
Environmental Guidance



CHEMICAL ACCIDENT PREVENTION and RISK MANAGEMENT PLANNING UNDER THE CLEAN AIR ACT

RMP Compliance Guidance for DOE Installations

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CHEMICAL ACCIDENT PREVENTION and RISK MANAGEMENT PLANNING UNDER the CLEAN AIR ACT -- RMP Compliance Guidance for DOE Installations

1 INTRODUCTION

Under the Clean Air Act ("the Act"), the U.S. Environmental Protection Agency ("EPA") has adopted regulations to help prevent accidental releases of hazardous chemicals that have the potential to affect public health and the environment. On May 24, 1996, EPA issued regulations establishing risk management planning requirements for facilities that handle, use, produce, or store acutely hazardous substances.¹ These requirements are applicable to federal facilities and risk management plans are required to be filed for covered installations on or before June 21, 1999 (See 68.10(a)).

The purpose of this guidance is to set out the requirements for risk management planning, and to explain their interaction with other programs such as the program for process safety management administered by the Occupational Safety and Health Administration ("OSHA"). It is intended to provide the legislative and regulatory foundation for understanding the requirements of the EPA Risk Management Plan (RMP) rule. With this understanding, along with the referenced EPA and other compliance guidance resources, it is hoped that this document will serve to aid the DOE installations in taking the necessary first steps in complying with the RMP rule. This guidance report is not intended to serve as a comprehensive RMP compliance document. Instead, it provides specific tools to aid the overall compliance effort for specific installations covered by the rule.

This guidance sets out the regulatory programs in detail and their implications for Department of Energy ("DOE") facilities. Section 2 outlines the major regulatory requirements under section 112(r) of the Act, as well as other regulatory requirements with which the risk management provisions interact. Section 3 is a review of the risk management planning program contained in the RMP rule, including the details necessary to determining the rule's program level and the requirements for each level. Finally, Section 4 is intended to serve as a guide, in checklist/data-form, to aid in the RMP applicability determination and documentation. Since the greatest interest is the rule's compliance requirements on DOE installations, these requirements are highlighted throughout.

2 OVERVIEW OF THE PROGRAMS

Before elaborating on the requirements of EPA's risk management regulations, it will be helpful to set them into context by identifying the regulatory background and the other provisions that will need to be considered by facilities in their compliance planning.

¹ Regulations for the risk management planning program were first proposed on October 20, 1993, at 58 Fed.Reg. 54,190, repropoed with changes on February 28, 1995, 60 Fed.Reg. 13,526 (Mar. 13, 1995), and issued in final on May 24, 1996, 61 Fed.Reg. 31,668 (Jun. 20, 1996).

2.1 BACKGROUND

Prior to 1990, a number of federal programs were created to deal with emergency response planning, such as the Emergency Planning and Community Right-to-Know Act. However, none of these required facilities to establish accident prevention programs.

Congress filled this gap in 1990. In Title III of the Clean Air Act Amendments Congress established two separate programs to cover accidental or catastrophic releases of air toxics.² Though they apply to the safety hazard protection of different population groups (worker vs. public), both programs are designed with emphasis on accident prevention and the elimination of fatalities and/or serious injury from accidental or catastrophic events.

The occupational program. In addition to making amendments to the Clean Air Act itself, Section 304 of the 1990 Clean Air Act Amendments also mandated that regulations be issued under the Occupational Safety and Health Act. This mandate required the Secretary of Labor to set up a program administered by OSHA to prevent accidental releases of chemicals that could pose a threat to employees in the workplace. The program, which covers "on-site" exposures, is known as the Process Safety Management ("PSM") program.

The public (non-occupational) program. Congress also created a parallel program for "off-site" consequences of accidental releases that is designed to prevent events that can cause death, injury or serious adverse effects to human health and the environment. Section 112(r) of the Act establishes a list of substances that are most hazardous in case of an accidental release. It requires the identification of substances present above specified thresholds and the preparation of risk management plans ("RMPs") that include hazard assessments and prevention and response programs. This program is administered by the EPA.

This report reviews these two programs and provides specific guidance on the risk management planning for compliance with the public RMP program. Because the occupational program has come into effect first, and because compliance with its provisions at a specific source will in many cases make additional actions under the RMP rule unnecessary, we discuss it here first.

2.2 OVERVIEW OF THE OSHA PSM PROVISIONS

The PSM program at OSHA establishes standards to prevent on-site occupational exposures to accidental releases of toxic, reactive, and flammable substances that could pose a threat to employees.

² Title III consists of a replacement to the old section 112, as well as provisions addressing other sections of the Clean Air Act and requirements of the Occupational Safety and Health Act of 1970, Pub.L. 91-596, Dec. 29, 1970, 84 Stat. 1590, as amended, codified principally at chapter 15 (section 651 et seq.) of Title 29, Labor, and the Solid Waste Disposal Act, Title II of Pub.L. 89-272, Oct. 20, 1965, 79 Stat. 997, as amended generally by Pub.L. 94-580, § 2, Oct. 21, 1976, 90 Stat. 2795. The 1970 Act contained three titles — for stationary sources, moving sources, and general provisions. The 1990 Amendments contained eleven titles, but only added three new titles to the codified law — for acid precipitation (Title IV), permits (Title V), and stratospheric ozone protection (Title VI). Thus the Clean Air Act now contains six titles. Title III of the 1990 Amendments is identical to Section 112 of the Act, as amended.

For general information on the OSHA PSM program, call 202-219-8031 or check the INTERNET at <http://www.osha-slc.gov/SLTC/ProcessSafetyManagement/index.html>. For information on OSHA standards, call Joanne Slattery at 202-219-7225, and for the OSHA PSM coordinator call Mike Marshall at 202-219-8118 ext. 12.

2.2.1 Regulations for Chemical Process Safety Management

Section 304(a) of the 1990 Amendments required the Secretary of Labor to promulgate chemical process safety standards under 29 U.S.C. § 653 by November 15, 1991.³ The OSHA PSM rules were issued on February 24, 1992,⁴ predating EPA's risk management planning requirements by more than four years. The purpose of the rules, which were codified at 29 CFR § 1910.119, was to eliminate the incidence of and mitigate the consequences of highly hazardous chemical releases that expose employees to the hazards of toxic, reactive, flammable or explosive chemicals.

The PSM rules are performance-based, that is, they do not prescribe the means by which its elements will be implemented. It is therefore necessary for individual facilities to conduct certain analyses, the minimum requirements for which are set out below, to determine what steps are necessary for its own compliance.

DOE has made its facilities subject to these regulations.⁵ To assist DOE facilities in this exercise,⁶ DOE EH-53 has produced a guidance handbook for PSM compliance entitled [Process Safety Management for Highly Hazardous Chemicals](#) (Report No. 1101.96, Feb. 1996), as well as

³ OSHA already had established regulations on hazardous chemicals under 29 CFR § 1910.1200, but these focused on routine or daily exposures or emergencies, rather than large, catastrophic accidental releases. In addition, OSHA has standards in 29 CFR Part 1910, Subpart H that address flammable and explosive materials, but these do not address toxicity. Beyond these provisions, OSHA depended on the "general duty clause," section 5(a)(1) of the Occupational Safety and Health Act to protect employees and relied on national consensus standards and industry standards to support these general duty provisions. However, evidence of chemical accidents had demonstrated the need for standard, and OSHA published a proposal for additional chemical safety standards at 55 Fed.Reg. 29,150 (Jul. 17, 1990), prior to enactment of the Clean Air Act Amendments of 1990. With this latter enactment, Congress specified the minimum terms for an OSHA rule.

⁴ The rules were issued under authority of the Occupational Safety and Health Act (OSHA), §§ 4, 6 and 8, 29 U.S.C. §§ 653, 655 and 657. In particular, section 6(b) of the OSHA authorizes the Secretary of Labor to issue rules to promulgate, modify or revoke any occupational safety and health standard. The OSHA rules were published at 57 Fed.Reg. 6356 (Feb. 24, 1992), codified at 29 CFR § 1910.119. The purpose stated for the rules was to prevent or minimize the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals that may cause hazardous conditions. Under 29 CFR § 1910.119(a)(2) the rules are not applicable to retail facilities, oil or gas well drilling or servicing operations, or normally unoccupied remote facilities. Also, the rules apply strictly to manufacture, and not to storage of the substances; other OSHA regulations apply to storage. After the rules at 29 CFR § 1910.119 were published, they were republished in 29 C.F.R. § 1926.64 as construction standards. The language of the two PSM rules are identical.

⁵ Section 4(b)(1) of the OSHA exempts DOE facilities from these regulations. However, the PSM rules have been made applicable to DOE facilities because of DOE Directives 5480.4 and 440.1. See National Academy of Public Administration, "Ensuring Worker Safety and Health Across the DOE Complex," available on the INTERNET at <http://tis-nt.eh.doe.gov/extreg/napa/>.

⁶ The Atomic Energy Act of 1954, together with the OSHA of 1970, vest DOE with the authority to regulate occupational safety and health at its facilities.

technical support and assistance.

2.2.2 List of Highly Hazardous Chemicals

Under section 304(b) of the 1990 Amendments the Secretary of Labor was required to include a list of highly hazardous chemicals as part of its standards, including toxic, flammable, highly reactive and explosive substances, and those listed by EPA under section 302 of the Emergency Planning and Community Right-to-Know Act ("EPCRA").⁷ The final OSHA list anticipated many of the substances that EPA would list under Section 112(r).

Under 29 CFR § 1910.119(a)(1) the PSM rules are applicable to processes⁸ that involve either of two classes of chemicals:

- (i) Substances listed in 29 CFR § 1910.119. In compliance with section 304(b) of the 1990 Amendments, the PSM rules listed 135 hazardous toxic and reactive substances and their thresholds in 29 CFR § 1910.119, Appendix A.⁹ The PSM rules apply to any process that involves a chemical at or above the specified threshold quantities listed in OSHA's Appendix A.
- (ii) Flammable liquids and gases. In addition to the substances on the Appendix A list, the PSM rules are also applicable to any process that involves a flammable liquid or gas, as defined in § 1910.1200(c), on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more.¹⁰

2.2.3 Elements of the PSM Standard

Section 304(c) of the 1990 Amendments lists fourteen elements that must be contained in the OSHA chemical process safety standards. These require that at minimum employers must:

- (1) Develop and maintain written safety information identifying workplace chemical and

⁷ The Emergency Planning and Community Right-to-Know Act of 1986 was enacted as Title III of the Superfund Amendments and Reauthorization Act ("SARA"), Pub. L. 99-499, Oct. 17, 1986, 100 Stat. 1728, which amended the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA" or "Superfund"), codified at 42 U.S.C. 9600 et seq.

⁸ "Process" is defined by 29 CFR § 1910.119(b) as follows: *Process means any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or combination of these activities. For purposes of this definition, any group of vessels which are interconnected and separate vessels which are located such that a highly hazardous chemical could be involved in a potential release shall be considered a single process.*

⁹ "Appendix A to § 1910.119 -- List of Highly Hazardous Chemicals, Toxics and Reactives," promulgated as part of the PSM regulations at 57 Fed.Reg. 6356 (Feb. 24, 1992). Appendix A lists toxic and reactive highly hazardous chemicals that present a potential for a catastrophic event at or above the threshold quantity. The Appendix A list is available on the INTERNET at http://www.osha-slc.gov/OshStd_data/1910_0119_APP_A.html.

¹⁰ The PSM rules provide exceptions for: (A) hydrocarbon fuels used solely for workplace consumption as a fuel (e.g., propane used for comfort heating, gasoline for vehicle refueling), if such fuels are not a part of a process containing another highly hazardous chemical covered by this standard; (B) flammable liquids stored in atmospheric tanks or transferred which are kept below their normal boiling point without benefit of chilling or refrigeration.

- process hazards, equipment used in the processes, and technology used in the processes;
- (2) Perform a workplace hazard assessment, including, as appropriate, identification of potential sources of accidental releases, an identification of any previous release within the facility which had a likely potential for catastrophic consequences in the workplace, estimation of workplace effects of a range of releases, estimation of the health and safety effects of such range on employees;
 - (3) Consult with employees and their representatives on the development and conduct of hazard assessments and the development of chemical accident prevention plans and provide access to these and other records required under the standard;
 - (4) Establish a system to respond to the workplace hazard assessment findings, which shall address prevention, mitigation, and emergency responses;
 - (5) Periodically review the workplace hazard assessment and response system;
 - (6) Develop and implement written operating procedures for the chemical process including procedures for each operating phase, operating limitations, and safety and health considerations;
 - (7) Provide written safety and operating information to employees and train employees in operating procedures, emphasizing hazards and safe practices;
 - (8) Ensure contractors and contract employees are provided appropriate information and training;
 - (9) Train and educate employees and contractors in emergency response in a manner as comprehensive and effective as that required by the regulation promulgated pursuant to section 126(d) of the Superfund Amendments and Reauthorization Act;
 - (10) Establish a quality assurance program to ensure that initial process related equipment, maintenance materials, and spare parts are fabricated and installed consistent with design specifications;
 - (11) Establish maintenance systems for critical process related equipment including written procedures, employee training, appropriate inspections, and testing of such equipment to ensure ongoing mechanical integrity;
 - (12) Conduct pre-start-up safety reviews of all newly installed or modified equipment;
 - (13) Establish and implement written procedures to manage change to process chemicals, technology, equipment and facilities; and
 - (14) Investigate every incident which results in or could have resulted in a major accident in the workplace, with any findings to be reviewed by operating personnel and modifications made if appropriate.

These fourteen elements state the basic requirements of the PSM program.

To comply with the requirements of the PSM program many sources have already inventoried the hazardous and flammable substances produced in processes at their facilities, conducted hazard assessments to determine the risks associated with their processes, and

implemented required risk reduction procedures. These accomplishments will be important for consideration in the implementation of the EPA risk management planning program rules.

2.3 OVERVIEW OF THE EPA RMP PROVISIONS

As a counterpart to the OSHA program, which is intended for on-site impacts of accidental releases, Congress also established the separate risk management planning program under Section 112(r) of the Act to cover off-site consequences of accidental releases. Under section 112(r)(2)(A), an "accidental release" is defined as "an unanticipated emission of a regulated substance or other extremely hazardous substance into the ambient air from a stationary source."¹¹ Congress intended these provisions "to prevent the accidental release and minimize the consequences of any such release" of certain listed substances or any other extremely hazardous substance.¹²

The program established under 112(r) of the Act contains three programmatic elements:

- Substances and threshold quantities. Section 112(r)(3) requires EPA to establish a list of substances that are most hazardous in case of an accidental release. EPA has identified certain substances called regulated substances that pose the greatest risk to the public and the environment.¹³
- The "general duty clause". Under section 112(r)(1) of the Act, the owners and operators of stationary sources producing, processing, handling or storing regulated substances or any other extremely hazardous substance have a general duty to identify hazards that may result from accidental releases (or any other extremely hazardous substance), design and maintain safe facilities, and minimize the consequences of releases which do occur.
- Specific duties. Stationary sources that have regulated substances above threshold quantities are required to conduct a set of planning exercises, including hazard assessments and RMPs to identify the substances present, prevent releases, and provide quick response to them. The risk management planning program was intended by Congress to complement and support EPCRA by making information available to the public on chemical risk and ways to reduce it.¹⁴

¹¹ Section 112(r)(2)(A) of the Act is codified verbatim in EPA regulations at 40 CFR § 68.3. Under section 112(r)(2)(B), "regulated substance" means a substance listed under section 112(r)(3). Under section 112(r)(2)(C), "stationary source" means "any buildings, structures, equipment, installations or substance emitting stationary activities (i) which belong to the same industrial group, (ii) which are located on one or more contiguous properties, (iii) which are under the control of the same person (or persons under common control), and (iv) from which an actual release may occur." [EPA regulations at 40 CFR § 68.3 add additional provisions relating to transportation facilities.]

¹² The Clean Air Act § 112(r)(1), 42 U.S.C. § 7412(r)(1).

¹³ 61 Fed.Reg. at 31,669 (Jun. 20, 1996).

¹⁴ Under section 112(r)(7)(C) the EPA regulations must also be consistent with recommendations and standards established by the ASME, ANSI, or ASTM, and must take into consideration the concerns of small business. Under section 112(r)(7)(D) EPA must consult with the Departments of Labor and Transportation.

These three elements are implemented in EPA regulations codified in 40 CFR Part 68.¹⁵ EPA estimates that after adoption of its regulations 66,000 facilities will be covered by the risk management planning rules, including chemical manufacturers, other manufacturers, certain wholesalers and retailers, drinking water systems, wastewater treatment works, ammonia refrigeration systems, utilities and federal facilities. This guidance is to provide information for compliance by DOE facilities, which is required by section 112 of the Act.¹⁶

The three risk management program elements are set out below. The elements are presented in summary form, and the status of program development is given to indicate where the program stands now.

2.3.1 List of Regulated Substances and Threshold Quantities

Section 112(r)(3) of the Act required EPA to establish a list of at least 100 "regulated substances" that in the case of accidental release could cause death, injury or serious adverse effects to human health and the environment.¹⁷ The list was intended to identify the substances that pose the greatest risk of causing adverse effects from accidental releases. Section 112(r)(3) named sixteen substances that must appear on the EPA list.¹⁸ The rest were to be selected by EPA according to criteria set out in section 112(r)(4) of the Act.¹⁹ The 112(r)(3) list was intended to be distinct from both the list of hazardous air pollutants under section 112(b)(1) and that established by OSHA for the PSM program.

Under section 112(r)(5) EPA was also required to assign a threshold quantity for each regulated substance which, as a result of an accidental release, is known or may reasonably be anticipated to cause death, injury or serious adverse effects to human health. EPA set the threshold for each regulated substance based on its toxicity, reactivity, volatility, dispersibility,

¹⁵ Unlike other programs under the Clean Air Act, the risk management planning program is organized within the EPA Office of Solid Waste and Emergency Response ("OSWER"). The Chemical Emergency Preparedness and Prevention Office is the lead office for the program within OSWER. To coordinate with others within EPA, the rules for the program were written by an inter-office work group that included representatives of the EPA Office of Air and Radiation.

¹⁶ Compliance with the Act by federal facilities is required by section 112 of the Act, 42 U.S.C. § 7418.

¹⁷ It should be noted that "extremely hazardous substances" are not the same as "regulated substances," nor are they necessarily limited to EPCRA. According to EPA's interpretation of the legislative history, an extremely hazardous substance is just that. It is a term which Congress used loosely in section 112(r) — it could mean anything. The term does not have a regulatory meaning. Interview with Craig Matthiessen, EPA, Oct. 3, 1996.

¹⁸ Section 112(r)(3) states, "The initial list shall include chlorine, anhydrous ammonia, methyl chloride, ethylene oxide, vinyl chloride, methyl isocyanate, hydrogen cyanide, ammonia, hydrogen sulfide, toluene diisocyanate, phosgene, bromine, anhydrous hydrogen chloride, hydrogen fluoride, anhydrous sulfur dioxide, and sulfur trioxide."

