency procedures, instrumentation, maintenance procedures, both routine and non-routine tasks, including how the tasks are authorized, procurement of parts and supplies, safety and health, and any other relevant subject as the need dictates. At least one team member must be familiar with the process.

The ideal team will have an intimate knowledge of the standards, codes, specifications and regulations applicable to the process being studied. The selected team members need to be compatible and the team leader needs to be able to manage the team and the PHA study. The team needs to be able to work together while benefiting from the expertise of others on the team or outside the team, to resolve issues, and to forge a consensus on the findings of the study and the recommendations.

The application of a PHA to a process may involve the use of different methodologies for various parts of the process. For example, a process involving a series of unit operations of varying sizes, complexities, and ages may use different methodologies and team members for each operation. Then the conclusions can be integrated into one final study and evaluation.

A more specific example is the use of a checklist PHA for a standard boiler or heat exchanger and the use of a Hazard and Operability PHA for the overall process. Also, for batch type processes like custom batch operations, a generic PHA of a representative batch may be used where there are only small changes of monomer or other ingredient ratios and the chemistry is documented for the full range and ratio of batch ingredients. Another process that might consider using a generic type of PHA is a gas plant. Often these plants are simply moved from site to site and therefore, a generic PHA may be used for these movable plants. Also, when an employer has several similar size gas plants and no sour gas is being processed at the site, then a generic PHA is feasible as long as the variations of the individual sites are accounted for in the PHA.

Finally, when an employer has a large continuous process which has several control rooms for different portions of the process such as for a distillation tower and a blending operation, the employer may wish to do each segment separately and then integrate the final results.

Additionally, small businesses which are covered by this rule, will often have processes that have less storage volume, less capacity, and less complicated than processes at a large facility. Therefore, OSHA would anticipate that the less complex methodologies would be used to meet the process hazard analysis criteria in the standard. These process hazard analyses can be done in less time and with a few people being involved. A less complex process generally means that less data, P&IDS, and process information is needed to perform a process hazard analysis.

Many small businesses have processes that are not unique, such as cold storage lockers or water treatment facilities. Where employer associations have a number of members with such facilities, a generic PHA, evolved from a checklist or what-if questions, could be developed and used by each employer effectively to reflect his/her particular process; this would simplify compliance for them.

When the employer has a number of processes which require a PHA, the employer must set up a priority system of which PHAs to conduct first. A preliminary or gross hazard analysis may be useful in prioritizing the processes that the employer has determined are subject to coverage by the process safety

management standard. Consideration should first be given to those processes with the potential of adversely affecting the largest number of employees. This prioritizing should consider the potential severity of a chemical release, the number of potentially affected employees, the operating history of the process such as the frequency of chemical releases, the age of the process and any other relevant factors. These factors would suggest a ranking order and would suggest either using a weighing factor system or a systematic ranking method. The use of a preliminary hazard analysis would assist an employer in determining which process should be of the highest priority and thereby the employer would obtain the greatest improvement in safety at the facility.

OPERATING PROCEDURES

Operating procedures describe tasks to be performed, data to be recorded, operating conditions to be maintained, samples to be collected, and safety and health precautions to be taken. The procedures need to be technically accurate, understandable to employees, and revised periodically to ensure that they reflect current operations. The process safety information package is to be used as a resource to better assure that the operating procedures and practices are consistent with the known hazards of the chemicals in the process and that the operating parameters are accurate. Operating procedures should be reviewed by engineering staff and operating personnel to ensure that they are accurate and provide practical instructions on how to actually carry out job duties safely.

Operating procedures will include specific instructions or details on what steps are to be taken or followed in carrying out the stated procedures. These operating instructions for each procedure should include the applicable safety precautions and should contain appropriate information on safety implications. For example, the operating procedures addressing operating parameters will contain operating instructions about pressure limits, temperature ranges, flow rates, what to do when an upset condition occurs, what alarms and instruments are pertinent if an upset condition occurs, and other subjects. Another example of using operating instructions to properly implement operating procedures is in starting up or shutting down the process. In these cases, different parameters will be required from those of normal operation. These operating instructions need to clearly indicate the distinctions between startup and normal operations such as the appropriate allowances for heating up a unit to reach the normal operating parameters. Also the operating instructions need to describe the proper method for increasing the temperature of the unit until the normal operating temperature parameters are achieved.