¹⁹ Section 112(r)(4) requires that in listing substances under paragraph (3), EPA shall consider (A) the severity of any acute adverse health effects, (B) the likelihood of accidental releases, and (C) the potential magnitude of human exposure resulting from accidental releases of a substance. Nothing in Title III of the 1990 Amendments expressly limits the substances listed under section 112(r)(3) to those substances that are already on the section 112(b)(1) list, and listing a substance on other lists under Title III does not affect the (b)(1) list. However, section 112(r)(3) does limit eligibility in other ways: no pollutant for which a national ambient air quality standard has been established under Sections 108 and 109 of the Act, or which is regulated under Title VI of the Act, may be listed as a regulated substance under 112(r)(3).

combustibility or flammability, and the quantity known or anticipated to cause effects of concern. Threshold quantities range from 500 to 20,000 pounds.

EPA issued its list on January 14, 1994 (the "List Rule").²⁰ Initially, this list included substances and their threshold quantities in three categories — toxic, flammable, and explosive substances. EPA has since deleted the category of explosives,²¹ leaving the following two categories of regulated substances:

Toxic substances. EPA listed 77 toxic substances, with threshold quantities ranging from 500 to 20,000 pounds. For a few of these substances that are commonly handled in solution with water EPA has established minimum regulated concentrations for mixtures with water.²²

On August 19, 1997, EPA issued amendments to the List Rule that vacated the listing for hydrochloric acid solutions with less than 37 percent concentrations of hydrogen chloride.²³ Hydrochloric acid was previously listed at concentrations of 30 percent or greater.

This amendment does not change the existing listing and threshold for all other regulated substances, including hydrochloric acid solutions with 37 percent or greater concentrations and the listing and threshold for anhydrous hydrogen chloride. These are unaffected by the amendment.

Flammable substances. EPA listed 63 flammable gases and volatile flammable liquids, with threshold quantities all at 10,000 pounds.

On December 18, 1997, EPA issued amendments to the List Rule to clarify that its rules do not apply to several types of processes and sources so that it could focus its efforts on sources

²⁰ 59 Fed.Reg. 4478 (Jan. 31, 1994). The list of substances is codified in EPA regulations at 40 CFR § 68.130.

The toxic endpoints appear in Appendix A to Part 68. EPA's rules also specify the requirements for petitions to the Agency to add substances to, or delete substances from, the List of Substances.

²¹ EPA listed all Division 1.1 high explosive substances listed by the U.S. Department of Transportation ("DOT"), with threshold quantities all at 5,000 pounds. EPA deleted the category of Division 1.1 explosives from the list of regulated substances under 40 CFR § 68.130; however, toxic and flammable substances continue to be listed as regulated substances. To accomplish this, EPA removed paragraph (a) from 40 CFR § 68.130 and redesignated paragraph (b) as (a) and (c) as (b). EPA expressed its belief that regulations and practices already in place, such as those adopted by the IME, are adequate to protect the public and the environment from the hazards involving explosives.

²² Two special cases are noted. First, lead is not listed as a regulated substance. Second, four chemicals are given concentrations for mixtures with water, called "concentration qualifiers." These are ammonia (20 percent or greater), hydrogen chloride/hydrochloric acid (37 percent or greater), hydrogen fluoride/hydrofluoric acid (50 percent or greater), and nitric acid (80 percent or greater). EPA also included separate listings for anhydrous forms of ammonia and hydrogen chloride. These are listed as additional listings in 40 CFR § 68.130, Tables 1 and 2.

²³ On April 7, 1997, EPA proposed a settlement of the case with General Electric Company in American Petroleum Institute v. EPA, No. 94-1273 (D.C. Cir.) and consolidated cases, which it made available for public comment at 62 Fed.Reg. 20,007 (Apr. 24, 1997). As a result of the settlement, EPA proposed amendments to the List Rule on May 16, 1997. 62 Fed.Reg. 27,992 (May 22, 1997). The final rule appeared at 62 Fed.Reg. 45,130 (Aug. 25, 1997). On the same day EPA issued interpretive rule to clarify provisions at 62 Fed.Reg. 45,133 (Aug. 25, 1997).

with the most hazardous operations and reduce duplication with other requirements.²⁴ To accomplish this, EPA made two changes regarding regulated flammable substances:

- EPA exempted from threshold determination flammable substances in gasoline used as a fuel for internal combustion engines and regulated substances in naturally occurring hydrocarbon mixtures (including natural gas, condensate, crude oil, field gas, and produced water) at a processing plant or refinery prior to initial processing.²⁵
- EPA set out new procedures to govern threshold quantity determinations of flammable substances in mixtures: for mixtures having one percent or greater concentration of a regulated flammable substance the entire weight of the mixture shall be treated as the substance unless the owner or operator can determine that the mixture does not have an NFPA flammability hazard rating of 4.²⁶

These amendments were effective upon publication in the Federal Register.

These regulated substances, 140 in total, are listed in the EPA regulations at 40 CFR § 68.130. This section contains four tables: Tables 1 and 3 list the regulated toxic and flammable substances with their threshold quantities, as amended, in alphabetical order. The “listed” chemicals, grouped by toxic and flammable compounds under gases, liquids, and water mixtures sub-groupings, are provided in this guidance (See Appendix A). The other two tables (Tables 2 and 4) in the rule, which are omitted here, list the same substances as given here (in Appendix A) by Chemical Abstracts Service (“CAS”) number.

EPA has no plans currently to add any chemicals to the list of regulated substances. However, section 112(r)(3) of the Act requires EPA to review the list at least every five years, and the EPA Administrator must respond to petitions requesting additions and modifications to the list.

Given that other programs EPA administers are also based on lists of substances, EPA

²⁴ On March 28, 1996, EPA proposed a settlement of the case with API and IME. As a result of the settlement, EPA proposed amendments to the List Rule regarding flammable and explosive substances. Pending final resolution of these issues, EPA issued an administrative stay of the provisions of the List Rule that were under consideration in the proposed amendments. With its proposed amendments to the List Rule, 61 Fed.Reg. 16,598 (Apr. 15, 1996), EPA proposed a stay the effectiveness of the provisions affected until final action could be taken on the amendments, 61 Fed.Reg. 16,606 (Apr. 15, 1996). No opposition to the stay having been registered, EPA promulgated it as part of Part 68 at 61 Fed.Reg. 31,730 (Jun. 20, 1996). These amendments were issued on December 18, 1997, 63 Fed.Reg. 639 (Jan. 6, 1998).

²⁵ To operationalize these changes, EPA added new definitions to 40 CFR § 68.3 for condensate, crude oil, field gas, natural gas processing plant, petroleum refining processing unit, and produced water. EPA also amended the definition of “stationary source” to clarify that naturally occurring hydrocarbon reservoirs are not considered stationary sources. See discussion below. EPA justified this amendment by arguing that the general duty clause under section 112(r)(1) would apply when site-specific factors might make such substances extremely hazardous. However, it should be kept in mind that this exemption does not apply to naturally occurring regulated toxic substances that may be present in hydrocarbon mixtures.

²⁶ The EPA rule incorporates by reference NFPA “Standard System for the Identification of Fire Hazards of Materials for Emergency Response,” NFPA 704-1996.

maintains a "list of lists," which sets out the substances listed under section 112 for purposes of comparison. More information can be obtained on the INTERNET at <http://www.epa.gov/swercepp/pubs/list>, or by calling the Hotline numbers given in Section 2.6.

2.3.2 Application of the General Duty Clause to DOE Facilities

As a starting point for defining responsibilities, section 112(r)(1) establishes a general duty of owners and operators of stationary sources producing, processing, handling or storing regulated substances to:

- identify hazards that may result from such releases using appropriate hazard assessment techniques,
- design and maintain safe facilities taking such steps as are necessary to prevent releases, and
- minimize the consequences of accidental releases which do occur.²⁷

While the general duty clause seems unspecific in nature, it does require a risk management program that puts prevention measures in place for any potential catastrophic release that could occur.

Although EPA has not issued specific compliance guidance on the general duty clause²⁸, EPA has indicated that it will interpret the general duty clause as a mandate to assert supervision over facilities at which listed substances are present in quantities below the threshold levels, that is, facilities that are otherwise not subject to the risk management planning program. It is to be noted that section 112(r)(9)(A) does not limit EPA's power to only those facilities that have listed regulated substances in quantities exceeding their thresholds. It is EPA's interpretation that it may act under extraordinary circumstances not only at facilities at which regulated substances are present but also at facilities where any extremely hazardous substance is found. For these purposes, any substance that causes death or serious injury would be considered extremely hazardous. Thus, it appears that EPA may use the general duty clause to find violations of section 112(r) where a major release or other unsafe conditions are detected and facility operators were negligent or industry standards were not followed.

Thus, the general duty clause should be seen as a statement of responsibility in principle that goes beyond the specific requirements of any procedures that are mandated by regulation. Facilities that handle regulated substances or any extremely hazardous substance are responsible for maintaining the safety of their processes and mitigating the consequences of any breakdown in safety systems, whether covered by specific regulatory provisions or not.²⁹

²⁷ The general duty clause is stated in the Act to be effective "in the same manner and to the same extent" as 29 U.S.C. § 654.

²⁸ In the risk management planning rule, June 20, 1996, EPA describes the general duty clause of section 112(r)(1) of the Act as a "self-executing" statutory requirement that requires no regulations to be implemented. 61 Fed.Reg. at 31,680.

²⁹ DOE facilities may obtain further information on consequences from the DOE Subcommittee on Consequence Assessment & Protective Actions, Chemical Mixtures Working Group, which may be accessed on the Internet at <http://www.sep.bnl.gov/scapa/chemmix.htm/>. See also OSHA Hazard Information Bulletins, which cover hazards that are not covered by the PSM program, listed in the Internet at http://www.osha-slc.gov/HIB_data/.

2.3.3 Specific Duties of Parties: Risk Management Planning

Under 40 CFR §68.10(a) the requirements of Part 68 are triggered if any one or more of the regulated substances is present in excess of the threshold quantities at a stationary source at any time. That is, if a facility has more than a threshold quantity of these substances in a single process, then it must develop and implement a risk management program. A process, for purposes of the rules, means manufacturing, storing, handling or using a regulated substance, but transportation, including pipelines and vehicles under active shipping orders, is excluded.

Risk management plans. Under § 68.12(a), any stationary source that is subject to the rules is required to prepare and implement a risk management plan for accident prevention and emergency response. A source that has more than one process at the facility must submit a single RMP for all covered processes at that source.

The plan for a facility must contain a written description of some or all of the following elements, depending on the program that applies to it:

- *Hazard assessment.* Sources must conduct an off-site consequence analysis that evaluates the specific potential release scenarios.³⁰ All sources are required to conduct worst-case release scenarios; sources with processes in the two categories that have the most stringent requirements (Programs 2 and 3, as discussed below) are required to conduct alternative release analyses as well.
- *Accident history.* Sources must review and present a 5-year history of accidental releases of regulated substances.
- *Prevention program.* Sources must establish an integrated prevention program to manage risk.
- *Emergency response program.* Sources must ensure that response actions have been coordinated with local emergency planning and response agencies.
- *Management system and risk management plan.* Sources must implement an overall management system to supervise implementation of these program elements, and a RMP that summarizes and documents these activities for all covered processes.

All risk management plans must be registered with EPA and submitted to the state and any local agencies that have responsibility in planning for and responding to accidental releases.³¹ Prior to the date the RMPs are due to being filed, June 20, 1999, EPA plans to issue guidance on procedures indicating where such documents are to be sent.

After publication of its initial proposed rule, EPA received a large number of comments in

³⁰ The interaction of the risk management program with other requirements of TSCA and EPCRA are discussed by EPA in an interpretive rule at 62 Fed.Reg. 45,134 (Aug. 25, 1997).

³¹ The Clean Air Act § 112(r)(7)(B)(iii). Under the Act, RMPs are also required to be submitted to the Chemical Safety and Hazard Investigation Board, but since that has been disbanded that requirement is now ineffective.

which regulated parties found EPA's fundamental issues in its approach burdensome or not cost-effective. The most critical comment EPA received on the proposed rule was that the degree of risk of accidental release varies greatly among sources, and that the regulatory requirements should be assigned according to the specific risk(s) found at that facility. EPA responded by proposing a three-tiered approach that was adopted in the final rule. To avoid confusion with the EPCRA Tier I and Tier II forms, EPA has divided the risk management requirements into three "programs." The three programs are explained further in the next section, with steps affected facilities should take.

2.3.4 Compliance and Enforcement

The following compliance and enforcement provisions apply to facilities that are subject to the risk management planning regulations.

Compliance schedule. Under § 68.10(a) the risk management program rules will take effect three years after publication of the final rule, June 20, 1999 (three years after the date on which a new regulated substance is first listed by EPA), or the date on which a regulated substance is first present above a threshold quantity in a process.³²

Facilities covered by the rules will comply by submitting a registration form to a central location, along with the RMP that describes the risk management program. Facilities will submit their RMPs electronically according to guidance EPA has developed.³³ To reduce the reporting burden, EPA's standardized form will allow sources to report all elements other than the executive summary by check-off boxes, yes/no answers, or numerical entries. The RMP is available electronically to state and local authorities, as well as the general public, subject to 42 U.S.C. § 7414(c).³⁴ DOE facilities will want to establish communication strategies for managing the disclosure of information to the public under the risk management planning program.

Owners and operators of sources are responsible for meeting all the requirements applicable to them and for maintaining records on an ongoing basis. Refiling, with updates, will be required every five years, or sooner if certain changes occur.

Reporting accidental releases of regulated substances. Section 112(r)(6) of the Act established a new institution, an independent Chemical Safety and Hazard Investigation Board,

³² The compliance date of June 21, 1999 falls far behind the statutory schedule. Section 112(r)(7) of the Act required EPA to promulgate the risk management regulations and guidance by November 15, 1993, which would then become applicable three years after the date of promulgation (November 15, 1996) or 3 years from the date a substance is first listed, whichever comes later. However, as the EPA regulations underwent substantial modification from their initial proposal and were thereby much delayed, the applicable date is dictated by the time of issuance of the regulations at 61 Fed.Reg. 31,668 (Jun. 20, 1996).

³³ On June 18, 1997, the Clean Air Act Advisory Committee, Accident Prevention Subcommittee, Electronic Submission Workgroup, released its report, the "Electronic Submission Workgroup Final Recommendations Report," which contains recommendations on the technical and practical issues associated with creating a national repository of electronic Risk Management Plans (See 62 Fed. Reg. 35,494 (July 1, 1997)). The report includes recommendations on how the regulated community will report their Risk Management Plans, and how state and local governments, EPA and the public will have access to this information. This document can be accessed in electronic formation through the Internet (at <http://www.epa.gov/swercepp/rmp-wg.html>).

³⁴ 40 CFR § 68.210(a).

modeled after the National Transportation Safety Board, to respond to and investigate accidental releases. Under sections 112(r)(6)(O) and (Q), once the risk management planning program regulations become effective sources must report the release of any extremely hazardous substance to the Board.

However, the Clinton Administration decided in January 1995 not to fund the Board. Instead, it was decided to use existing authorities at OSHA and EPA to carry out investigations of major chemical accidents and make recommendations to prevent recurrence. Under EPA's Memorandum of Understanding with OSHA (December 1, 1996) ("MOU"),³⁵ EPA and OSHA will cooperate to work together to conduct investigations.³⁶

Under the MOU EPA and OSHA has investigated major chemical accidents or releases.³⁷ While the primary goal of accident investigations is to determine the root causes of accidents, EPA and OSHA may take enforcement actions on the findings of these investigations if violations are uncovered. Reports made under these provisions are available to Congress and the public, except for confidential business information or classified information they may contain.

On November 5, 1997, President Clinton allowed a \$4 million FY'98 appropriation for the Board to survive the line item veto, which will allow it to begin work this year.³⁸ However, with only three of its five members confirmed by the Senate it remains unclear how soon that its presence will be felt.

Enforcement. Under section 112(r)(7)(E), after the effective date of the EPA regulations, it will be unlawful for any person to operate any stationary source subject to such regulations in violation of them.

Under section 113 of the Act, firms failing to comply with the rules face fines of up to \$25,000 per day per violation, as well as possible criminal penalties. All sources are subject to the requirements without exception.

³⁵ A copy of the Memorandum of Understanding can be obtained from the internet at www.epa.gov/swercepp/pubs/oshaimou.html.

³⁶ OSHA and EPA did not inherit the Board's statutory authority. Nevertheless, they are acting to fulfill the required function using other authorities. For example, on October 24, 1997, EPA released a report of the joint EPA-OSHA investigation of an April 1995 fire and explosion at the Napp Technologies Inc. chemical plant in Lodi, N.J. that killed five people. EPA and OSHA found the causes and contributing factors to be: inadequate process for hazards analysis that resulted in not taking appropriate preventive actions; less than adequate standard operating procedures and training; inadequate information in making an important decision; inappropriate equipment; inadequate communication between Napp and a company for which it was doing a blending operation; and inadequate training of fire brigade members. Copies of the "EPA/OSHA Joint Chemical Accident Investigation Report on Napp Technologies Inc. in Lodi, N.J." and others are available on the web at www.epa.gov/swercepp/acc-his.html, and through the EPA Hotline numbers listed below. By email, contact epa-press@valley.rtpnc.epa.gov_at_INTERNET at X400PO.

³⁷ The MOU defines a "major chemical accident or release" as one which meets one or more of the following criteria: (1) results in one or more human fatalities; (2) results in the hospitalization of three or more workers or members of the public; (3) causes property damage (on- and/or off-site) initially estimated at \$500,000 or more in total; (4) presents a serious threat to worker health and safety, public health, property or the environment; (5) has significant off-site consequences; or (6) is an event of significant public concern.

³⁸ See Enviro-Newsbrief, Nov. 5, 1997, at <http://www.epa.gov/epapages/natlibra/hqirc/enb/enb1105.htm>.

The risk management planning rules do not apply where a regulated substance is present in quantities not exceeding the threshold. However, under section 112(r)(9)(A), when conditions indicate an imminent and substantial endangerment to the human health or welfare or the environment from an actual or threatened accidental release of a regulated substance, EPA is entitled to abate the danger or threat and may enforce its orders through the U.S. District Court.

2.4 INTEGRATING COMPLIANCE: A COMPARISON OF THE OSHA AND EPA PROGRAMS

Many of the facilities subject to the EPA risk management program will have already met many of its requirements through prior compliance with the OSHA process safety management rules. Nevertheless, the two programs show some significant differences.³⁹

Listing of regulated substances. First, there are differences in the lists of substances:

- *Substances listed.* The lists of substances regulated by OSHA and EPA are not identical and do not have the same thresholds.
 - On the one hand, the OSHA list is broader than the EPA list. This is appropriate given that OSHA covers reactive chemicals that EPA does not; also some conditions such as flammability hazards may affect on-site safety without affecting off-site safety.
 - On the other hand, there are 10 substances EPA has listed as regulated substances that OSHA has not. For example, OSHA did not list all of the 16 substances mandated by section 112(r)(3) of the Act for EPA to list, excluding for example toluene diisocyanate, which EPA listed in three chemical forms.
- *Detail in listing.* Moreover, the 1990 Amendments required more detail in the listing of the 112(r) regulated substances than it did of the OSHA list. As part of the listing process under section 112(r)(3), EPA is required to provide an explanation of the basis for its listing.

Program requirements. Second, the requirements for the EPA risk management planning program exceed those of the OSHA PSM program in three respects:

- *Worst-case hazard assessments.* Facilities must conduct hazard assessments that include analyses of the "worst case" accident consequences.
- *Written risk management plans.* Facilities must prepare written risk management plans to document the risk management program. The plans will be submitted to designated agencies and will be available to the public.
- *Registration of the plans with EPA.* Facilities must register the plans with EPA, which includes among other things the regulated substances on site and the quantities. However,

³⁹ See EPA discussion at 61 Fed.Reg. 31,686-88.

most of these requirements are already reported under EPCRA. Facilities are required to file notice of changes within 60 days of their occurrence.

A detailed comparison of the different requirements of the risk management planning and PSM programs appears in DOE's (EH-53) Process Safety Management for Highly Hazardous Chemicals, as Appendix C.

Now that the EPA rules have been issued, OSHA is considering amendments to its rules to bring the two programs closer together.⁴⁰ However, there is no indication that any regulatory changes are imminent.

Section 112(r)(8) requires EPA to establish a program of long-term research on methods and techniques of hazard assessment. EPA and OSHA entered into a memorandum of understanding in December 1996 to establish principles for cooperation in joint research on the root causes of chemical accidents and for prevention of such accidents in the future.⁴¹

2.5 IMPLEMENTATION OF THE RMP PROGRAM

EPA has provided guidance for implementation of the risk management planning program. In addition, facilities that are subject to the risk management planning rules must also take into account a number of other parallel provisions.

2.5.1 EPA Technical Guidance Documents

In addition to the risk management regulations, EPA was required to promulgate guidelines to assist sources in their compliance activities.⁴² In May, 1996 EPA issued three final guidance documents⁴³:

- "RMP Off-site Consequence Analysis (OCA) Guidance". This contains all the methodologies and reference tables ("look-up tables") that would be necessary to develop and analyze the consequences of worst case and more likely ("alternative case") scenarios. It is designed to assist affected sources who do not have specific expertise or access to computer-based and more sophisticated modeling tools.
- "Risk Management Plan Data Elements". This maps out the types of information that would be submitted by each source as its risk management plan, which are an executive summary, registration, data on worst case and alternative releases for toxics and flammables, five-year

⁴⁰ OSHA has indicated its intent to make propose corrections and technical amendments to its PSM rules, address issues that have arisen since publication of its regulations on February 4, 1992, and add certain chemicals included in EPA's RMP list under section 68.130, in order to bring its program into closer alignment with the EPA program. See 62 Fed.Reg. 57,750 (Oct. 29, 1997).

⁴¹ Copies of information on the Memorandum of Understanding, as well as updates on case studies in the future, are available on EPA's Chemical Emergency Preparedness home page, at <http://www.epa.gov/swercepp>.

⁴² The Clean Air Act § 112(r)(7)(B)(ii).

⁴³ EPA issued the guidance documents after notice and comment. See 61 Fed.Reg. 3031 (Jan. 30, 1996). DOE comments on the proposal recommended that EPA structure the requirements to minimize duplication as much as possible by allowing facilities to use existing, in-house accident prevention programs, documents and data. (Letter from Raymond F. Pelletier, DOE, to EPA Air Docket No. A-91-73 Category VIII-B, March 26, 1996).

accident history, prevention program, and emergency response program. The data elements are provided in Appendix B of this report.

- "Model Risk Management Program and Plan for Ammonia Refrigeration". This is a model program and plan to help these facilities, as well as to serve as guidance for other source types.

These guidance documents can be accessed through the Internet.⁴⁴ In addition, EPA has issued a "User's Guide to Federal Accidental Release Databases," which provides information on the seven federal accidental release databases.⁴⁵

Though the guidance documents have been issued in final, EPA does not consider them completely finished. Over time, EPA has promised to take steps to keep the guidance documents fresh and current with management techniques as they develop, and it anticipates that the guidance will be updated from time to time as experience is gained through implementation.

DOE facilities will want to consider the full range of possibilities when planning their compliance strategies. In addition to the official guidance documents produced by EPA to assist facilities in conducting the required analyses, various consulting organizations have also produced tools for conducting the required analyses, including dispersion modeling analysis software. DOE has access to a software package, RMPlannerTM, developed under a Cooperative Research and Development Agreement ("CRADA") between JBF Associates, Inc. and Westinghouse Savannah River Company. Because of the CRADA, the software is free to all DOE sites and is available as a compliance tool. Access to this software is being made available through DOE's EH-41 Mirror Web Site at www.tis-nt.eh.doe.gov/oepa. Information on a variety of other RMP planning and/or analysis tools is available through EPA's Web Site at <http://www.epa.gov/swercepp/tools.html>, including a demo of the RMPlanner.

In addition, EPA has referenced several models as alternative approaches to the OCA guidance to assist owners and operators of covered processes in conducting the off-site consequence or hazard assessments. Two of the models, TSCREEN and ALOHA, were developed by and/or with the support of EPA. The TSCREEN (Toxic Screening) model is considered a conservative modeling tool that can be used to simulate a variety of release scenarios, pollutant dispersion, downwind plume concentrations, and hazard distances. TSCREEN can be downloaded from EPA's SCRAM Web Site at <http://www.epa.gov/scram001>. The ALOHA (Areal Locations of Hazardous Atmospheres) model, developed by NOAA with EPA cooperation and support, simulates a variety of time-dependent release scenarios. It can be used to simulate vapor cloud dispersion and plot the area downwind of a release where concentrations may exceed a user specified toxic threshold exposure concentration value.

⁴⁴ For Internet access, use EPA's gopher server at GOPHER.EPA.GOV. The information is also available using the File Transfer Protocol on FTP.EPA.GOV or using the World Wide Web at <http://earth1.epa.gov/ceppo/>. For information on EPA's Technology Transfer Network, contact the systems operator at (919) 541-5742.

⁴⁵ EPA announced the availability of this Guide at 60 Fed.Reg. 57,005 (Nov. 13, 1995). The document was developed by EPA in coordination with by the National Response Team to facilitate access to the various federal accidental release databases. Need for such guidance was identified by "A Review of Federal Authorities for Hazardous Materials Accident Safety," which was required under Section 112(r)(10) of the Act.

ALOHA is available from the National Safety Council. Both the ALOHA and TSCREEN models, in addition to 22 other consequence assessment models, were reviewed and evaluated under DOE's Accident Phenomenology and Consequence Assessment (APAC) Methodology Program.⁴⁶

2.5.2 State Participation and Delegation of Federal Authority

Programs for state regulation of air quality predated the modern Clean Air Act and continue as integral parts of the current regulatory system. Section 112(r)(11) of the Act preserves the rights of states to adopt their own control programs and establish controls that are more stringent than those adopted by EPA.⁴⁷ Four states — New Jersey, California, Nevada and Delaware — already have state regulations on accidental release prevention. Others have legislative authority to develop programs. Thus, any facility should also check state and local regulations for additional provisions that may apply. Despite their independence, state programs must nevertheless work through the federal permitting program under Title V of the Act.

In addition, states may request that EPA delegate authority to them or their political subdivisions to serve as the regulating agency. Under section 112(l)(1) each state may develop and submit to EPA a program for implementation and enforcement of the risk management planning program. EPA may delegate its authorities to such a program in part or completely, but the standards of a state program cannot be less stringent than those promulgated by EPA.

Under section 112(l)(2), EPA was required by November 15, 1991 to publish guidance to the states in developing programs. EPA promulgated guidance under section 112(l) on November 26, 1993 that addresses the section 112(r) issues in state delegations.⁴⁸

2.5.3 Clean Air Act Operating Permits

Along with its other provisions, the 1990 Clean Air Act Amendments also established an operating permits program under Title V.⁴⁹ As a general matter, facilities subject to the risk

⁴⁶ See Lazaro, et al., APAC Working Group 6 Report, Model Review and Evaluation for Application in DOE Safety Basis Documentation of Chemical Accidents, Modeling Guidance for Atmospheric Dispersion and Consequence Assessment, September, 1997. Also, see related discussion of safety analysis reporting requirements within DOE complex in Section 2.5.4 of this report.

⁴⁷ Congress specified under section 112(r)(11) that nothing in the Act precludes or limits the right of a state or political subdivision to adopt regulations more stringent than the federal rules or to adopt rules to control a substance not subject to the federal program. Section 112(r)(11) reinforces the Act's general authority under section 116, 42 U.S.C. § 7416, which states that: nothing in this Act shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce (1) any standard or limitation respecting emissions of air pollutants or (2) any requirement respecting control or abatement of air pollution; except that if an emission standard or limitation is in effect under an applicable implementation plan or under section 111 or 112, such State or political subdivision may not adopt or enforce any emission standard or limitation which is less stringent than the standard or limitation under such plan or section. In addition, Congress specified under section 304(d) that nothing in the provisions for the OSHA PSM program diminishes the authority of the states and their political subdivisions to exercise their authorities as specified under section 112(r)(11).

⁴⁸ 58 Fed.Reg. 62,262.

⁴⁹ Section 502(a) of the Act, 42 U.S.C. 7661a(a), states that: After the effective date of any permit program approved or promulgated under this title, it shall be unlawful for any person ... to operate ... any ... source ...

management program of 112(r) of the Act are also subject to Title V.⁵⁰ Such facilities must comply with the requirements of the applicable state operating permitting program established under Title V.⁵¹

However, there are a number of facilities that store regulated substances in quantities that exceed the threshold level but do not have emissions. Section 112(r)(7)(F) of the Act specifically states that no stationary source is required to apply for a permit under Title V solely because it is subject to section 112(r).⁵² That is, facilities that have regulated substances in quantities greater than the threshold levels, but do not have emissions and are not stationary sources subject to other parts of the Act, do not become subject to Title V by virtue of the application of section 112(r)(3) alone. Such facilities need not meet the Title V requirements at all.⁵³

After application of this exception EPA estimates that only about 30 percent of all the facilities that are subject to 112(r) will also be subject to Title V. For these facilities the requirements are fairly straightforward. Section 68.215(a) requires that the permit for such a source contain a statement listing 112(r) as applicable to that source and include conditions requiring the source to submit a compliance schedule for meeting the requirements of Part 68 and a certification that the source is in compliance with all its requirements.⁵⁴

2.5.4 Other Implementation Considerations

Several activities currently conducted by DOE facilities to evaluate health and safety hazards, project or monitor emissions, or conduct analysis may overlap activities that will be required as part of the implementation of the risk management planning requirements. A challenge in complying with risk management planning requirements will be the integration of it with other ES&H activities.

subject to standards or regulations under section ... 112, except in compliance with a permit issued by a permitting authority under this title.

EPA has interpreted the Act as defining the regulated substances under section 112(r)(3) as "regulated air pollutants" and the accident prevention regulations under section 112(r)(7) as "applicable requirements" for purposes of Title V.

⁵⁰ Section 502(a) of the Act, 42 U.S.C. 7661a(a), states that After the effective date of any permit program approved or promulgated under this title, it shall be unlawful for any person ... to operate ... any ... source ... subject to standards or regulations under section ... 112, except in compliance with a permit issued by a permitting authority under this title.

EPA has interpreted the Act as defining the regulated substances under section 112(r)(3) as "regulated air pollutants" and the accident prevention regulations under section 112(r)(7) as "applicable requirements" for purposes of Title V.

⁵¹ Title V requires that each source must comply with all applicable requirements of the Act. While EPA agreed with commenters in its risk management rulemaking proceedings that Congress did not intend for section 112(r) to be implemented and enforced primarily through Title V permits, it still believes that those sources that are subject to Title V must also complete the requirements as to their burdens under section 112(r) as well. See 61 Fed.Reg. at 31,688-89 (Jun. 20, 1996).

⁵² Section 112(r)(7)(F) states that, "Notwithstanding the provisions of title V or this section, no stationary source shall be required to apply for, or operate pursuant to, a permit issued under such title solely because such source is subject to regulations or requirements under this subsection."

⁵³ The Clean Air Act § 112(r)(7)(F). Confirmed in interview with Craig Matthiessen, EPA, Oct. 3, 1996.

⁵⁴ In EPA's view, this comes to little more than checking off the box on the form that acknowledges that the source is subject to section 112(r). Interview with Craig Matthiessen, Oct. 3, 1996.

Safety Analysis Reporting. Safety Analysis is a requirement at DOE for documentation to provide systematic identification of hazards within a given DOE operation, to describe and analyze the adequacy of measures taken to eliminate, control, or mitigate identified hazards, and to analyze and evaluate potential accidents and their associated risks.⁵⁵

A Safety Analysis Report ("SAR") is the documented review of systems at nuclear facilities that have the potential to cause risk to the public and workers because of materials that are handled there, both chemical and nuclear. It documents the adequacy of safety analysis for a facility to ensure that the facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations. A SAR defines the safety basis, documents the logic of its derivation, demonstrates adherence to the safety basis, and justifies its adequacy. It includes the documentation for the results of the safety analysis which identifies the dominant contributors to the risk of the facility so that these vulnerabilities can be better managed⁵⁶.

The SAR is a preconstruction analysis, reviewed periodically, to evaluate the kinds of accidents that could occur and what their consequences would be. It covers risk of natural phenomena as well as facility failures in processes and storage. The SAR analysis involves mostly on-site consequences, but also includes the site boundaries (which are examined according to the maximally exposed individual), and in some instances population impacts.

Many of the analyses conducted for the SAR, as well as the data collected for the analyses, will provide useful starting points for the risk management planning process. DOE facilities should review their SARs to determine whether any such information or modeling is useful or could be used as part of their RMPs.

National Environmental Policy Act. Under the familiar National Environmental Policy Act ("NEPA"),⁵⁷ agencies are required to write environmental impact statements ("EISs") and assessments to assure that they will consider environmental considerations in their decisionmaking. The EIS requirement applies where there is an agency proposal that is major, federal, and significantly affecting the quality of the human environment.⁵⁸

The potential for emissions of air pollutants is considered to significantly affect the quality of the human environment, and as a result most DOE EISs require dispersion modeling for off-site releases to the public. These may include both chemical and radiological releases. DOE facilities are therefore encouraged to engage in consultation with the various affected federal and state agencies to be sure of addressing all relevant concerns. However, DOE NEPA guidance

⁵⁵ DOE Order No. 420.1 ("Facility Safety"), as last amended Oct. 24, 1996.

⁵⁶ DOE Order 5481.1B ("Safety analysis and Review System"), and DOE STD-1027-92 (Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23).

⁵⁷ National Environmental Policy Act of 1969, 42 U.S.C. § 4321, et seq., implemented by Council on Environmental Quality regulations at 40 C.F.R. Part 1500-1508. The CEQ rules are binding on agencies, 40 C.F.R. § 1507.3(b), Andrus v. Sierra Club, 442 U.S. 347, 357, 60 L.Ed.2d 943 (1979), and require agencies to supplement them.

⁵⁸ 42 U.S.C. § 4332(2)(c), 40 C.F.R. § 1501.4.

encourages evaluation of typical release (high frequency low consequence) scenarios instead of the worst-case scenarios required under the risk management planning program.⁵⁹ The applicability of such existing analyses to the risk management program is not an issue that EPA has addressed directly in guidance.

Integrated Safety Management System. Under DOE Policy 450.4, a management system has been established to systematically integrate safety into work practices at all levels. Its approach is to treat the multiple environment, safety and health ("ES&H") requirements DOE facilities are subject to not as stand-alone programs but as integral workplace considerations so that workplace risks will be reduced to reasonable levels. The Integrated Safety Management Systems ("ISMS") sets up a framework for managing the work subsequently performed as independent requirements.

Policy 450.4 details the integration of various ES&H functions, including hazard analysis, implementation of hazard controls, feedback and improvement processes. This will provide both a challenge and an opportunity to mesh the ISMS for DOE facilities with the EPA risk management planning process. While in many cases DOE facilities do not have well integrated ES&H programs, it has been observed that a true ISMS will be essential to achieving full compliance.

Integrated Contingency Plans. As chair of the National Response Team, EPA announced on April 18, 1996 the availability of guidance for the Integrated Contingency Plan ("ICP"),⁶⁰ which is designed to make it possible for facilities that are preparing multiple emergency response plans under various regulations to consolidate them into one integrated plan that would cover all such plans jointly. The guidance provides a sample format for an ICP.

The ICP is a joint project of the EPA, DOT (Coast Guard and Research and Special Programs Administration), Department of Labor (OSHA), and Department of Interior (Minerals Management Service). Emergency response plans that may be consolidated in a single ICP are those which are required by programs these agencies administer.⁶¹

The ICP does not change any of the existing regulatory requirements to which it applies. The ICP is intended to work as a consolidation tool, so that facilities that are subject to one or more of these requirements may consolidate them into one comprehensive plan rather than file them as separate plans for each program. Use of the ICP is voluntary; though the ICP is the

⁵⁹ For INTERNET access to DOE NEPA guidance, see <http://tis-nt.eh.doe.gov/nepa/tools/tools.htm>.

⁶⁰ This appears at 61 Fed.Reg. 28642 (June 5, 1996). The ICP resulted from a Presidential review of federal release prevention, mitigation and response activities required by section 112(r)(10) of the Clean Air Act.

⁶¹ A particular facility may be subject to one or more of the following federal regulations: EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements), 40 CFR Part 112.7(d) and 112.20-.21; MMS's Facility Response Plan Regulation, 30 CFR Part 254; RSPA's Pipeline Response Plan Regulation, 49 CFR Part 194; USCG's Facility Response Plan Regulation, 33 CFR Part 154, SubPart F; 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; and 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. In addition, facilities may also be subject to state emergency response planning requirements. The guidance encourages facilities to coordinate development of their ICP with relevant state and local agencies.

preferred mechanism, no facility is required to use it.

While the use of the ICP is encouraged for risk management planning, its use is not sufficient to fulfill all the risk management planning requirements. The ICP can be used to satisfy the emergency response plan requirements.

The guidance issued April 18, 1996 is the only guidance on the ICP. Since the program is new, little experience is available to guide the use of it by facilities. For further information on the ICP program, one may call William Finan at EPA, 202-260-0030.⁶²

Interaction of these provisions with TSCA. Under the Toxic Substances Control Act ("TSCA")⁶³ producers, importers and processors of chemicals are required to report a broad range of health and safety studies. EPA has determined that hazard assessments mandated by the risk management planning program are not subject to the copy and list submission requirements of the Health and Safety Data Reporting Rule under 40 CFR Part 716, which implements section 8(d) of TSCA, nor are such hazard assessments subject to the reporting requirements of section 8(e) of TSCA.⁶⁴

For more information on the risk management program one may contact the EPA Emergency Planning and Community Right-to-Know Hotline at 800-424-9346, or 703-412-9810 from the Washington, D.C. area, and the INTERNET at <http://www.epa.gov/swercepp/acc-pre.html>.

EPA has produced a useful question-and-answer document, "CAA Section 112(r) Frequently Asked Questions," that users of this guidance may find to be a source of information on specific technical questions. It may be obtained from the INTERNET at <http://www.epa.gov/swercepp/pubs/ caa-faqs.html>. EPA fact sheets on the program and other relevant information can be obtained at www.epa.gov/swercepp/fct-shts.html. Information on a variety of other RMP analysis and/or planning tools is available at <http://www.epa.gov/swercepp/tools.html>.