Computerized process control systems add complexity to operating instructions. These operating instructions need to describe the logic of the software as well as the relationship between the equipment and the control system; otherwise, it may not be apparent to the operator.

Operating procedures and instructions are important for training operating personnel. The operating procedures are often viewed as the standard operating practices (SOPs) for operations. Control room personnel and operating staff, in general, need to have a full understanding of operating procedures. If workers are not fluent in English then procedures and instructions need to be prepared in a second language understood by the workers. In addition, operating procedures need to be changed when there is a change in the process as a result of the management of change procedures. The consequences of operating procedure changes need to be fully evaluated and the information conveyed to the personnel. For example, mechanical changes to the process made by the maintenance department (like changing a valve from steel to brass or other subtle changes) need to be evaluated to determine if operating procedures and practices also need to be changed. All management of change actions must be coordinated and integrated with

current operating procedures and operating personnel must be oriented to the changes in procedures before the change is made. When the process is shutdown to make a change, then the operating procedures must be updated before startup of the process.

Training in how to handle upset conditions must be accomplished as well as what operating personnel are to do in emergencies such as when a pump seal fails or a pipeline ruptures. Communication between operating personnel and workers performing work within the process area, such as non-routine tasks, also must be maintained. The hazards of the tasks are to be conveyed to operating personnel in accordance with established procedures and to those performing the actual tasks. When the work is completed, operating personnel should be informed to provide closure on the job.

TRAINING

All employees, including maintenance and contractor employees, involved with highly hazardous chemicals need to fully understand the safety and health hazards of the chemicals and processes they work with for the protection of themselves, their fellow employees and the citizens of nearby communities. Training conducted in compliance with 1910.1200, the Hazard Communication standard, will help employees to be more knowledgeable about the chemicals they work with as well as familiarize them with reading and understanding MSDS. However, additional training in subjects such as operating procedures and safety work practices, emergency evacuation and response, safety procedures, routine and non-routine work authorization activities, and other areas pertinent to process safety and health will need to be covered by an employer's training program.

In establishing their training programs, employers must clearly define the employees to be trained and what subjects are to be covered in their training. Employers in setting up their training program will need to clearly establish the goals and objectives they wish to achieve with the training that they provide to their employees. The learning goals or objectives should be written in clear measurable terms before the training begins. These goals and objectives need to be tailored to each of the specific training modules or segments. Employers should describe the important actions and conditions under which the employee will demonstrate competence or knowledge as well as what is acceptable performance.

Hands-on-training where employees are able to use their senses beyond listening, will enhance learning. For example, operating personnel, who will work in a control room or at control panels, would benefit by being trained at a simulated control panel or panels. Upset conditions of various types could be displayed on the simulator, and then the employee could go through the proper operating procedures to bring the simulator panel back to the normal operating parameters. A training environment could be created to help the trainee feel the full reality of the situation but, of course, under controlled conditions. This realistic type of training can be very effective in teaching employees correct procedures while allowing them to also see the consequences of what might happens if they do not follow established operating procedures. Other training techniques using videos or on-the-job training can also be very effective for teaching other job tasks, duties, or other important information. An effective training program will allow the employee to fully participate in the training process and to practice their skill or knowledge.

Employers need to periodically evaluate their training programs to see if the necessary skills, knowledge, and routines are being properly understood and implemented by their trained employees. The means or methods for evaluating the training should be developed along with the training program goals and objectives. Training program evaluation will help employers to determine the amount of training their

employees understood, and whether the desired results were obtained. If, after the evaluation, it appears that the trained employees are not at the level of knowledge and skill that was expected, the employer will need to revise the training program, provide retraining, or provide more frequent refresher training sessions until the deficiency is resolved. Those who conducted the training and those who received the training should also be consulted as to how best to improve the training process. If there is a language barrier, the language known to the trainees should be used to reinforce the training messages and information.

Careful consideration must be given to assure that employees including maintenance and contract employees receive current and updated training. For example, if changes are made to a process, impacted employees must be trained in the changes and understand the effects of the changes on their job tasks (e.g., any new operating procedures pertinent to their tasks). Additionally, as already discussed the evaluation of the employee's absorption of training will certainly influence the need for training.

MECHANICAL INTEGRITY

Employers will need to review their maintenance programs and schedules to see if there are areas where "breakdown" maintenance is used rather than an on-going mechanical integrity program. Equipment used to process, store, or handle highly hazardous chemicals needs to be designed, constructed, installed and maintained to minimize the risk of releases of such chemicals. This requires that a mechanical integrity program be in place to assure the continued integrity of process equipment.

Elements of a mechanical integrity program include the identification and categorization of equipment and instrumentation, inspections and tests, testing and inspection frequencies, development of maintenance procedures, training of maintenance personnel, the establishment of criteria for acceptable test results, documentation of test and inspection results, and documentation of manufacturer recommendations as to meantime to failure for equipment and instrumentation.

The first line of defense an employer has available is to operate and maintain the process as designed, and to keep the chemicals contained. This line of defense is backed up by the next line of defense which is the controlled release of chemicals through venting to scrubbers or flares, or to surge or overflow tanks which are designed to receive such chemicals, etc. These lines of defense are the primary lines of defense or means to prevent unwanted releases. The secondary lines of defense would include fixed fire protection systems like sprinklers, water spray, or deluge systems, monitor guns, etc., dikes, designed drainage systems, and other systems which would control or mitigate hazardous chemicals once an unwanted release occurs. These primary and secondary lines of defense are what the mechanical integrity program needs to protect and strengthen these primary and secondary lines of defenses where appropriate.

The first step of an effective mechanical integrity program is to compile and categorize a list of process equipment and instrumentation for inclusion in the program. This list would include pressure vessels, storage tanks, process piping, relief and vent systems, fire protection system components, emergency shutdown systems and alarms and interlocks and pumps. For the categorization of instrumentation and the listed equipment the employer would prioritize which pieces of equipment require closer scrutiny than others.

Meantime to failure of various instrumentation and equipment parts would be known from the manufacturer's data or the employer's experience with the parts, which would then influence the inspection and testing frequency and associated procedures. Also, applicable codes and standards such as the National

Board Inspection Code, or those from the American Society for Testing and Material, American Petroleum Institute, National Fire Protection Association, American National Standards Institute, American Society of Mechanical Engineers, and other groups, provide information to help establish an effective testing and inspection frequency, as well as appropriate methodologies.

The applicable codes and standards provide criteria for external inspections for such items as foundation and supports, anchor bolts, concrete or steel supports, guy wires, nozzles and sprinklers, pipe hangers, grounding connections, protective coatings and insulation, and external metal surfaces of piping and vessels, etc. These codes and standards also provide information on methodologies for internal inspection, and a frequency formula based on the corrosion rate of the materials of construction. Also, erosion both internal and external needs to be considered along with corrosion effects for piping and valves. Where the corrosion rate is not known, a maximum inspection frequency is recommended, and methods of developing the corrosion rate are available in the codes. Internal inspections need to cover items such as vessel shell, bottom and head; metallic linings; nonmetallic linings; thickness measurements for vessels and piping; inspection for erosion, corrosion, cracking and bulges; internal equipment like trays, baffles, sensors and screens for erosion, corrosion or cracking and other deficiencies. Some of these inspections may be performed by state or local government inspectors under state and local statutes. However, each employer needs to develop procedures to ensure that tests and inspections are conducted properly and that consistency is maintained even where different employees may be involved. Appropriate training is to be provided to maintenance personnel to ensure that they understand the preventive maintenance program procedures, safe practices, and the proper use and application of special equipment or unique tools that may be required. This training is part of the overall training program called for in the standard.

A quality assurance system is needed to help ensure that the proper materials of construction are used, that fabrication and inspection procedures are proper, and that installation procedures recognize field installation concerns. The quality assurance program is an essential part of the mechanical integrity program and will help to maintain the primary and secondary lines of defense that have been designed into the process to prevent unwanted chemical releases or those which control or mitigate a release. "As built" drawings, together with certifications of coded vessels and other equipment, and materials of construction need to be verified and retained in the quality assurance documentation.