⁶² DOE facilities may wish to coordinate the integration of various regulations by contacting all agencies whose regulations may apply: regarding EPA's Oil Pollution Prevention Regulation: Bobbie Lively-Diebold, U.S. Environmental Protection Agency, Mail Code 5203G, 401 M Street, SW., Washington, DC 20460, at (703) 356-8774 (email Lively.Barbara@epamail.epa.gov), or the SPCC Information Line at (202) 260-2342); regarding the U.S. Coast Guard's Facility Response Plan Regulation: LCDR Mark Hamilton, U.S. Coast Guard, Commandant (G-MOR), 2100 2nd Street, SW., Washington, DC 20593, at 202-267-1983 (email M.Hamilton/G-M03@CGSMTP.uscg.mil); regarding DOT/RSPA's Pipeline Response Plan Regulation: Jim Taylor, U.S. Department of Transportation, Room 2335, 400 7th Street, SW., Washington, DC 20590 at (202) 366-8860 (email OPATEAM@RSPA.DOT.GOV); regarding pertinent OSHA regulations, contact either your Regional or Area OSHA office; regarding DOI/MMS' Facility Response Plan Regulation: Larry Ake, U.S. Department of the Interior--Minerals Management Service, MS 4700, 381 Elden Street, Herndon, VA 22070-4817 at (703) 787-1567 (email Larry__Ake@SMTP.MMS.GOV); regarding EPA's Risk Management Program Regulation: William Finan (see above); and regarding RCRA's Contingency Planning Requirements, contact the EPCRA/RCRA/Superfund Hotline.

⁶³ The Toxic Substances Control Act, Pub.L. 94-469, Oct. 11, 1976, 90 Stat. 2003, as amended, codified generally in U.S. Code chapter 53, section 2601 et seq. (Commerce and Trade).

⁶⁴ See EPA interpretive rule at 62 Fed.Reg. 45,134 (Aug. 25, 1997).

3 SOME IMPORTANT CONSIDERATIONS for RMP COMPLIANCE

As detailed above, the regulations EPA has promulgated in 40 CFR Part 68 pursuant to Section 112(r) establish a comprehensive program to help prevent accidental releases of regulated substances and reduce the severity of those that do occur through emergency response.

While the prior section introduces the risk management program and sets the context by identifying its purposes and interaction with other parallel provisions, the following discussion provides some of the detailed requirements in the RMP rule. This is followed, in Section 4, with a mini-guide specific to compliance applicability determination and documentation.

3.1 KEY DEFINITIONS

The following are definitions provided by § 68.3 of EPA's regulations that are critical to compliance with the risk management program. In some cases, these definitions elaborate on terms discussed above.

- *Accidental release* means an unanticipated emission of a regulated substance or other extremely hazardous substance into the ambient air from a stationary source.
- *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.
- *Covered process* means a process that has a regulated substance present in more than a threshold quantity as determined under § 68.115.
- *Endpoint* is farthest extent to which the threshold for serious injuries to off-site receptors is exceeded in the event of a worst-case accidental release.⁶⁵ The endpoints for toxic substances are listed as Appendix A to Part 68 (set out as Appendix C to this guidance). The endpoints for flammables are set out in § 68.22. Methodologies for estimating endpoints for toxic and flammable substances are found in EPA's Off-site Consequence Assessment Guidance.
- *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), and as a result of an accidental release and that can be identified on local U.S. Geological Survey maps.
- *Injury* means any effect on a human that requires medical treatment or hospitalization and which results either from direct exposure to 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. 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

⁶⁵ The term "endpoint" is not defined in § 68.3. The definition set out here is composed from various statements in EPA documents. See 61 Fed.Reg. 31,685.

minimize exposure of the public or the environment. Active mitigation means equipment, devices, or technologies that require human, mechanical, or other energy input to function. Passive mitigation means equipment, devices, or technologies that function without human, mechanical, or other energy input; in general, passive mitigation serves to minimize potential adverse effects after the loss of containment. Thus, a double wall tank would not be considered passive, since its purpose is to prevent loss of containment in the first place.

- *Off-site* 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.
- *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, are considered a single process. There is no general exemption for underground storage.
- *Public receptor* means off-site 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. Public receptors are within the distance from the source to the endpoint in the event of a worst-case release. Roads are not considered public receptors.
- *Regulated substance* means substance listed in § 68.130 (which is summarized in Appendix A to this report).
- *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 provisions of Part 68. 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. Properties are not be considered contiguous solely because of a railroad or gas pipeline right-of-way.⁶⁶

⁶⁶ Along with its amendments to the list rule issued December 18, 1997, 63 Fed.Reg. 639 (Jan. 6, 1998), EPA amended the definition of "stationary source" to exempt transportation (and storage incident to transportation) from the program requirements. Key to the EPA policy is that a container is considered to be in transportation so long as it is attached to the motive power (such as a truck or locomotive) that delivered it to the site. If the container remains attached to the motive power that delivered it, even after the facility accepts delivery, the contents of the container would not be counted in the threshold determination. While these changes were not among those EPA had initially proposed in the proposed rule, EPA's action reflects the numerous comments submitted by industry asking for this redefinition. However, EPA noted in the preamble to its amendments that these amendments may leave some overlap between its regulations and those of the U.S. Department of

- *Threshold quantity* means the quantity specified for regulated substances listed in § 68.130 and determined to be present at a stationary source as specified in § 68.115. One should note certain exemptions that apply in specific circumstances, as listed below.
- “*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).

3.2 THRESHOLD DETERMINATION, APPLICABILITY OF THE PROGRAM, AND EXEMPTIONS

The first step in compliance with the risk management planning rules is for a facility to determine the applicability of the risk management program to it. Although EPA has generated a round number estimate of the number of facilities subject to the rules, it has not developed a specific list of facilities itself that are subject to the them. Owners or operators of a facility must determine, based on conditions at the facility currently, whether the criteria of eligibility apply to them and identify themselves to EPA or the State agency (in States to which EPA has delegated program authority).

Under § 68.10 of the regulations, the risk management planning requirements are applicable to those facilities at which a regulated substance is present in more than a threshold quantity in a process. However, facilities should keep in mind that the threshold determination is made on a process-by-process basis. Thus, where a regulated substance is found at more than one process at a source the quantities of that substance in the various processes do not need to be aggregated for determination whether the threshold quantity is exceeded at that source (see Section 4.0 for further discussion).

In determining the threshold quantity of a regulated substance present, the following exemptions may apply under 40 CFR § 68.115⁶⁷:

- *Substances present in a mixture*. Where substances are present in a mixture two rules may apply, depending on the nature of the regulated substance:
 - *toxic substances*. If a toxic substance is at a concentration below 1 percent by weight in the mixture, the amount of the substance in the mixture need not be considered in determining whether the threshold quantity is present. If the substance is at a concentration of 1 percent or greater, facilities must consider the weight of the substance in the solution in determining the presence of the threshold quantity. However, amounts of substances in mixtures greater than 1 percent need not be considered if the owner or operator of the source can

Transportation ("DOT") at 49 CFR Parts 192, 193 and 195, implementing 49 U.S.C. § 60105. "Transportation in commerce" is defined by DOT, pursuant to the Federal Hazardous Materials Transportation Law, 49 U.S.C. 5107-5127. For questions on DOT programs, DOT provides a Hazardous Materials Information Line at 800-467-4922. To clarify these issues, EPA and DOT have engaged in discussions to determine the jurisdictional distinction of those that will be subject to EPA rules and those that will be covered instead by DOT regulations.

⁶⁷ Along with its amendments to the list rule issued December 18, 1997, 63 Fed.Reg. 639 (Jan. 6, 1998), EPA amended the rules for mixtures. Section 68.115(b)(3), regarding explosive mixtures, was deleted, and other provisions of § 68.115(b) were redesignated for citation purposes.

demonstrate that the partial pressure of the regulated substance in the mixture (solution) under handling and storage conditions is less than 10 millimeters of mercury (except for oleum, toluene 2,4-diisocyanate, toluene 2,6-diisocyanate, and toluene diisocyanate (unspecified isomer)).

For those four toxic substances for which EPA has established minimum concentrations for mixtures with water — ammonia (20 percent or greater), hydrogen chloride/hydrochloric acid (37 percent or greater), hydrogen fluoride/hydrofluoric acid (50 percent or greater), and nitric acid (80 percent or greater) — these concentrations supersede the 1 percent default rule applicable to other substances in mixtures. For these substances, mixtures with concentrations below the specified limits will not have to be considered in determining whether a threshold quantity is present. In addition, EPA has clarified that when calculating threshold quantities of these aqueous mixtures only the quantity of the regulated toxic substance is counted, and not the water content of the solution.⁶⁸

- *flammable substances.* If a flammable substance is at a concentration below 1 percent by weight in the mixture, the amount of the substance in the mixture need not be considered in determining the threshold quantity. If the substance is at a concentration of 1 percent or greater, the entire weight of the mixture is treated as the regulated substance unless the owner or operator can show that the mixture does not have a National Fire Protection Association flammability hazard rating of 4 in accordance with the NFPA 704 standard. Boiling point and flash point are defined in accordance with the NFPA 30 standard. Regulated substances in gasoline that is in distribution or related storage for use as a fuel for internal combustion engines does not need to be considered. Regulated substances in naturally occurring hydrocarbon mixtures including condensate, crude oil, field gas, and produced water) do not need to be considered.
- *Substances contained in articles.* A regulated substance need not be considered in determining the threshold quantity if it is contained in an article, defined as a manufactured item whose use depends upon the shape or form it is given during manufacture, and it does not result in exposure to the regulated substance under normal conditions of processing and use.
- *Substances used for specific purposes.* A regulated substance need not be considered where it is: used as a structural component of the stationary source; used for routine janitorial maintenance; used as part of foods, drugs, cosmetics or other personal items by employees; or contained in process or non-contact cooling water.
- *Substances at laboratories.* Where a regulated substance is used in a laboratory under the supervision of a qualified individual the quantity of the substance need not be considered in determining whether a threshold quantity is present. However, this exemption does not apply to specialty chemical production; to manufacture, processing, or use of substances in

⁶⁸ See 62 Fed.Reg. 45,135 (Aug. 25, 1997), and 59 Fed.Reg. 4478, 4488 (Jan. 31, 1994).

pilot plant scale operations; or to activities conducted or chemicals stored outside the laboratory.

In any case where such exemptions or any others may apply,⁶⁹ the burden is on the source who owns or controls the process to document the exemption.

In addition, a contentious issue that has arisen is the role of transportation in defining threshold quantities. Facilities that use small amounts of regulated substances may be treated under certain interpretations of the EPA rules as having them above the threshold quantities when rail cars delivering such chemicals cross into the plant boundaries. These issues are currently under discussion with the Department of Transportation.

If analysis shows that a regulated substance is present in more than a threshold quantity at the source, given the exemptions, the owner or operator of the source is required to submit a single RMP for the source that includes a registration for all covered processes.⁷⁰

3.3 THREE DISTINCT RMP PROGRAMS

Having determined that the risk management planning requirements are applicable to processes at a facility, the next step is to decide which program applies to processes located there. A covered process is subject to one of three distinct programs according to the following four criteria:

1. the potential for off-site consequences from a worst-case accidental release,
2. the facility's accident history,
3. application of the OSHA Process Safety Management Standard, and
4. Standard Industrial Classification ("SIC") code.⁷¹

The applicability of any of the programs is based on these process criteria, so that the classification of any one process in a program does not influence the classification of any other process at the facility. A source could have processes in more than one of the three programs.

It should be noted that the requirements for the three programs are not additive. That is, Program 2 is not designed for sources to meet the Program 1 requirements plus additional Program 2 requirements. The requirements of each program are independent of the other two in significant respects.

⁶⁹ Along with its amendments to the list rule issued December 18, 1997, 63 Fed.Reg. 639 (Jan. 6, 1998), EPA amended the applicability provisions in 40 CFR § 68.10 to clarify that the rules under Part 68 do not apply to sources located on the Outer Continental Shelf. This was accomplished by adding 40 CFR section 68.10(f), which expressly exempts Outer Continental Shelf sources, as defined by 40 CFR § 55.2.

⁷⁰ 40 CFR § 68.12(a).

⁷¹ It should be noted that EPA has suggested that in the future it may replace the SIC codes currently used in the RMP rules with the North American Industry Classification System ("NAICS"). See 62 Fed.Reg. 58,187 (Oct. 29, 1997). On December 18, 1997 EPA took an interim step in this direction by proposing changes in the definition of "natural gas processing plant" and "petroleum refining process unit" that would add the NAICS code to the definition of these facilities in the final rule. The changes would appear in definitions of these terms in 40 CFR § 68.3. 63 Fed.Reg. 639 (Jan. 6, 1998).

3.3.1 Program 1

Applicability of Program 1 Processes that are shown to have no potential for serious off-site consequences in the case of an accidental release are considered Program 1 processes and have minimal requirements. To qualify as Program 1 under 40 CFR § 68.10(b), a covered process must show through the proper analyses that it has met all of the following criteria:

- *Distance to toxic or flammable endpoint.* The distance to a toxic or flammable endpoint for a worst-case release assessment is less than the distance to a public receptor. That is, in a worst-case accidental release the range of potential harmful effects does not reach individuals in the public. The toxic endpoints for off-site analysis as issued by EPA in Part 68, Appendix A, are included herein in the Appendices (Appendix C of this report). The endpoints for flammables vary according to criteria set out by EPA in 40 CFR § 68.22(a)(2). To conduct this analysis, facilities should consult EPA's "RMP Off-site Consequence Analysis Guidance" (discussed above in section 2.5.1). If the worst-case release scenarios for a regulated toxic substance and a regulated flammable substance involve the same process, both scenarios must be analyzed separately. Observers have noted that the methodologies prescribed in EPA's guidance often overpredict hazards to receptors. DOE facilities are encouraged to use the best available dispersion model technologies.
- *Accident history.* For the five years prior to the date its RMP is submitted, the process has not had an accidental release of a regulated substance in which the off-site exposure to the substance, its reaction products, overpressure from an explosion, or radiant heat from the substance led to death or injury of the public or to response or restoration activities for exposure of an environmental receptor;⁷² however, if such an accident occurs, the process will lose its Program 1 status immediately.
- *Emergency response coordination.* Emergency response procedures have been coordinated between the source and local emergency planning and response officials.

In providing Program 1, EPA is recognizing that there are processes that have regulated substances in amounts greater than the threshold but do not have serious potential off-site consequences.

A new source can obtain Program 1 status provided that the process has not had an accidental release of a regulated substance that would trigger loss of Program 1 status for an existing source, and if it meets the other two eligibility criteria.

Requirements of Program 1 processes. Sources that own or control Program 1 processes are not required to implement a prevention program, an emergency response program, or a management system. However, under 40 CFR § 68.12(b) sources having Program 1 processes are required to submit an RMP and registration that contains the following elements for covered processes at the source:

⁷² 40 CFR § 68.168.

- an analysis of the worst-case release scenario as provided under § 68.165 to demonstrate the absence of hazards from the process,
- the complete a five-year accident history, as specified above,
- a statement that response actions have been coordinated with local agencies, and
- make a statement of certification in their risk management plan that no additional measures are necessary to prevent off-site impacts from accidental releases.

The statement Program 1 sources are required to make, as set out in § 68.12(b)(4), is as follows:

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 off-site impacts provided in the risk management program rule (40 CFR 68.10(b)(1)). No additional measures are necessary to prevent off-site 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.]

By contrast with Program 1 sources, as detailed below, Program 2 and 3 sources must establish management systems to oversee implementation of their risk management plans, which integrate and document the activities for all covered processes.

3.3.2 Program 2

Applicability of Program 2 EPA has designed Program 2 to be an intermediate category between Program 1 (which has the least requirements) and Program 3 (which has the most stringent requirements). It is defined as a covered process that does not meet the eligibility requirements of either Program 1 or Program 3.

Requirements of Program 2 processes Under 40 CFR § 68.12(c) sources having Program 2 processes are required to submit an RMP and registration that contains the following elements for covered processes at the source:

- a management system to oversee the implementation of the risk management program elements under § 68.15,
- conduct a hazard assessment that contains an off-site consequence analysis, a worst-case release scenario analysis, an alternative release scenario analysis, and a five-year accident history,⁷³

⁷³ In addition to the official guidance documents produced by EPA to assist facilities in conducting the required analyses, various consulting organizations have also produced tools for conducting the required analyses,

- implement the prevention steps for either Program 2, set out in the EPA regulations at §§ 68.48 through 68.60, or Program 3, set out in the EPA regulations at §§ 68.65 through 68.68.87,
- develop and implement an emergency response program, as provided in the EPA regulations at §§ 68.90 through 68.95, and
- submit data on the prevention program elements for Program 2 processes, as provided under § 68.170.

The off-site consequence analysis must be reviewed and updated every five years, or sooner if changes occur which might cause one to reasonably expect that the distance to the endpoint might decrease by a factor of two or more. Where such changes occur, under § 68.36 the owner or operator must submit a revised analysis within six months.

Although Program 2 is more stringent than Program 1, EPA considers Program 2 to be a streamlined approach as compared to Program 3, which contains the toughest requirements.

3.3.3 Program 3

Applicability of Program 3. Under § 68.10(d) a covered process is subject to Program 3 if either of the following two conditions apply:

- It is in Standard Industrial Classification (SIC) codes 2611 (pulp mills), 2812 chlor-alkali), 2819 (industrial inorganics), 2821 (plastics and resins), 2865 (cyclic crudes), 2869 (industrial organics), 2873 (nitrogen fertilizers), 2879 (agricultural chemicals), or 2911 (petroleum refineries); or
- The process is subject to the OSHA PSM Standard, 29 CFR § 1910.119.⁷⁴

An exception is that such processes will be subject to Program 1 if they meet the eligibility criteria for Program 1.

EPA considers that with very few exceptions processes classified as Program 3 are already subject to the prevention program elements in the OSHA PSM standard. The other Program 3 sources are those that have processes with a demonstrated accident history.

Program 3 requirements. The steps for compliance by Program 3 processes are the same five steps as in Program 2, with more stringent requirements for the prevention program and its data.

Integrating the OSHA PSM and EPA risk management Program 3 requirements. Although the PSM and risk management planning RMP programs were designed to not overlap — EPA has no authority to regulate the workplace, and OSHA has no authority to regulate exposures off-site

including dispersion modeling analysis software. DOE facilities may wish to consider the full range of possibilities when planning their compliance strategies.

⁷⁴ It should be noted that OSHA exempts certain industries from the PSM standard, such as atmospheric storage of flammable substances. However, EPA does not have authority under section 112(r) to exempt a source that has more than a threshold quantity of a regulated substance in a process, so such PSM exemptions are not allowed under the RMP program.

— EPA recognizes that in practice the two programs do in fact overlap. EPA has adopted actions taken in pursuit of the PSM program in two respects.

First, in the design of the program, EPA has taken the view that if the OSHA PSM requirements are carried out there will be no need to establish additional requirements through its own authorities, and therefore EPA has adopted the PSM standards for its Program 3 requirements at 40 CFR §§ 68.65 - 68.87 with only slight wording changes to adapt it to off-site rather than on-site consequences. Thus, with few exceptions, Program 3 facilities that are already complying with the PSM program will have already met many of the EPA requirements. The exceptions are for those sources that have a history of accidental releases, which are subject to Program 3 but may not be complying with OSHA rules. However, a source that is in compliance with the PSM program will still need to develop a management system, conduct a hazard assessment, develop and implement an emergency response program, and submit a risk management plan.

Second, in implementation of the RMP program, EPA recognizes the value of steps taken to comply with the PSM rules as part of compliance with its own program. Thus, EPA will accept all the initial process analyses that have been accepted by OSHA for program 3.

3.4 CLASSIFIED INFORMATION

As a general rule, the risk management plan is available to the public under 42 U.S.C. § 7414(c). However, under 40 CFR § 68.150(d) information which is considered classified under other applicable laws is excluded from disclosure in an RMP.

Under § 68.210(b) EPA defers entirely to other sources of law on this issue. As defined in EPA rules at 40 CFR § 68.3, "classified information" has the same meaning that the term has under the Classified Information Procedures Act, 18 U.S.C. App. 3, section 1(a):

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.⁷⁵

Given EPA's deference, DOE facilities should consult the Classified Information Procedures Act to determine what information, otherwise required for disclosure, may be exempt and the proper procedures for asserting that exemption.

While classified information is not required to be submitted as part of an RMP, classified information excluded from an RMP may be made available in a classified annex for review by federal and state representatives who have received the appropriate security clearances.

⁷⁵ Classified Information Procedures Act, 18 U.S.C. App. 3, § 1(a).

4. MINI-GUIDE for RMP COMPLIANCE within the DOE COMPLEX⁷⁶

4.1 PURPOSE

Unlike the previous parts of this report, this section is written as a mini-guide with a checklist/data-form. It is designed to provide an overview of the steps that are needed to comply along with specific and practical guidance in determining and documenting RMP rule applicability. The specific guidance given in Section 4.4 is referred to herein as the RMP Checklist Applicability Determination and Documentation (RCAD) Guide.

The purpose of the RCAD guide is to help installations assess whether regulated substances listed pursuant to 112(r) chemicals are currently used or stored in amounts that do or could (see discussion at the end of Sec. 4.4) exceed published threshold levels. If these levels are exceeded, then a RMP will be required. It is hoped that the results from the completed checklist/data-form will assist DOE installations in planning RMP work and quality assurance (QA) reviews, as well as provide a means for effective and efficient compliance planning for each of the affected installations. Attached to the checklist/data-form is a brief optional questionnaire to help headquarters (EH-41) gauge the usefulness of this report and other related guidance (e.g., DOE-HDBK-1100-96 and DOE-HDBK-1101-96, go to http://tis-hq.eh.doe.gov/web/chem_safety/doe_reg.html under approved DOE technical standards to download pdf files of these handbooks) on OSHA Process Safety Management rule (29 CFR 1910.119). Although some DOE installations may have already initiated RMP compliance work, completion of the questionnaire might serve to assist those that have not been thinking about, and planning for, chemical accident prevention.

This document and its associated Web Page are not intended to provide comprehensive guidance in complying with the RMP rule. Other actions will be necessary in conducting and documenting all of the analyses required by the rule. Some of the resources and tools for conducting the required off-site consequence assessment, preparing the necessary Plan, and developing and implementing the Program specific to your installation have been previously referenced in Section 2.5.1 this document. The RMPlanner, referenced previously in Section 2.5.1, is an example of one compliance tool that may be of interest to DOE installations.

In addition to the general guidance in Sections 2 and 3 of this document, Section 4.2 below provides additional details for completing the applicability determinations for the rule. Section 4.3 gives a brief overview of the major steps required for meeting the RMP requirements. Finally, an explanation and instructions for using the RCAD guide are given in Section 4.4.

⁷⁶ This section of the report is also incorporated as a Web Page planning guide (<http://tis-net.eh.doe.gov/oepa/rcad>). It is intended to help DOE facilities determine the applicability and the level of compliance that may be required under Section 112(r) of the Act and the EPA regulations at 40 CFR Part 68, which implement Section 112(r). These regulations are frequently referred by the regulated community as the RMP rule, but is also known as the EPA's "chemical accident prevention program." The online version of this guide includes the full text, available for downloading in Adobe® Acrobat® PDF format, and a web form for the checklist, data-form, and questionnaire. The data-form and questionnaire may be conveniently filled out and submitted online, which is encouraged.

4.2 PREFACE TO THIS GUIDE: A WORD ON THE RMP RULE⁷⁷

EPA's risk management planning rules, 40 CFR Part 68, require any DOE installation that has more than a threshold quantity of a regulated substance in a process to comply with the requirements of Part 68. The principal requirement will be to submit an RMP by June 21, 1999, which may be submitted electronically⁷⁸. The RMPlan is a summary of the installation's risk management program, which consists of four major parts: the hazard assessment, accident prevention program, emergency response program, and a management system. The plan should reflect specific requirements of each of these elements depending on the risk level of the "process" and substance in question. As distinct from the RMPlan submitted to EPA, the "RMProgram" is the installation's management structure and personnel established to implement the requirements of the RMPlan. The overall emphasis should be on accident prevention measures and practices. To reiterate, the RMPlan is what an installation submits; the RMProgram is what the installation does.

The list of regulated substances at 40 CFR 68.130, which includes toxic chemicals and flammable substances, establishes threshold quantities for each listed substance. The threshold quantity is the amount present (e.g., in use, stored, or handled) in a process at the installation. In its list, EPA has established individual threshold quantities for toxic chemicals; by contrast, for all flammable substances EPA has assigned 10,000 pounds as the threshold quantity. The chemical names of the listed toxic and flammable substances and their respective CAS numbers and threshold quantities are set out in Appendix A⁷⁹.

The RMP rule also includes reference to the general duty clause (see Section 2.3.2), Section 112(r)(1) of the Act. The clause provides a separate statutory mechanism that EPA has indicated it will use, in appropriate circumstances to ensure the protection of public health and the environment (61 FR at 31667, June 20, 1996). This requires facilities to perform activities to prevent accidental releases of harmful substances as a matter of general business or safe operating practice, regardless of the type or quantity of the substance in a process. Activities that would fall under what is covered by general duty include 1) hazard identification and assessment, 2) design, maintenance, and operation of a safe facility, and 3) minimizing the consequences of accidental release if they occur. Although general duty by itself does not require the submission of an RMP, the general duty clause does require a risk management program that demonstrates that prevention measures are in place for any potential catastrophic release that could occur. The chemical and potential hazard associated with its particular use does not specifically have to be covered by EPA's list of regulated substances at 40 CFR§68.130. General duty could cover the release of any chemical, with or without a threshold quantity, which may pose imminent and substantial endangerment to the public (e.g., death or injury) and/or the environment.

⁷⁷ See discussion in sections 1 through 3 of this report, including references to the RMP rule and technical guidance documents, for additional legislative and regulatory background that would be helpful to understanding the specific requirements of the rule.

⁷⁸ Recommendations in Final Report of the Electronic Submissions Workgroup to the Accident Prevention Subcommittee of the Clean Air Act Advisory Committee, June 18, 1997

⁷⁹ Chlorine inventories are expected to exceed the threshold quantity at many installations due to its common use in water and wastewater treatment systems. Ammonia, sulfur dioxide, and flammables such as butane, methane and/or propane may also be found at some installations in amounts sufficient to trigger Section 112(r)(7) requirements.

To date, EPA has undertaken several inspections designed in part to determine compliance with Section 112(r)(1). Its most recent action has been a commitment made during EPA's Implementation Working Group (<http://www.epa.gov/swercepp/rmp-imp.html/>) deliberations to develop draft guidance on what needs to be done to demonstrate compliance with the general duty clause. As appropriate at a future date, EPA may issue policies or guidance on application of the general duty clause. In the absence of such guidance, it is important for DOE facilities to address all the known potential hazards that could arise from the handling, mixing (e.g., incompatible mixtures, see <http://www.sep.bnl.gov/scapa/chemmix.htm/> for information additive toxicity effects from mixtures and http://www.osha-slc.gov/HIB_data/HIB19960703.html/ for hazardous from water reactives), or using of listed and unlisted compounds that could result in significant off-site consequences. These considerations should be incorporated in the risk management planning process and as necessary in risk management program development. This planning is essential in building public trust and involving the community, which the EPA has strongly encouraged and emphasized.

As mentioned previously, effective as of January 6, 1998 (FR 635-645) the category of Division 1.1 explosives (as listed by DOT) was deleted from EPA's list of Section 112(r) regulated substances (under §86.130). However, the use and/or storage of explosives at DOE installations would still be covered under the 112(r) rule's general duty clause.

4.3 STEPS THAT DOE FACILITIES CAN TAKE TO COMPLY

The stepwise compliance overview outlined below is not intended to provide comprehensive or detailed guidance for decisions and considerations needed in complying with the RMP rule. Specifics on important factors need to be considered, such as organizing, coordinating, and implementing effective strategies for public involvement and the need to consider alternative methods beyond the Off-site Consequence Assessment (OCA) guidance for conducting the off-site consequence assessment.

4.3.1 Overview of Compliance Steps

To fulfill the requirements of Section 112 (r)(7) of the Act, DOE facilities need to follow a sequence of specific steps outlined in EPA's final rule (61 FR at 31667, June 20, 1996), and as presented in various EPA workshops and guidance materials. Compliance can be achieved by following the following seven major steps, as outlined below. Although the communication steps (in italics) are not mandated in the RMP rule, EPA has emphasized the importance of risk communication to successful and effective implementation of RMP programs.

- Is the DOE facility covered?
- How are a facility's processes covered?
- risk management plan (RMP) analyses
- risk management plan (RMP) summary
- facility and process(es) changes.

4.3.2 Establish facility's process coverage

DOE facilities will be covered by the final rule, if they have any regulated substance(s) in a process(es) at level(s) above threshold quantities (TQs). If this is the case, then the DOE facility must comply with additional steps explained below. If not, then the facility simply should monitor periodically for any changes in its process(es) that might add a regulated substance or push level(s) of an existing regulated substance(s) above its(their) TQ level(s). Periodic monitoring is required under the general duty clause in Section 112(r)(1) of the Clean Air Act.

4.3.3 Determine Program Level for covered process(es)

If a facility has determined that it is covered by the final rule, then it next must decide which process(es) at the facility is(are) covered. The first step in this process is to identify which process(es) at the facility involve regulated substance(s). Section 4.2 below provides additional detailed guidance on an efficient method for facilities to make these determinations.

Each process involving regulated substance(s) is assigned to one of three specific Program classifications established in the final rule. A process is classified in **Program 1** if:

- the process did **NOT** contribute to any off-site accident in the past five (5) years;
- there are **NO** public receptors within the worst case release zone encircling the facility; and,
- the facility's emergency response is coordinated with local responders.

If a process cannot meet all three conditions, then it will be assigned to either a **Program 2** or **Program 3** classification. If the process is subject to OSHA PSM requirements, then it is assigned to **Program 3**; otherwise, it is assigned to **Program 2**.

4.3.4 Comply, develop, and analyze the RMPlan elements and the RMProgram

Once covered processes have been assigned to a particular Program, the DOE facility must conduct a series of analyses to be included in the risk management plan (RMP). These analyses are summarized in a single RMP compiled across all covered processes at the facility. Table 3 shows that RMP requirements are greater for a Program 3 process than for a Program 2 process which in turn are greater than for those for a Program 1 process.

Processes assigned to either of the three Programs must perform the following RMP analyses:

- five-year accident history
- worst-case and alternative scenarios
- prevention program
- emergency response program.

4.3.4.1 Five-Year Accident History

For processes assigned to all three Program types, DOE facilities must document the five-year accident history. Even though processes were assigned to Program 1 based on the absence of off-site accidents in the past five years, DOE facilities must still go through this exercise for those processes, since they may have had an on-site accident that did not produce off-site consequences. Nevertheless, EPA wants this track record documented in the RMP for all

processes, regardless of Program assignment, in order to establish a baseline for the facility. For processes assigned to Program 3, many of the on-site factors included in this documentation can be abstracted from OSHA PSMs already completed. However, DOE facilities should be aware that for Program 3 processes that additional information, considering regulated substances not covered by OSHA PSMs, or addressing off-site consequences, will, as a rule, not be included in PSMs, and must be added to the RMP analysis.

4.3.4.2 Worst-Case and Alternative Scenarios

The worst-case analysis explores the consequences of off-site releases and is unique to the RMP process. Thus, for Program 3 processes, there is no parallel OSHA PSM analyses that a DOE facility can substitute for a worst-case analysis. Worst-case release conditions assume that only passive mitigation mechanisms operate, even though a DOE facility may have active mitigation mechanisms in place. Release types are limited to a set of default assumptions. DOE facilities have the option of employing air models other than default EPA models, but only by using worst-case conditions with the other models. Off-site receptors are not limited to just human receptors within the worst-case release zone; worst-case analyses must also identify, but not model, landmark institutions and environmental receptors. Although the basic procedures for a worst-case analysis are identical for all three Program types, processes assigned to Programs 2 and 3 are required to perform an alternative release scenarios that account for more typical or realistic release conditions, such as, release duration and quantity and meteorological conditions.

4.3.4.3 Prevention Programs

For processes assigned to all three Programs, a DOE facility must document accident prevention programs and summarize the findings in the RMP. For Program 1 processes, a DOE facility merely needs to certify that no additional steps are necessary to prevent accidents. In contrast, for Program 2 processes and Program 3 processes, a DOE facility must compile additional safety information for the RMP. For Program 2 processes, the additional safety information consists of the five procedures under 40 CFR §68.12(c), but the DOE facility must also update this information if any major change occurs in the operation of the facility. For Program 3 processes, a DOE facility must compile safety information describing the process itself. Much of this information should have already been collected for the PSM documentation that the facility has on file with OSHA. However, the final EPA rule adds a requirement that DOE facilities to submit material and energy balances for Program 3 processes built after June 21, 1999.

In addition to providing process safety information the other six elements of the Program 2 Prevention, include:

- 1. Hazard Review*** - For Program 2 processes, a DOE facility inventories causes of hazards, on a **facility-wide basis**, and steps to detect and prevent them from resulting in accidental releases. For these processes, a DOE facility must also monitor for facility procedural changes that merit an update of the hazard review. In contrast, for Program 3 processes, a DOE facility must conduct a hazard analysis on a **process level basis**. The process hazard analysis must be completed by June 21, 1999 and can use information available from the DOE facility's OSHA PSM. For processes assigned to both Programs 2 and 3, a DOE facility must conduct

Table 1: Summary of Risk Management Program Requirements

Risk Management Program requirements	Program 1	Program 2	Program 3
<u>Hazard Assessment</u>			
“Worst-case” analyses	Yes	yes	yes
Alternative releases	-	yes	yes
Five-year accident history	Yes	yes	yes
<u>Management System^a</u>			
Management system	-	yes	yes
Designation of qualified manager and/or implementation team	-	yes	yes
<u>Prevention Program^b</u>			
Process safety information	-	yes	yes
Hazard review ¹ /process hazard analysis ²	-	yes ¹	yes ²
Operating procedures	-	yes	yes
Training	-	yes	yes
Maintenance ¹ /mechanical integrity ²	-	yes ¹	yes ²
Incident investigation	-	yes	yes
Compliance audit	-	yes	yes
Management of change	-	-	yes
Pre-startup review	-	-	yes
Contractors	-	-	yes
Employee participation	-	-	yes
Hot work permits	-	-	yes
<u>Emergency Response Program</u>			
Coordination with local responders	Yes	Yes	yes
System-wide plan and program, consolidating existing plans	-	Yes	yes

^a Each program contained within the risk management plan is to be covered by an implementation plan to carry out specific program requirements. Though little appears in the regulations on this requirement, EPA considers this an important component of the program.

^b The prevention program established for the applicable RMP rule is essentially identical to the prevention program requirements of the PSM rules. For Program 3, RMP programs would need to be established for processes not covered by the PSM rules.

a new hazard review once every five-years.

2. **Operating Procedures** - Only for processes assigned to either Program 2 or 3, a DOE facility must develop operating procedures. For Program 2 processes, a DOE facility merely develops operating steps, and updates procedures if any major change in the Program 2 process occurs. For Program 3 processes, a DOE facility adds information on operating limits, safety and health, and safety systems and functions to operating steps. For those processes, a DOE facility must certify the accuracy of the operating procedures annually. Some information contained in OSHA PSM documentation may suffice to meet the requirements for operating procedures for Program 3 processes contained in the final EPA rule, nevertheless the DOE facility must recertify the operating procedures annually.
3. **Training** - A DOE facility must establish a training program under identical requirements for processes assigned to either Program 2 or 3. The training program: (1) allows DOE facilities to grandfather existing employees, who operate the process before June 21, 1999, by certifying their competency; (2) requires initial training for employees who do not operate the process until after June 21, 1999; and, (3) for all employees, requires a refresher training course every three (3) years thereafter.
4. **Maintenance Procedures** - A DOE facility must implement maintenance procedures for processes assigned to either Program 2 or 3. For Program 2 processes, a DOE facility merely implements general approaches, including training and inspections. However, for Program 3 processes, besides training and inspections, a DOE facility must address the mechanical integrity of Program 3 process equipment, including documented procedures and inspections, corrective procedures and a quality assurance (QA) program. DOE facilities may substitute existing OSHA PSM information for some of the requirements that apply to Program 3 processes.
5. **Incident Investigation** - A DOE facility must investigate incidents by following essentially the same procedures for either Program 2 and Program 3 processes. The only differences in procedures between the two process types is that for Program 2 processes, a DOE facility provides summary data, while for Program 3 processes, a report is required. In addition, for Program 3 processes, a DOE facility must: (1) deploy an investigation team; and, (2) establish an incident resolution system.
6. **Compliance Audits** - A DOE facility must conduct compliance audits using identical procedures for both Program 2 and Program 3 processes. Compliance audits are conducted once every three years.

The additional element covered under Program 3 Prevention include: management of change, Pre-startup review, contracts, employee participation and hot work permits.

4.3.4.4 Emergency Response Program

For processes assigned to all three Programs, a DOE facility must have an emergency response program in place. Although emergency response programs are generally written on a facility-wide basis, they must include procedures that anticipate accidents at processes assigned to the three Programs. For Program 1 processes, a DOE facility simply has to certify that it will coordinate with local responders. For Program 2 processes and Program 3 processes, a DOE facility must address the following additional items in its emergency response program: (1) more

details on coordination with external emergency responders; (2) mechanisms to notify external emergency responders; (3) consistency of the emergency response program with other Federal emergency response plans; and, (4) development of a detailed emergency response plan.

4.3.5 Develop and submit the RMPlan

After a facility has completed all the RMP analyses required by its covered processes' respective Program types, the separate analyses are consolidated into a single RMP summary written across all covered processes. For DOE facilities, sensitive information can be treated according to the procedures of the Classified Information Procedures Act, before facilities submit their RMPs to EPA. RMPs must be coordinated with air permits covering a facility. RMPs must be filed with EPA within certain time frames:

- (1) For facilities currently known to be covered, by June 21, 1999;
- (2) for an uncovered facility, immediately following the presence of a regulated substance above its TQ in any of the facility's processes; and,
- (3) within three (3) years of an EPA action to add a new regulated substance to the list.

4.3.6 Implement and maintain a current RMPlan and RMProgram

If a DOE facility changes a process, it may have to submit to EPA an update of the RMP, under certain conditions. Consequences that trigger an update include:

- Does the process change require a revised process hazard analysis or hazard review?
- Does the process change require a revised off-site consequence analysis?
- Does the process change alter the Program level of any covered process?

If a DOE facility meets any of the above three conditions, then the DOE facility must submit an updated RMP to EPA. In addition, on a periodic basis, a DOE facility must submit an updated RMP to EPA once every five years. At this point, the covered DOE facility returns to Section 4.1.1 above, and simply periodically monitors for any changes in individual process operations that might trigger RMP requirements.