Equipment installation jobs need to be properly inspected in the field for use of proper materials and procedures and to assure that qualified craftsmen are used to do the job. The use of appropriate gaskets, packing, bolts, valves, lubricants and welding rods need to be verified in the field. Also, procedures for installation of safety devices need to be verified, such as the torque on the bolts on ruptured disc installations, uniform torque on flange bolts, proper installation of pump seals, etc. If the quality of parts is a problem, it may be appropriate to conduct audits of the equipment supplier's facilities to better assure proper purchases of required equipment which is suitable for its intended service. Any changes in equipment that may become necessary will need to go through the management of change procedures.

MANAGEMENT OF CHANGE

To properly manage changes to process chemicals, technology, equipment and facilities, one must define what is meant by change. In this process safety management standard, change includes all modifications to equipment, procedures, raw materials and processing conditions other than "replacement in kind." These changes need to be properly managed by identifying and reviewing them prior to implementation of the change. For example, the operating procedures contain the operating parameters (pressure limits,

temperature ranges, flow rates, etc.) and the importance of operating within these limits. While the operator must have the flexibility to maintain safe operation within the established parameters, any operation outside of these parameters requires review and approval by a written management of change procedure. Management of change covers changes in process technology and changes to equipment and instrumentation. Changes in process technology can result from changes in production rates, raw materials, experimentation, equipment unavailability, new equipment, new product development, change in catalyst and changes in operating conditions to improve yield or quality. Equipment changes include among others change in materials of construction, equipment specifications, piping pre-arrangements, experimental equipment, computer program revisions and changes in alarms and interlocks. Employers need to establish means and methods to detect both technical changes and mechanical changes.

Temporary changes have caused a number of catastrophes over the years, and employers need to establish ways to detect temporary changes as well as those that are permanent. It is important that a time limit for temporary changes be established and monitored since, without control, these changes may tend to become permanent. Temporary changes are subject to the management of change provisions. In addition, the management of change procedures are used to insure that the equipment and procedures are returned to their original or designed conditions at the end of the temporary change. Proper documentation and review of these changes is invaluable in assuring that the safety and health considerations are being incorporated into the operating procedures and the process. Employers may wish to develop a form or clearance sheet to facilitate the processing of changes through the management of change procedures. A typical change form may include a description and the purpose of the change, the technical basis for the change, safety and health considerations, documentation of changes for the operating procedures, maintenance procedures, inspection and testing, P&IDS, electrical classification, training and communications, pre-startup inspection, duration if a temporary change, approvals and authorization. Where the impact of the change is minor and well understood, a check list reviewed by an authorized person with proper communication to others who are affected may be sufficient.

However, for a more complex or significant design change, a hazard evaluation procedure with approvals by operations, maintenance, and safety departments may be appropriate. Changes in documents such as P&IDS, raw materials, operating procedures, mechanical integrity programs, electrical classifications, etc., need to be noted so that these revisions can be made permanent when the drawings and procedure manuals are updated. Copies of process changes need to be kept in an accessible location to ensure that design changes are available to operating personnel as well as to PHA team members when a PHA is being done or one is being updated.

PRE-STARTUP REVIEW

For new processes, the employer will find a PHA helpful in improving the design and construction of the process from a reliability and quality point of view. The safe operation of the new process will be enhanced by making use of the PHA recommendations before final installations are completed. P&IDs are to be completed along with having the operating procedures in place and the operating staff trained to run the process before startup. The initial startup procedures and normal operating procedures need to be fully evaluated as part of the pre-startup review to assure a safe transfer into the normal operating mode for meeting the process parameters.

For existing processes that have been shutdown for turnaround, or modification, etc., the employer must assure that any changes other than "replacement in kind" made to the process during shutdown go through

the management of change procedures. P&IDS will need to be updated as necessary, as well as operating procedures and instructions. If the changes made to the process during shutdown are significant and impact the training program, then operating personnel as well as employees engaged in routine and non-routine work in the process area may need some refresher or additional training in light of the changes. Any incident investigation recommendations, compliance audits or PHA recommendations need to be reviewed as well to see what impacts they may have on the process before beginning the startup.

COMPLIANCE AUDITS

Employers need to select a trained individual or assemble a trained team of people to audit the process safety management system and program. A small process or plant may need only one knowledgeable person to conduct an audit. The audit is to include an evaluation of the design and effectiveness of the process safety management system and a field inspection of the safety and health conditions and practices to verify that the employer's systems are effectively implemented. The audit should be conducted or led by a person knowledgeable in audit techniques and who is impartial towards the facility or area being audited. The essential elements of an audit program include planning, staffing, conducting the audit, evaluation and corrective action, follow-up and documentation.

Planning in advance is essential to the success of the auditing process. Each employer needs to establish the format, staffing, scheduling and verification methods prior to conducting the audit. The format should be designed to provide the lead auditor with a procedure or checklist which details the requirements of each section of the standard. The names of the audit team members should be listed as part of the format as well. The checklist, if properly designed, could serve as the verification sheet which provides the auditor with the necessary information to expedite the review and assure that no requirements of the standard are omitted. This verification sheet format could also identify those elements that will require evaluation or a response to correct deficiencies. This sheet could also be used for developing the follow-up and documentation requirements.

The selection of effective audit team members is critical to the success of the program. Team members should be chosen for their experience, knowledge, and training and should be familiar with the processes and with auditing techniques, practices and procedures. The size of the team will vary depending on the size and complexity of the process under consideration. For a large, complex, highly instrumented plant, it may be desirable to have team members with expertise in process engineering and design, process chemistry, instrumentation and computer controls, electrical hazards and classifications, safety and health disciplines, maintenance, emergency preparedness, warehousing or shipping, and process safety auditing. The team may use part-time members to provide for the depth of expertise required as well as for what is actually done or followed, compared to what is written.

An effective audit includes a review of the relevant documentation and process safety information, inspection of the physical facilities, and interviews with all levels of plant personnel. Using the audit procedure and checklist developed in the preplanning stage, the audit team can systematically analyze compliance with the provisions of the standard and any other corporate policies that are relevant. For example, the audit team will review all aspects of the training program as part of the overall audit. The team will review the written training program for adequacy of content, frequency of training, effectiveness of training in terms of its goals and objectives as well as to how it fits into meeting the standard's requirements, documentation, etc. Through interviews, the team can determine the employee's knowledge and awareness of the safety procedures, duties, rules, emergency response assignments, etc. During the

inspection, the team can observe actual practices such as safety and health policies, procedures, and work authorization practices. This approach enables the team to identify deficiencies and determine where corrective actions or improvements are necessary.

An audit is a technique used to gather sufficient facts and information, including statistical information, to verify compliance with standards. Auditors should select as part of their preplanning a sample size sufficient to give a degree of confidence that the audit reflects the level of compliance with the standard. The audit team, through this systematic analysis, should document areas which require corrective action as well as those areas where the process safety management system is effective and working in an effective manner. This provides a record of the audit procedures and findings, and serves as a baseline of operation data for future audits. It will assist future auditors in determining changes or trends from previous audits.

Corrective action is one of the most important parts of the audit. It includes not only addressing the identified deficiencies, but also planning, follow up, and documentation. The corrective action process normally begins with a management review of the audit findings. The purpose of this review is to determine what actions are appropriate, and to establish priorities, timetables, resource allocations and requirements and responsibilities. In some cases, corrective action may involve a simple change in procedure or minor maintenance effort to remedy the concern. Management of change procedures need to be used, as appropriate, even for what may seem to be a minor change. Many of the deficiencies can be acted on promptly, while some may require engineering studies or in-depth review of actual procedures and practices. There may be instances where no action is necessary and this is a valid response to an audit finding. All actions taken, including an explanation where no action is taken on a finding, needs to be documented as to what was done and why.

It is important to assure that each deficiency identified is addressed, the corrective action to be taken noted, and the audit person or team responsible be properly documented by the employer.