4.4 THIS COMPLIANCE APPLICABILITY AND DETERMINATION RCAD GUIDE

This RCAD guide is specific to the first two steps outlined in Section 4.3.1. The guide is organized in three parts as follows:

- Part I: Background for completing Part II;
- Part II: Checklist, Information (RADD) Sheet, and Questionnaire; and
- Part III: Appendices: Listed Substances and Preliminary Chemical Inventories

Part I: The background needed to determine the applicability and program level for the RMP rule is provided in Part I of this Web Page planning guide. This part covers the rule's key definitions that will need to be understood in determining applicability. A sample applicability determination for chlorine (most commonly occurring chemical at or above RMP threshold across DOE complex) is given, along with a brief discussion of some possible applicability and compliance issues that may need to be addressed.

Part II: A “checklist” is incorporated in Part II of the Web Page, which is organized into three sections. Part II-a is a 2-page check-off form listing nine RMP listed chemicals most likely to be present at or above their respective threshold values. Reference to the other “Listed” chemicals (Part III, Appendix A) is also provided. Part II-b contains the RMP applicability determination and documentation (RADD) sheet to provide the essential information for determining and documenting the applicability of the RMP rule to your installation. It is important that this sheet be filled out for each process and each chemical above their respective listed threshold values. An addendum is provided for entering explanatory notes, as needed. Part II-c is an optional questionnaire that we would encourage and appreciate you taking a few minutes to complete. The data submitted in the forms will be reviewed and used by headquarters for determining DOE complex-wide compliance coverage for the EPA rule and assessing the need for coordination in implementing and/or integrating with other related programs (e.g., PSM, Chemical Safety Vulnerability review, SARs, BIOs, ... etc.).

Part III: This part of the guide is composed of three appendices. Appendix A (Table A-1) is provided as a handy reference, which gives the RMP “listed” chemical names, CAS Nos., and threshold values for the 140 RMP rule covered chemicals. For your convenience, the chemicals are grouped as gases, liquids, or water solutions that are toxic or flammable. Appendix D provides, for your reference, a list of chemicals identified to be present or in use at a select group of DOE installations (Table D-1) and an inventory of chemicals that could likely trigger the RMP rule (Table D-2). The data in the tables are provided to aid your identification of covered chemicals and processes that may trigger an RMP at your installation. The EH-41 office expects that each installation would have available more up-to-date, detailed, and complete information on chemical inventories and thus you should not solely rely on this data for your applicability determinations. Any feedback you may have on the accuracy or completeness of the data given in Tables D-1 and D-2 in Appendix D should be provided on the RADD sheet in Part II-b of this guide (Web page). Appendix E in Part III lists some typical uses and locations (“process”) of EPA listed RMP chemicals. This information was extracted from the Navy Hazardous Material Information System (HMIS) database and may not necessarily be representative of typical chemical uses or represent a complete list of chemicals at your specific facilities¹. The designated representative responsible at each installation for completing the attached checklist sheet(s) in Part II (Table 1) is strongly encouraged to refer to Part III-a (Appendix A, Table A.1.1, A.1.2, A.1.3, A.2.1, and A.2.2) and b (Appendix C, Table C.1) of this RCAD package for a complete list of the RMP regulated chemicals.

It is important to note that the EPA rule requires RMP reviews and updates in the submitted and approved plan if significant changes might reasonably be expected in processes, quantities stored or handled, or any other aspect of the stationary source. Changes that increase or decrease the distance to the endpoint by a factor of two or more, will require the owner or operator to complete a revised analysis within six months of the change and submit a revised risk management

¹ The enclosed “Some Typical Uses of Listed Section 112(r) Substances at DOD Installations” (Part III, Appendix E) was generated by cross-referencing the Section 112(r) list of toxic chemicals and flammable substances against the HMIS CD-ROM. Output from the cross-index yielded materials likely to contain Section 112(r) chemicals. *This listing is not comprehensive.* It is intended that institutional knowledge combined with the chemical use list as a “memory jogger” will provide a complete applicability review.

plan (as provided in Sec. 68.190 of the rule). It is therefore important to anticipate and plan for changes to avoid reanalysis and resubmittal of your RMPs before the 5-year review and update cycle specified in the rule.

4.4.1 **Part I: Definitions, Sample Determinations, and Applicability Issues**

4.4.1.1. Application of Definitions Relevant to Applicability Determinations

In determining RMP Rule applicability, the definitions given in the rule must be understood by installation personnel. The EPA definitions from the final rule (40 CFR 68.3) are italicized below and followed by a brief discussion to aid in its application and understanding in complying with the rule. The reader is referred to Section 3.1 of this report for a complete set of RMP rule definitions.

- a. ***Covered Process** means a process that has a regulated substance present in more than a threshold quantity as determined under Sec. 68.115.*

This would cover 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.

If hazardous material is brought on-site to a warehouse and then transported on-site, the storage, transport, and use could be defined as one “process”. The concept of any group of vessels that could be involved in a potential release is integral to this definition (see note to paragraph (f) below).

- b. ***Public receptor** means off-site 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.*

Other examples of “public receptors” would be industrial, commercial, and office buildings, parks, and recreational areas. The use of the terms “**public**” and “**off-site**” in the definition of “public receptor” and as defined in the rule highlight the applicability of the rule to situations in which on-site areas could be defined as “public receptors” and therefore subject to inclusion in the rule’s hazard or off-site consequence assessment. If, for example, the required “worst-case” hazard assessment for a “**covered process**” (or conceivably for a chemical covered under the general duty provision) produces hazard zones (or distances to toxic or flammable endpoints) that could cover “public receptors,” then the rule would apply at the Program 2 or 3 level (see discussion of difference in RMP Program Levels in Section 3.3 of this report.)

- c. **Public** means any person except employees or contractors at the stationary source. By this definition, public would include laboratory visitors and retirees, as well as members of the general public.
- d. **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.

The definitions for facility “**covered process**” and “**threshold quantity**”, provided above, should be used in source applicability determinations (e.g. exceedance of a chemical’s threshold quantity at a given process).

As recommended by most commentaries, the EPA is retaining the threshold determination based on the total quantity in a process, using the same covered process definition. This approach focuses on the quantity of a substance that might be released in a single accident and that could be reasonably anticipated to cause effects of concern because of the release. This threshold determination approach is consistent with OSHA’s PSM standard.

The critical point to note is that the threshold can only be exceeded within a “single process” (as defined in (b) above) and must be capable of being released in a single catastrophic accident.

It is important to plan for potential chemical inventories that may eventually exceed an applicable threshold. This planning would avoid the 6-month RMP review and update requirement built into the RMP rule for stationary sources that do not adequately plan for changes that might occur over a 5-year period (RMPs required update period). Inventory or “process changes” that might reasonably be expected to increase or decrease the distance to the endpoint by a factor of two or more would require the owner or operator to complete a revised analysis within six months of the change and submit a revised risk management plan. The rule also states that “If a new substance or new process is added, the RMP will need to be revised and submitted by the date the substance is first in the process above the threshold quantity.”

- e. **Off-site** 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.

4.4.1.2 Applicability Determination – Chlorine Examples

Chlorine is a regulated substance under §68.130 with a listed threshold quantity of 2,500 pounds.

- a. The presence of 1,400 pounds of chlorine at the wastewater treatment plant and 1,300 pounds at the drinking water plant (total 2,700 pounds) would not normally trigger an RMP submittal requirement at such a plant. The exception is that an accidental or catastrophic event (e.g., a Boiling Liquid Expanding Vapor Explosion [BLEVE]) at one plant along with the proximity of the vessels containing chlorine at each plant could involve a simultaneous

release at both plants. This facility would not have to report chlorine unless the installations were in close proximity or in the unusual case that chlorine containers from both installations were connected via process piping.

- b. An installation that has two 1-ton cylinders of chlorine (4,000 pounds total) at the wastewater treatment plant and 1,000 pounds of chlorine at the drinking water plant would trigger the Section 112(r) requirements as a single covered process (the wastewater treatment plant). If a catastrophic event at the wastewater treatment plant does not involve the chlorine at the drinking water plant, the chlorine at the drinking water plant would not trigger the applicability threshold.
- c. If the installation has two 1-ton cylinders at the treatment plant and two 1-ton cylinders at the drinking water plant, the installation would trigger the Section 112(r) requirements, as two covered processes involving one listed chemical.
- d. In contrast to scenario c. above, if an installation exceeds the threshold for chlorine and sulfur dioxide in its wastewater treatment plant, this installation would have two listed chemicals in one covered process.

Special Note on Chlorine: Most swimming pools are not expected to be considered covered processes since most use solid disinfectants (such as the commercially available product, HT). These substances are often called “chlorine” but are not. The active component in these substances is usually a form of hypochlorite, which is not a Section 112(r) listed substance. Only chlorine gas (usually found in cylinders, under pressure) is listed under §68.130.

4.4.1.3. Other Applicability Concerns

Mixture Rule Examples (See 40 CFR 68.115 and discussion in Sec. 3.2 of this report for further background).

- (1) Mixtures containing 112(r) listed **toxic chemicals** present at a concentration of one percent or greater by weight must be considered when determining if threshold amounts are exceeded. Only the weight of the listed chemical(s) in the mixture is considered for determining the threshold (e.g., total weight of mixture multiplied by the weight percentage of the listed chemical). **Partial pressure exemption**: Mixtures containing regulated flammable substances are exempt from 112(r) eligibility if the facility demonstrates that the partial pressure of the regulated substance in the mixture under all storage or handling conditions is less than 10 mm Hg.
- (2) Mixtures containing 112(r) listed **flammable substances** present at a concentration of one percent or greater by weight must also be considered. In this case, the entire weight of the mixture, not just the chemical present, is applied to threshold determination. **Flammability exemption**: Mixtures containing regulated flammable substances are exempt from threshold determination if the facility demonstrates that the mixture itself does not meet the criteria for flammability: flash point below 73°F and boiling point below 100°F.

Warehouses and on-site transport personnel should be aware that in threshold quantity determinations one must consider not only the threshold amounts in processes but also the amounts of chemicals in warehouse storage and in intra-installation transportation of chemicals.

Concerning storage of chemicals, large storage containers (above-ground tanks) would be expected to fall under the “potentially involved in a single catastrophic release” concept. Even a large collection of drums could possibly meet this definition. In the case of large amounts of small containers (e.g., hundreds or even thousands of 1 gallon cans), it is recommended that installation personnel seek the opinion of safety experts and/or local fire departments to determine if the listed chemical could possibly be involved in a single catastrophic release. The U.S. EPA is currently working with the Warehouse Association in developing a model RMP Plan for warehouses.

4.4.2 **Part II: RCAD Checklist, Information Sheet, and Questionnaire**

4.4.2.1 *Chemicals “Most Likely Present” Checklist*

The following nine substances in Table 1 are an initial list of chemicals that most likely would be present at a majority of DOE installations. It is recommended that facilities at these installations place first priority on specifically investigating these initial substances to determine whether they currently or potentially will be present on-site at greater than threshold quantities. The applicability determination and documentation sheet (Part II-b, Table 2), should be filled out for each chemical that is checked off in Table 1 and for each process for which that chemical is above its threshold value. Where possible the most probable locations for these chemicals are identified in the table.

Table 2. Chemicals Most Likely to Exceed Threshold	
_____	Chlorine (<i>threshold = 2,500 pounds</i>): Check for the use of chlorine water disinfection at wastewater treatment plants or drinking water plants. Installations that receive drinking water from local municipalities and/or send wastewater to local Publicly Owned Treatment Works may not exceed a chlorine threshold. If disinfection of water does occur on-site, determine the amount of chlorine used at the various locations. Note that only chlorine is listed. Common disinfection chemicals such as calcium hypochlorite or other “solid” disinfection chemicals are not reportable.
_____	Sulfur Dioxide (<i>threshold = 5,000 pounds</i>): This substance is used in wastewater treatment plants on some installations. It can exist for other water treatment, chemical reactant, manufacturing, or process purposes. Only anhydrous sulfur dioxide is listed.
_____	Anhydrous Ammonia (<i>threshold = 10,000 pounds and 20,000 pounds for solutions</i>): Only anhydrous ammonia and ammonia at greater than 20 percent concentration are listed in the RMP rule.
_____	Hydrochloric Acid (<i>threshold = 15,000 pounds or 5,000 pounds for the anhydrous form</i>): Hydrochloric acid is commonly used in industrial and laboratory applications. It is only reportable via the RMP if it exists at greater than 30 percent concentration.
_____	Nitric Acid (<i>threshold = 15,000 pounds</i>): Nitric acid is commonly used in industrial and laboratory applications. It is only reportable via the RMP if it exists at greater than 80 percent concentration.

Table 2 (Cont.)	
_____	Propane (<i>threshold = 10,000 pounds</i>): Propane is used primarily as a fuel for space heating and for vehicle use. Propane storage can be large for installations without natural gas pipelines and central heating plants. Propane tanks can be especially large if used for heating buildings. If large propane tanks are being used, the installation's contract and facility engineer's offices should be aware of them.
_____	Methane (<i>threshold = 10,000 pounds</i>): Installation of natural gas (methane) pipelines will not trigger RMP requirements unless a Compressed Natural Gas (CNG) storage system is used. If large methane tanks are being used, or are planning to be used, the installation's contract, facilities engineer's office should be aware of them.
_____	Butane and Propane as propellants (<i>thresholds = 10,000 pounds</i>): Propane is noted above as a common fuel. Both butane and propane may exist in large quantities in warehousing operations that store aerosol cans. Many aerosols use butane and/or propane as the propellant mixture.

4.4.2.2 Other Chemicals of Concern

Once the initial list of chemicals is addressed, other chemicals and their potential hazards should be investigated. As further support in identifying inventories of hazard, installations are advised to check spill plans and Emergency Planning and Community Right-to-Know Act inventories against the "List Rule" toxic and flammable substances. As an aid to identifying chemicals that might be present and subject to the rule, Appendix E provides a description of typical chemical uses for the listed chemicals found at DOD Installations. The "List Rule" chemicals, set out in this guidance in Appendix A should be referenced for the complete list of covered chemicals. Although not required at this time, inventories that could fall under the RMP rule's "general duty" clause (see discussion in Section 4.2) should be identified for compliance implementation planning.

4.4.2.3 Installation RMP Applicability Determination and Documentation

The following, Table 2, provides all of the relevant information and data that would be necessary to collect in determining and documenting applicability of the RMProgram and determining the Program Level that would apply, including some of the "data elements" that EPA has identified as necessary for preparation of your RMPlan and implementation of your RMProgram (see Section 4.3 for the distinctions between the Plan and the Program). Please note that a separate RADD sheet should be used for each listed chemical determined to be in present in excess of the applicable threshold values at any on-site location. If no processes are currently covered at your installation, this exercise will provide you with the documentation necessary to demonstrate that conclusion to the designated regulatory compliance authority.

Table 3: RMP Applicability Determination and Documentation Sheet*

Installation Name: _____

Sheet 1 of _____

1.	Chemical Name and CAS# (Listed or Regulated Chemical, see Appendix A and Appendix E of Part III), describe the primary use of this chemical.	Name/CAS#: _____ Use [∇] : _____ Quantity: _____ Physical state: _____
2.	Covered Process (see Sec. 3.1 definitions)	
	Description [∇] _____ _____ _____	_____ _____ _____
	Location _____ _____	_____ _____
3.	Maximum Amount [♦]	_____ lbs. [∇]
4.	Installation RMP Contact: _____	Process Contact: _____
	Name: _____	Name: _____
	Address: _____ _____ _____	Address: _____ _____ _____
	Phone/Fax: _____	Phone/Fax: _____
	e-Mail: _____	e-Mail (if applicable): _____
5.	Five year Release History [∇] Has there been any release (e.g. spill) of a listed substance over the past five years which has resulted in off-site death or injury or may have led to environmental response or restoration activities (e.g., soil remediation, shut-off of drinking water, isolation, replacement of vegetation)?	_____ Yes _____ No Explanatory Notes: _____ _____ _____ _____
6.	Distance to Nearest Public Receptor: (e.g., residence, churches, hospitals, schools, parks, recreation areas, on-site public access facilities, such as museums, housing, etc.).	_____ ft or m (circle appropriate unit) Explanatory Notes [∇] : _____ _____ _____
7.	Is the process covered by the OSHA PSM Standard (29 CFR 1910.119)?	_____ Yes _____ No Explanatory Notes [∇] : _____ _____

Reproduce this page for each Section 112(r) substance exceeding a threshold at each process. See discussion in Sec. 3.4 and 4.3.5 of this report if classified or sensitive information is of concern.

NOTES: For assistance in this data-form, refer to background information in Sec. 4.1 and 4.2, and the RCAD guidance in Sec. 4.4 of this report. [∇] See Supplemental Notes sheet, next page, for adding additional notes.

[♦] Historical or expected anticipated maximum inventory for this chemical

4.4.2.4 RCAD Questionnaire - Optional Program Planning Questions

As mentioned previously, the RCAD guide alone is not intended to provide the steps required for determining a facility's Program Level. Section 3.3 of this report provides guidance for these determinations. Facility or installation compliance managers who would like assistance in applying the data collected on the RADD sheets for establishing facility Program Level or would like a confirmation of your own determinations should indicate your preference on this questionnaire. Other needs for compliance assistance can also be identified.

- | | | |
|--|-----|----|
| 1. Will you prepare RMP with current in-house capabilities? | yes | no |
| 2. Are you currently receiving RMP assistance? | yes | no |
| If yes, who is the contractor: _____ | | |
| 3. Would you like direct Program Level determination assistance or confirmation of your own determinations? | yes | no |
| 4. Would you like assistance in preparing your RMP? | yes | no |
| If yes, would you like recommendations on contractors who are best qualified to provide the expertise needed in providing RMP assistance? | | |
| | yes | no |
| 5. Special areas where assistance is needed: | | |
| Entire RMPlan preparation and/or RMProgram implementation: | yes | no |
| <u>Consequence modeling:</u> | yes | no |
| <u>Process safety:</u> | yes | no |
| <u>Emergency response:</u> | yes | no |
| <u>Hazard assessment:</u> | yes | no |
| <u>Management system:</u> | yes | no |
| <u>Public outreach:</u> | yes | no |
| 6. If answer to the item 7 question on the RADD sheet is yes (covered by OSHA PSM rule), what is your current OSHA compliance status? _____ Did the DOE handbooks ¹ covering the rule help your compliance effort? _____ | | |
| 7. Comment on the RMP, 112 (r), guidance accompanying this questionnaire. Is its coverage and emphasis at an appropriate level? If an update were necessary, what additional guidance would be helpful to your compliance needs? _____ | | |
| _____ | | |
| _____ | | |
| _____ | | |
| _____ | | |
| _____ | | |

¹ DOE-HDBK-1101-96, Process Safety Management for Highly Hazardous Chemicals, Feb. 1996 and DOE-HDBK-1000-96, Chemical Process Hazards Analysis, Feb. 1996

APPENDICES

Part III: Appendix A, D, and E provides listed chemicals, a list of probable chemicals present at DOE installations, and a preliminary indication of DOE complex use and locations of RMP and/or OSHA listed chemicals above threshold quantities.

APPENDIX A: LISTED TOXIC AND FLAMMABLE SUBSTANCES AND THRESHOLDS

Table A.1.1 TOXIC GASES*

CAS NUMBER	CHEMICAL NAME	THRESHOLD QUANTITIES (lbs)
7664-41-7	Ammonia	10,000.0
7784-42-1	Arsine	1000.0
10294-34-5	Boron trichloride	5000.0
7637-07-2	Boron trifluoride	5000.0
7782-50-5	Chlorine	2500.0
10049-04-4	Chlorine dioxide	1000.0
506-77-4	Cyanogen chloride*	10,000.0
19287-45-7	Diborane	2500.0
75-21-8	Ethylene oxide	10,000.0
7782-41-4	Fluorine	1000.0
50-00-0	Formaldehyde (anhydrous)	15,000.0
74-90-8	Hydrocyanic acid	2500.0
7647-01-0	Hydrogen chloride (anhydrous)	5000.0
7664-39-3	Hydrogen fluoride (anhydrous)	1000.0
7783-07-5	Hydrogen selenide*	500.0
7783-06-4	Hydrogen sulfide	10,000.0
74-87-3	Methyl chloride	10,000.0
74-93-1	Methyl mercaptan	10,000.0
10102-43-9	Nitric oxide	10,000.0
75-44-5	Phosgene	500.0
7803-51-2	Phosphine	5000.0
7446-09-5	Sulfur dioxide (anhydrous)	5000.0
7783-60-0	Sulfur tetrafluoride	2500.0

♦ If any substance in this table is present above the listed threshold at your facility, please fill out the RADD information sheet for this chemical (Table 2, Section 4.3.2.3).

* Not included in Appendix E list of chemicals.

Table A.1.2 TOXIC LIQUIDS*

CAS NUMBER	CHEMICAL NAME	THRESHOLD QUANTITIES (lbs)
107-02-8	Acrolein	5000.0
107-13-1	Acrylonitrile	20,000.0
814-68-6	Acrylyl chloride*	5000.0
107-18-6	Allyl alcohol	15,000.0
107-11-9	Allylamine*	10,000.0
7784-34-1	Arsenous trichloride	15,000.0
353-42-4	Boron trifluoride, with methyl ether (1:1)*	15,000.0
7726-95-6	Bromine	10,000.0
75-15-0	Carbon disulfide	20,000.0
67-66-3	Chloroform	20,000.0
542-88-1	Chloromethyl ether*	1000.0
107-30-2	Chloromethyl methyl ether*	5000.0
4170-30-3	Crotonaldehyde	20,000.0
123-73-9	Crotonaldehyde, (E)-*	20,000.0
108-91-8	Cyclohexylamine	15,000.0
75-78-5	Dimethyldichlorosilane	5000.0
57-14-7	1,1-Dimethylhydrazine*	15,000.0
106-89-8	Epichlorohydrin	20,000.0
107-15-3	Ethylendiamine	20,000.0
151-56-4	Ethyleneimine	10,000.0
110-00-9	Furan*	5000.0
302-01-2	Hydrazine	15,000.0
13463-40-6	Iron, pentacarbonyl-*	2500.0
78-82-0	Isobutyronitrile*	20,000.0
108-23-6	Isopropyl chloroformate*	15,000.0
126-98-7	Methacrylonitrile	10,000.0
79-22-1	Methyl chloroformate	5000.0
60-34-4	Methyl hydrazine*	15,000.0
624-83-9	Methyl isocyanate*	10,000.0
556-64-9	Methyl thiocyanate*	20,000.0
75-79-6	Methyltrichlorosilane	5000.0
13463-39-3	Nickel carbonyl*	1000.0
7697-37-2	Nitric acid (100%)	15,000.0
79-21-0	Peracetic acid	10,000.0
594-42-3	Perchloromethylmercaptan*	10,000.0

♦ If any substance in this table is present above the listed threshold at your facility, please fill out the RADD information sheet for this chemical (Table 2, Section 4.3.2.3).

* Not included in Appendix E list of chemicals.

Table A.1.2 TOXIC LIQUIDS[♦] (Cont.)

CAS NUMBER	CHEMICAL NAME	THRESHOLD QUANTITIES (lbs)
10025-87-3	Phosphorous oxychloride	5000.0
7719-12-2	Phosphorous trichloride	15,000.0
110-89-4	Piperidine	15,000.0
107-12-0	Propionitrile*	10,000.0
109-61-5	Propyl chloroformate*	15,000.0
75-55-8	Propyleneimine*	10,000.0
75-56-9	Propylene oxide	10,000.0
7446-11-9	Sulfur trioxide	10,000.0
75-74-1	Tetramethyllead*	10,000.0
509-14-8	Tetranitromethane	10,000.0
7550-45-0	Titanium tetrachloride	2,500.0
584-84-9	Toluene 2,4-diisocyanate	10,000.0
91-08-7	Toluene 2,6-diisocyanate	10,000.0
26471-62-5	Toluene diisocyanate (unspecified isomer)	10,000.0
75-77-4	Trimethylchlorosilane	10,000.0
108-05-4	Vinyl acetate monomer	15,000.0

Table A.1.3 TOXIC WATER SOLUTIONS[♦]

CAS NUMBER	CHEMICAL NAME	THRESHOLD QUANTITIES (lbs)
7664-41-7	Ammonia (20%)	20,000.0
50-00-0	Formaldehyde	15,000.0
7647-01-0	Hydrochloric acid (30%)	15,000.0
7664-39-3	Hydrofluoric acid (50%)	1,000.0
7697-37-2	Nitric acid (80%)	15,000.0
8014-95-7	Oleum	10,000.0

[♦] If any substance in this table is present above the listed threshold at your facility, please fill out the RADD information sheet for this chemical (Table 2, Section 4.3.2.3).

* Not included in Appendix E list of chemicals.

Table A.2.1 FLAMMABLE GASES*

CAS NUMBER	CHEMICAL NAME	THRESHOLD QUANTITIES (lbs)
75-07-0	Acetaldehyde	10,000.0
74-86-2	Acetylene	10,000.0
598-73-2	Bromotrifluoroethylene*	10,000.0
106-99-0	1,3-Butadiene	10,000.0
106-97-8	Butane	10,000.0
25167-67-3	Butene	10,000.0
590-18-1	2-Butene-cis*	10,000.0
624-64-6	2-Butene-trans*	10,000.0
106-98-9	1-Butene*	10,000.0
107-01-7	2-Butene	10,000.0
463-58-1	Carbon oxysulfide	10,000.0
7791-21-1	Chlorine monoxide*	10,000.0
557-98-2	2-Chloropropylene*	10,000.0
460-19-5	Cyanogen	10,000.0
75-19-4	Cyclopropane*	10,000.0
4109-96-0	Dichlorosilane	10,000.0
75-37-6	Difluoroethane	10,000.0
124-40-3	Dimethylamine	10,000.0
463-82-1	2,2-Dimethylpropane*	10,000.0
74-84-0	Ethane	10,000.0
107-00-6	Ethyl acetylene*	10,000.0
75-04-7	Ethylamine	10,000.0
75-00-3	Ethyl chloride	10,000.0
74-85-1	Ethylene	10,000.0
109-95-5	Ethyl nitrite*	10,000.0
1333-74-0	Hydrogen	10,000.0
75-28-5	Isobutane	10,000.0
74-82-8	Methane	10,000.0
74-89-5	Methylamine	10,000.0
563-45-1	3-Methyl-1-butene*	10,000.0
115-10-6	Methyl ether	10,000.0
115-11-7	2-Methylpropene	10,000.0
504-60-9	1,3-Pentadiene	10,000.0
463-49-0	Propadiene	10,000.0
74-98-6	Propane	10,000.0

♦ If any substance in this table is present above the listed threshold at your facility, please fill out the RADD information sheet for this chemical (Table 2, Section 4.3.2.3).

* Not included in Appendix E list of chemicals.

Table A.2.1 FLAMMABLE GASES[♦] (cont.)

CAS NUMBER	CHEMICAL NAME	THRESHOLD QUANTITIES (lbs)
115-07-1	Propylene	10,000.0
74-99-7	Propyne	10,000.0
7803-62-5	Silane	10,000.0
116-14-3	Tetrafluoroethylene	10,000.0
79-38-9	Trifluorochloroethylene	10,000.0
75-50-3	Trimethylamine	10,000.0

Table A.2.2 FLAMMABLE LIQUIDS

CAS NUMBER	CHEMICAL NAME	THRESHOLD QUANTITIES (lbs)
689-97-4	Vinyl acetylene*	10,000.0
75-01-4	Vinyl chloride	10,000.0
75-02-5	Vinyl fluoride*	10,000.0
75-38-7	Vinylidene fluoride*	10,000.0
107-25-5	Vinyl methyl ether*	10,000.0
590-21-6	1-Chloropropylene*	10,000.0
60-29-7	Ethyl ether	10,000.0
75-08-1	Ethyl mercaptan	10,000.0
78-78-4	Isopentane	10,000.0
78-79-5	Isoprene	10,000.0
75-31-0	Isopropylamine	10,000.0
75-29-6	Isopropyl chloride*	10,000.0
563-46-2	2-Methyl-1-butene*	10,000.0
107-31-3	Methyl formate	10,000.0
109-66-0	Pentane	10,000.0
109-67-1	1-Pentene*	10,000.0
646-04-8	2-Pentene, (E)-	10,000.0
627-20-3	2-Pentene, (Z)-	10,000.0
75-76-3	Tetramethylsilane	10,000.0
10025-78-2	Trichlorosilane*	10,000.0
109-92-2	Vinyl ethyl ether	10,000.0
75-35-4	Vinylidene chloride	10,000.0

[♦] If any substance in this table is present above the listed threshold at your facility, please fill out the RADD information sheet for this chemical (Table 2, Section 4.3.2.3).

* Not included in Appendix E list of chemicals.

APPENDIX B: RISK MANAGEMENT PLAN DATA ELEMENTS

1. REGISTRATION

1.1 Source identification

a. Name	g. Latitude
b. Street	h. Longitude
c. City	e. State
d. County	f. Zip

1.2 Source Dun and Bradstreet number (if applicable)

1.3 Corporate Company (if applicable)

- a. Name of corporate parent company (if applicable)
- b. Dun and Bradstreet number of corporate parent company (if applicable)

1.4 Owner/operator

- a. Name _____
- b. Phone _____
- c. Mailing address: _____

1.5 Name and title of person responsible for Part 68 implementation: _____

1.6 Emergency contact

- a. Name _____
- b. Title _____
- c. Phone _____
- d. 24-hour phone _____

1.7 For each covered process:

1. Chemical Name	Process/Source Name or I.D	2. CAS number	3. Quantity	4. SIC code	5. Program level
a.					
b.					
c.					

1.8 EPA Identifier _____ 1.9 Number of full-time employees _____

1.10 Covered by:

- a. OSHA PSM Yes No
- b. EPCRA Section 302 Yes No
- c. CAA Title V operating permit Yes No

- 1.11 Last safety inspection a. _____ Date
By:
b. ___ OSHA
c. ___ State OSHA
d. ___ EPA
e. ___ State EPA
f. ___ Fire department
g. ___ Other (specify)
h. ___ Not applicable

2. TOXICS: WORST CASE (complete at least one)

2.1 Chemical name

2.2 Physical state a. ___ Gas b. ___ Liquid

2.3 Results based on

- a. ___ Reference table
a. ___ Reference table b. ___ Modeling, Code used: _____

2.4 Scenario

- a. ___ Explosion c. ___ Toxic gas release
b. ___ Fire d. ___ Liquid spill and vaporization

2.5 Quantity released _____ lbs 2.6 Release rate _____ lbs/min.

2.7 Release duration (if modeled) _____ min.

2.8 Wind speed _____ m/sec 2.9 Stability class _____

2.10 Topography (check one) a. ___ Urban b. ___ Rural

2.11 Distance to endpoint _____ miles

2.12 Residential population within distance (number) _____

2.13 Public receptors (check all that apply)

- a. ___ Schools d. ___ Prisons
b. ___ Residences e. ___ Public recreational areas or arenas
c. ___ Hospitals f. ___ Major commercial, office, or industrial areas

2.14 Environmental receptors within distance (check all that apply)

- a. ___ National or state parks, forests, or monuments
b. ___ Officially designated wildlife sanctuaries, preserves, or refuges
c. ___ Federal wilderness areas

2.15 Passive mitigation considered (check all that apply)

- a. Dikes
- b. Enclosures
- c. Berms
- d. Drains
- e. Sumps
- f. Other (specify)

3. TOXICS: ALTERNATIVE RELEASES (complete for each toxic)

3.1 Chemical

3.2 Physical state a. Gas b. Liquid

3.3 Results based on:

- a. Reference table
- a. Reference table b. Modeling, Code used: _____

3.4 Scenario (check one)

- a. Transfer hose failure
- b. Pipe leak
- c. Vessel leak
- d. Overfilling
- e. Rupture disk/relief valve
- f. Excess flow valve failure
- g. Other (specify) _____

3.5 Quantity released _____ lbs 3.6 Release rate _____ lbs/min.

3.7 Release duration _____ min.

3.8 Wind speed _____ m/sec 3.9 Stability class _____

3.10 Topography (check one) a. Urban b. Rural

3.11 Distance to endpoint _____ miles

3.12 Residential population within distance (number) _____

3.13 Public receptors (check all that apply)

- a. Schools
- b. Residences
- c. Hospitals
- d. Prisons
- e. Public recreational areas or arenas
- f. Major commercial, office, or industrial areas

3.14 Environmental receptors within distance (check all that apply)

- a. National or state parks, forests, or monuments
- b. Officially designated wildlife sanctuaries, preserves, or refuges
- c. Federal wilderness areas

3.15 Passive mitigation considered (check all that apply)

- a. Dikes
- b. Enclosures
- c. Berms
- d. Drains
- e. Sumps
- f. Other (specify)

3.16 Active mitigation considered (check all that apply)

- a. Sprinkler systems
- b. Deluge system
- c. Water curtain
- d. Neutralization
- e. Excess flow valve
- f. Flares
- g. Scrubbers
- h. Emergency shutdown systems
- i. Other (specify)

4. FLAMMABLES WORST CASE (complete one)

4.1 Chemical

4.2 Results based on (check one)

- a. Reference table
- b. Modeling, Code used: _____

4.3 Scenario (check one)

- a. Vapor cloud explosion
- b. Fireball

4.4 Quantity released _____ lbs

4.5 Endpoint used _____

4.6 Distance to endpoint _____ miles

4.7 Residential population within distance (number) _____

4.8 Public receptors (check all that apply)

- a. Schools
- b. Residences
- c. Hospitals
- d. Prisons
- e. Public recreational areas or arenas
- f. Major commercial, office, or industrial areas

4.9 Environmental receptors within distance (check all that apply)

- a. National or state parks, forests, or monuments
- b. Officially designated wildlife sanctuaries, preserves, or refuges
- c. Federal wilderness areas

4.10 Passive mitigation considered (check all that apply)

- a. Dikes
- b. Fire walls
- c. Blast walls
- d. Enclosures
- e. Other (specify)

5. FLAMMABLES ALTERNATIVE RELEASES (complete one)

5.1 Chemical

5.2 Results based on (check one)

- a. Reference table
- b. Modeling
- c. Model used _____

5.3 Scenario (check one)

- a. Vapor cloud explosion
- b. Fireball
- c. BLEVE
- d. Pool fire
- e. Jet fire
- f. Vapor cloud fire

5.4 Quantity released _____ lbs

5.5 Endpoint used _____

5.6 Distance to endpoint _____ miles

5.7 Residential population within distance (number) _____

5.8 Public receptors (check all that apply)

- a. Schools
- b. Residences
- c. Hospitals
- d. Prisons
- e. Public recreational areas or arenas
- f. Major commercial, office, or industrial areas

5.9 Environmental receptors within distance (check all that apply)

- a. National or state parks, forests, or monuments
- b. Officially designated wildlife sanctuaries, preserves, or refuges
- c. Federal wilderness areas

5.10 Passive mitigation considered (check all that apply)

- a. Dikes
- b. Fire walls
- c. Blast walls

5.11 Active mitigation considered (check all that apply)

- a. ___ Sprinkler systems
- b. ___ Deluge system
- c. ___ Water curtain
- d. ___ Excess flow valve

6. FIVE-YEAR ACCIDENT HISTORY (complete the following for each release)

6.1 Date _____ 6.2 Time _____

6.3 Release duration _____

6.4 Chemical(s)

6.5 Quantity released (lbs) _____

6.6 Release event

6.7 Release source

- a. ___ Gas release
- b. ___ Liquid spill/evaporation
- c. ___ Fire
- d. ___ Explosion

- a. ___ Storage vessel
- b. ___ Piping
- c. ___ Process vessel
- d. ___ Transfer hose
- e. ___ Valve
- f. ___ Pump

6.8 Weather conditions at time of event (if known)

- a. Wind speed/direction _____
- b. Temperature _____
- c. Stability class _____
- d. Precipitation present _____
- e. Unknown _____

6.9 On-site impacts

- a. Deaths _____ (number)
- b. Injuries _____ (number)
- c. Property damage (\$) _____

6.10 Known off-site impacts

- a. Deaths _____ (number)
- b. Hospitalizations _____ (number)
- c. Other medical treatment _____ (number)
- d. Evacuated _____ (number)
- e. Sheltered _____ (number)
- f. Property damage (\$) _____
- g. Environmental damage _____ (specify type)

6.11 Initiating event

- a. Equipment failure
- b. Human error
- c. Weather condition

6.12 Contributing factors (check all that apply)

- a. Overpressurization
- b. Upset condition
- c. By-pass condition
- d. Maintenance activity/Inactivity
- e. Process design
- f. Unsuitable equipment
- g. Unusual weather condition
- h. Management error

6.13 Off-site responders notified a. Yes b. No

6.14 Changes introduced as a result of the accident

- a. Improved/upgrade equipment
- b. Revised maintenance
- c. Revised training
- d. Revised operating procedures
- e. New process controls
- f. New mitigation systems
- g. Revised emergency response plan
- h. Changed process
- i. Reduced inventory
- j. Other
- k. None

7. PREVENTION PROGRAM -- PROGRAM 3 (For Each Program 3 Process)

7.1 SIC code for process _____

7.2 Name of substance(s) covered

- a. _____
- b. _____
- c. _____

7.3 Date on which the safety information was last reviewed or revised

7.4 PHA

a. The date of completion of the most recent PHA or update

b. The technique used

- 1. What If

2. Checklist
3. What If/Checklist
4. HAZOP
5. Failure Mode and Effects Analysis
6. Fault Tree Analysis
7. Other

c. The expected date of completion of any changes resulting from the PHA

d. Major hazards identified (check all that apply)

1. Toxic release
2. Fire
3. Explosion
4. Runaway reaction
5. Polymerization
6. Overpressurization
7. Corrosion
8. Overfilling
9. Contamination
10. Equipment failure
11. Loss of cooling, heating, electricity, instrument air
12. Earthquake
13. Floods (flood plain)
14. Tornado
15. Hurricanes
16. Other

e. Process controls in use (check all that apply)

1. Vents
2. Relief valves
3. Check valves
4. Scrubbers
5. Flares
6. Manual shutoffs
7. Automatic shutoffs
8. Interlocks
9. Alarms and procedures
10. Keyed bypass
11. Emergency air supply
12. Emergency power
13. Backup pump
14. Grounding equipment
15. Inhibitor addition
16. Rupture disks
17. Excess flow device
18. Quench system
19. Purge system
20. Other

f. Mitigation systems in use (check all that apply)

1. Sprinkler system
2. Dikes
3. Fire walls
4. Blast walls
5. Deluge system
6. Water curtain
7. Enclosure
8. Neutralization
9. Other

g. Monitoring/detection systems in use (check all the apply)

1. Process area detectors
2. Perimeter monitors
3. Other

h. Changes since last PHA update (check all that apply)

1. Reduction in chemical inventory
2. Increase in chemical inventory
3. Change in process parameters
4. Installation of process controls
5. Installation of process detection systems
6. Installation of perimeter monitoring systems
7. Installation of mitigation systems
8. Other
9. None required/recommended

7.5 The date of the most recent review or revision of operating procedures

7.6 Training

a. The date of the most recent review or revision of training programs

b. The type of training provided

1. Classroom
2. Classroom plus on the job
3. On the job
4. Other

c. The type of competency testing used

1. Written tests
2. Oral tests
3. Demonstration
4. Observation
5. Other

7.7 Maintenance

- a. The date of the most recent review or revision of maintenance procedures
- b. The date of the most recent equipment inspection or test
- c. The equipment inspected or tested

7.8 Management of Change

- a. The date of the most recent change that triggered management of change procedures
- b. The date of the most recent review or revision of management of change procedures

7.8 The date of the most recent pre-startup review

7.9 Compliance audits

- a. The date of the most recent compliance audit
- b. The expected date of completion of any changes resulting from the compliance audit

7.10 Incident investigation

- a. The date of the most recent incident investigation
- b. The expected date of completion of any changes resulting from the investigation

7.11 The date of the most recent review or revision of employee participation plans

7.12 The date of the most recent review or revision of hot work permit procedures

7.13 The date of the most recent review or revision of contractor safety procedures

7.14 The date of the most recent evaluation of contractor safety performance

8. PREVENTION PROGRAM -- PROGRAM 2 (For Each Program 2 Process)

8.1 SIC code for process _____

8.2. Chemicals

- a.
- b.