To control the corrective action process, the employer should consider the use of a tracking system. This tracking system might include periodic status reports shared with affected levels of management, specific reports such as completion of an engineering study, and a final implementation report to provide closure for audit findings that have been through management of change, if appropriate, and then shared with affected employees and management. This type of tracking system provides the employer with the status of the corrective action. It also provides the documentation required to verify that appropriate corrective actions were taken on deficiencies identified in the audit.

INCIDENT INVESTIGATION

Incident investigation is the process of identifying the underlying causes of incidents and implementing steps to prevent similar events from occurring. The intent of an incident investigation is for employers to learn from past experiences and thus avoid repeating past mistakes. Some of the events are sometimes referred to as "near misses," meaning that a serious consequence did not occur, but could have.

Employers need to develop in-house capability to investigate incidents that occur in their facilities. A team needs to be assembled by the employer and trained in the techniques of investigation including how to conduct interviews of witnesses, needed documentation and report writing. A multi-disciplinary team is better able to gather the facts of the event and to analyze them and develop plausible scenarios as to what

happened, and why. Team members should be selected on the basis of their training, knowledge and ability to contribute to a team effort to fully investigate the incident.

Employees in the process area where the incident occurred should be consulted, interviewed or made a member of the team. Their knowledge of the events form a significant set of facts about the incident which occurred. The report, its findings and recommendations are to be shared with those who can benefit from the information. The cooperation of employees is essential to an effective incident investigation. The focus of the investigation should be to obtain facts, and not to place blame. The team and the investigation process should clearly deal with all involved individuals in a fair, open and consistent manner.

EMPLOYEE PARTICIPATION

Section 304 of the Clean Air Act Amendments states that employers are to consult with their employees and their representatives regarding the employers efforts in the development and implementation of the process safety management program elements and hazard assessments. Section 304 also requires employers to train and educate their employees and to inform affected employees of the findings from incident investigations required by the process safety management program. Many employers, under their safety and health programs, have already established means and methods to keep employees and their representatives informed about relevant safety and health issues and employers may be able to adapt these practices and procedures to meet their obligations under this standard. Employers who have not implemented an occupational safety and health program may wish to form a safety and health committee of employees and management representatives to help the employer meet the obligations specified by this standard. These committees can become a significant ally in helping the employer to implement and maintain an effective process safety management program for all employees.

HOT WORK PERMIT

Non-routine work which is conducted in process areas needs to be controlled by the employer in a consistent manner. The hazards identified involving the work that is to be accomplished must be communicated to those doing the work, but also to those operating personnel whose work could affect the safety of the process. A work authorization notice or permit must have a procedure that describes the steps the maintenance supervisor, contractor representative or other person needs to follow to obtain the necessary clearance to get the job started. The work authorization procedures need to reference and coordinate, as applicable, lockout/tagout procedures, line breaking procedures, confined space entry procedures and hot work authorizations. This procedure also needs to provide clear steps to follow once the job is completed to provide closure for those that need to know the job is now completed and equipment can be returned to normal.

CONTRACTORS

Employers who use contractors to perform work in and around processes that involve highly hazardous chemicals, will need to establish a screening process so that they hire and use contractors who accomplish the desired job tasks without compromising the safety and health of employees at a facility. For contractors, whose safety performance on the job is not known to the hiring employer, the employer will need to obtain information on injury and illness rates and experience and should obtain contractor references. Additionally, the employer must assure that the contractor has the appropriate job skills, knowledge and certifications (such as for pressure vessel welders). Contractor work methods and

experiences should be evaluated. For example, does the contractor conducting demolition work swing loads over operating processes or does the contractor avoid such hazards?

Contract employees must perform their work safely. Considering that contractors often perform very specialized and potentially hazardous tasks such as confined space entry activities and non-routine repair activities it is quite important that their activities be controlled while they are working on or near a covered process. A permit system or work authorization system for these activities would also be helpful to all affected employers. The use of a work authorization system keeps an employer informed of contract employee activities, and as a benefit the employer will have better coordination and more management control over the work being performed in the process area. A well run and well maintained process where employee safety is fully recognized will benefit all of those who work in the facility whether they be contract employees or employees of the owner.