8.3 Safety information

- a. The date of the most recent review or revision of the safety information
- b. A list of Federal or state regulations or industry-specific design codes and standards used to demonstrate compliance with the safety information requirement.

- 1. ___ NFPA 58 (or state law based on NFPA 58)
- 2. ___ OSHA 1910.111
- 3. ___ ASTM
- 4. ___ ANSI standards

5. ASME standards
6. Other (specify)
7. None

8.4 Hazard review

- a. The date of completion of the most recent hazard review or update
- b. The expected date of completion of any changes resulting from the hazard review
- c. Major hazards identified (check all that apply)

1. Toxic release
2. Fire
3. Explosion
4. Runaway reaction
5. Polymerization
6. Overpressurization
7. Corrosion
8. Overfilling
9. Contamination
10. Equipment failure
11. Loss of cooling, heating, electricity, instrument air
12. Earthquake
13. Floods (flood plain)
14. Tornado
15. Hurricanes
16. Other

- d. Process controls in use (check all that apply)

1. Vents
2. Relief valves
3. Check valves
4. Scrubbers
5. Flares
6. Manual shutoffs
7. Automatic shutoffs
8. Interlocks
9. Alarms and procedures
10. Keyed bypass
11. Emergency air supply
12. Emergency power
13. Backup pump
14. Grounding equipment
15. Inhibitor addition
16. Rupture disks
17. Excess flow device
18. Quench system
19. Purge system

20. _____ Other

e. Mitigation systems in use (check all that apply)

1. _____ Sprinkler system
2. _____ Dikes
3. _____ Fire walls
4. _____ Blast walls
5. _____ Deluge system
6. _____ Water curtain
7. _____ Enclosure
8. _____ Neutralization
9. _____ Other

f. Monitoring/detection systems in use

1. _____ Process area detectors
2. _____ Perimeter monitors
3. _____ Other

g. Changes since last hazard review update (check all that apply)

1. _____ Reduction in chemical inventory
2. _____ Increase in chemical inventory
3. _____ Change in process parameters
4. _____ Installation of process controls
5. _____ Installation of process detection systems
6. _____ Installation of perimeter monitoring systems
7. _____ Installation of mitigation systems
8. _____ Other
9. _____ None required/recommended

8.5 The date of the most recent review or revision of operating procedures

8.6 Training

a. The date of the most recent review or revision of training programs

b. The type of training provided

1. ____ Classroom
2. ____ Classroom plus on the job
3. ____ On the job
4. ____ Other

c. The type of competency testing used

1. ____ Written tests
2. ____ Oral tests
3. ____ Demonstration
4. ____ Observation
5. ____ Other

8.7 Maintenance

- a. The date of the most recent review or revision of maintenance procedures
- b. The date of the most recent equipment inspection or test
- c. The equipment inspected or tested

8.8 Compliance audits

- a. The date of the most recent compliance audit
- b. The expected date of completion of any changes resulting from the compliance audit

8.9 Incident investigation

- a. The date of the most recent incident investigation
- b. The expected date of completion of any changes resulting from the investigation

8.10 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

9. EMERGENCY RESPONSE

9.1 Do you have a written emergency response plan? a. Yes b. No

9.2 Does the plan include specific actions to be taken in response to an accidental releases of a regulated substance? a. Yes b. No

9.3 Does the plan include procedures for informing the public and local agencies responsible for responding to accidental releases? a. Yes b. No

9.4 Does the plan include information on emergency health care? a. Yes b. No

9.5 The date of the most recent review or update of the emergency response plan

9.6 The date of the most recent emergency response training for employees

9.7 The name and telephone number of the local agency with which the plan is coordinated

- a. Name _____
- b. Telephone number _____

9.8 Subject to (check all that apply)

- a. OSHA 1910.38 (Emergency Action Plan)
- b. OSHA 1910.120 (HAZWOPER)
- c. Clean Water Act/SPCC
- d. RCRA
- e. OPA-90
- f. State EPCRA Rules/Law
- g. Other (specify)

APPENDIX C: TABLE OF TOXIC ENDPOINTS

{ with ppm conversions and ERPG equivalents }

77 Listed Toxic Chemicals, Appendix A to Part 68 (adapted from Appendix A of Part 68)

Table C.1: RMP Toxic Endpoint Concentrations

CAS no.	Chemical name	Toxic End Point Concentration		Basis for Endpoint	ERPG or [TEEL] ¹ (ppm) ¹
		(mg/L)	(ppm) ²		
107-02-8	Acrolein [2-Propenal]	0.0011	0.5	ERPG-2	n/a
107-13-1	Acrylonitrile [2-Propenenitrile]	0.076	3 5	ERPG-2	n/a
814-68-6	Acrylyl choride [2-Propenoyl chloride]	0.00090	0.2	EHS-LOC (TOX)	n/a
107-18-6	Allyl alcohol [2-Propen-1-ol]	0.036	15	EHS-LOC (IDLH)	15
107-11-9	Allylamine [2-Propen-1-amine]	0.0032	2	EHS-LOC (TOX)	n/a
7664-41-7	Ammonia (anhydrous)	0.14	200	ERPG-2	n/a
7664-41-7	Ammonia (conc 20% or greater)	0.14	200	ERPG-2	n/a
7784-34-1	Arsenous trichloride	0.010	2	EHS-LOC (TOX)	n/a
7784-42-1	Arsine.	0.0019	1	EHS-LOC (IDLH)	1
10294-34-5	Boron trichloride [Borane, trichloro-]	0.010	2	EHS-LOC (TOX)	n/a
7637-07-2	Boron trichloride [Borane, trifluoro-]	0.028	10	EHS-LOC (IDLH)	n/a
353-42-4	Boron trifluoride compound with methyl ether (1:1) [Boron, trifluoro[oxybis[methane]]-, T-4	0.023	5	EHS-LOC (TOX**)	n/a
7726-95-6	Bromine	0.0065	1	ERPG-2	n/a
75-15-0	Carbon disulfide	0.16	50	ERPG-2	n/a
7782-50-5	Chlorine	0.0087	3	ERPG-2	n/a
10049-04-4	Chlorine dioxide [Chlorine oxide (ClO ₂)]	0.0028	1	EHS-LOC equivalent (IDLH)	n/a
67-66-3	Chloroform [Methane, trichloro-]	0.49	95	EHS-LOC (IDLH)	1,000
542-88-1	Chloromethyl ether [Methane, oxybis[chloro-]	0.00025	0.05	EHS-LOC (TOX)	0.05
107-30-2	Chloromethyl methyl ether [Methane, chloromethoxy-]	0.0018	0.5	EHS-LOC (TOX)	1.8
4170-30-3	Crotonaldehyde [2-Butenal]	0.029	10	ERPG-2	n/a

CAS no.	Chemical name	Toxic End Point Concentration		Basis for Endpoint	ERPG or [TEEL] ¹ (ppm)
		(mg/L)	(ppm) ²		
123-73-9	Crotonaldehyde, (E)-, [2-Butenal, (E)-].	0.029	10	ERPG-2	n/a
506-77-4	Cyanogen chloride	0.030	15	EHS-LOC equivalent (TOX)	n/a
108-91-8	Cyclohexylamine [Cyclohexanamine]	0.16	40	EHS-LOC (TOX)	50
19287-45-7	Diborane	0.0011	1	ERPG-2	n/a
75-78-5	Dimethyldichlorosilane [Silane, dichlorodimethyl-]	0.026	5	ERPG-2	n/a
57-14-7	1,1-Dimethylhydrazine [Hydrazine, 1,1-dimethyl-]	0.012	5	EHS-LOC (IDLH)	5
106-89-8	Epichlorohydrin [Oxirane, (chloromethyl)-]	0.076	20	ERPG-2	n/a
107-15-3	Ethylendiamine [1,2-Ethanediamine]	0.49	200	EHS-LOC (IDLH)	n/a
151-56-4	Ethyleneimine [Aziridine]	0.018	10	EHS-LOC (IDLH)	2.3
75-21-8.	Ethylene oxide [Oxirane]	0.090	50	ERPG-2	n/a
7782-41-4.	Fluorine	0.0039	3	EHS-LOC (IDLH)	7.5
50-00-0	Formaldehyde (solution)	0.012	10	ERPG-2	n/a
110-00-9	Furan	0.0012	0.4	EHS-LOC (TOX)	0.43
302-01-2	Hydrazine	0.011	10	EHS-LOC (IDLH)	0.8
7647-01-0	Hydrochloric acid (conc 30% or greater)	0.030	20	ERPG-2	n/a
74-90-8	Hydrocyanic acid	0.011	10	ERPG-2	n/a
7647-01-0	Hydrogen chloride (anhydrous) [Hydrochloric acid]	0.030	20	ERPG-2	n/a
7664-39-3	Hydrogen fluoride/Hydrofluoric acid (conc 50% or greater) [Hydrofluoric acid]	0.016	20	ERPG-2	n/a
7783-07-5	Hydrogen selenide	0.00056	0.2	EHS-LOC (IDLH)	n/a
7783-06-4	Hydrogen sulfide	0.042	30	ERPG-2	n/a
13463-40-6	Iron, pentacarbonyl- [Iron carbonyl (Fe(CO) ₅), (TB-5-11)-]	0.00044	0.05	EHS-LOC (TOX)	n/a
78-82-0	Isobutyronitrile [Propanenitrile, 2-methyl-]	0.14	50	ERPG-2	n/a
108-23-6	Isopropyl chloroformate [Carbonochloride acid, 1-methylethyl ester]	0.10	20	EHS-LOC (TOX)	n/a
126-98-7	Methacrylonitrile [2-Propenenitrile, 2-methyl-]	0.0027	1	EHS-LOC (TLV)	n/a
74-87-3	Methyl chloride [Methane, chloro-]	0.82	400	ERPG-2	n/a

CAS no.	Chemical name	Toxic End Point Concentration		Basis for Endpoint	ERPG or [TEEL] ¹ (ppm)
		(mg/L)	(ppm) ²		
79-22-1	Methyl chloroformate [Carbonochloridic acid, methylester]	0.0019	0.5	EHS-LOC (TOX)	n/a
60-34-4	Methyl hydrazine [Hydrazine, methyl-]	0.0094	5	EHS-LOC (IDLH)	0.5
624-83-9	Methyl isocyanate [Methane, isocyanato-]	0.0012	0.5	ERPG-2	n/a
74-93-1	Methyl mercaptan [Methanethiol]	0.049	25	ERPG-2	n/a
556-64-9	Methyl thiocyanate [Thiocyanic acid, methyl ester]	0.085	30	EHS-LOC (TOX)	n/a
75-79-6	Methyltrichlorosilane [Silane, trichloromethyl-]	0.018	3	ERPG-2	n/a
13463-39-3	Nickel carbonyl	0.00067	0.09	EHS-LOC (TOX)	0.05
7697-37-2	Nitric acid (conc 80% or greater)	0.026	10	EHS-LOC (IDLH)	15
10102-43-9	Nitric oxide [Nitrogen oxide (NO)]	0.031	25	EHS-LOC (TLV)	25
8014-95-7	Oleum (Fuming Sulfuric acid) [Sulfuric acid, mixture with sulfur trioxide]	0.010	3		n/a
79-21-0	Peracetic acid [Ethaneperoxoic acid]	0.0045	2	EHS-LOC (TOX)	n/a
594-42-3	Perchloromethylmercaptan [Methanesulfonyl chloride, trichloro-]	0.0076	1	EHS-LOC (IDLH)	n/a
75-44-5	Phosgene [Carbonic dichloride]	0.00081	0.2	ERPG-2	n/a
7803-51-2	Phosphine	0.0035	2.5	ERPG-2	n/a
10025-87-3	Phosphorus oxychloride [Phosphoryl chloride]	0.0030	0.5	EHS-LOC (TOX)	n/a
7719-12-2	Phosphorus trichloride [Phosphorous trichloride]	0.028	5	EHS-LOC (IDLH)	n/a
110-89-4	Piperidine	0.022	10	EHS-LOC (TOX)	n/a
107-12-0	Propionitrile [Propanenitrile]	0.0037	2	EHS-LOC (TOX)	n/a
109-61-5	Propyl chloroformate [Carbonochloridic acid, propylester]	0.010	2	EHS-LOC (TOX)	n/a
75-55-8	Propyleneimine [Aziridine, 2-methyl-]	0.12	50	EHS-LOC (IDLH)	51.5
75-56-9	Propylene oxide [Oxirane, methyl-].....	0.59	250	ERPG-2	n/a
7446-09-5	Sulfur dioxide (anhydrous)	0.0078	3	ERPG-2	n/a
7783-60-0	Sulfur tetrafluoride [Sulfur fluoride (SF4), (T-4)-]	0.0092	2	EHS-LOC (TOX)	n/a
7446-11-9	Sulfur trioxide	0.010	3	ERPG-2	n/a

CAS no.	Chemical name	Toxic End Point Concentration		Basis for Endpoint	ERPG or [TEEL] ¹ (ppm)
		(mg/L)	(ppm) ²		
75-74-1	Tetramethyllead [Plumbane, tetramethyl-]	0.0040	0.4	EHS-LOC (IDLH)	n/a
509-14-8	Tetranitromethane [Methane, tetranitr.o-]	0.0040	0.5	EHS-LOC (IDLH)	1
7750-45-0	Titanium tetrachloride [Titanium chloride (TiCl ₄) (T-4)-]	0.020	3	ERPG-2	n/a
584-84-9	Toluene 2,4-diisocyanate [Benzene, 2,4-diisocyanato-1-methyl-]	0.0070	1	EHS-LOC (IDLH)	1
91-08-7	Toluene 2,6-diisocyanate [Benzene, 1,3-diisocyanato-2-methyl-]	0.0070	1	EHS-LOC (IDLH)	n/a
26471-62-5	Toluene diisocyanate (unspecified isomer) [Benzene, 1,3-diisocyanatomethyl-]	0.0070	1	EHS-LOC equivalent (IDLH)	n/a
75-77-4	Trimethylchlorosilane [Silane, chlorotrimethyl-]	0.050	15	EHS-LOC (TOX)	n/a
108-05-4	Vinyl acetate monomer [Acetic acid ethenyl ester]	0.26	75	ERPG-2	n/a

¹ The TEEL values have been taken from Douglas K. Craig's Revision 13.

² Values have been rounded according to the procedure employed by Douglas K. Craig.

APPENDIX D: Known Chemicals Present within DOE Complex Survey

These 1994 data are sensitive and have been removed from this document. If DOE staff need to access this information, contact the Office of Air, Water and Radiation Protection Policy and Guidance at DOE Headquarters.

APPENDIX E: Typical Uses of Listed RMP Substances

(not necessarily typical to DOE installations)

The following Section 112(r) listed chemicals were found in the Navy Hazardous Material Information System (HMIS) database and therefore, could exist on military installations. Section 112(r) toxic chemicals are listed first followed by 112(r) flammable substances. Within each list, commonly expected items are listed first, followed by those not expected to be a large impact to military installations. Most of the "low impact" items listed are used in small amounts on an installation and are not expected to trigger thresholds. Only for warehousing operations or unique situations would it be expected that many of the below listed items be considered. Installation personnel should be aware of such large concentrations of these products.

Many of the items listed are trade names and trade marked items. The use of these materials for inclusion on this list does not represent an endorsement from any Federal Agency.

Toxic Chemicals:

1. Chlorine:

Probable location(s): Wastewater and drinking water treatment plants, swimming pools.

Threshold (pounds) 2,500

Comments: Water treatment will be one of the most common covered processes found on Army installations. Chlorine is most often found in 1-ton or 150-pound cylinders. Swimming pools are unlikely to have threshold amounts stored or utilized on location. Particular attention must be paid to possible interconnections of storage vessels through piping and intra-installation transport.

May be Present in the Following Mixtures: UNK

2. Sulfur Dioxide:

Probable location(s): Wastewater treatment plants.

Threshold (pounds): 5,000

Comments: Primary impact to military installations will probably be wastewater treatment.

May be Present in the Following Mixtures: (concentration range: 1-100%): various process compounds/solution.

3. Ammonia:

Probable location(s): Refrigeration, chemical laboratories, shops.

Threshold (pounds): Anhydrous: 10,000; conc. 20 % or greater: 20,000

Comments: Anhydrous ammonia is 100 percent concentration, certain agricultural exemptions apply.

May be Present in the Following Mixtures: Process mixtures, disinfection and cleaning solution, and fertilizer solutions.

4. Liquid fuels used for motor vehicles:

Probable location(s): Gasoline (MOGAS), diesel, tanks and stations.

Comments: The RMP listed chemical components of gasoline are exempt from consideration by the EPA. Diesel and jet fuels need not be considered since they do not meet the above mentioned criteria for flammability: flash point below 73° F, boiling point below 100° F. Also, any listed

components are not present in the fuel mixture in amounts at or above 1 percent. Propane is discussed below.

May be Present in the Following Mixtures: UNK

5. Chloroform (trichloromethane):

Probable location(s): Dental clinics, laboratories, shops.

Threshold (pounds): 20,000.

Comments: An ODC substance.

May be Present in the Following Mixtures: Dental applications, solvents/thinners, hydranal couamat, titration solutions, Aquimicron, Turco.

6. Ethylene oxide:

Probable location(s): Hospitals, shops.

Threshold (pounds): 10,000.

Comments: Used for sterilization. Unlikely to be present in threshold amounts.

May be Present in the Following Mixtures: Various paints and strippers, Penngas, sterilant mixtures.

7. Fluorine:

Probable location(s): UNK.

Threshold (pounds): 1,000.

Comments: None.

May be Present in the Following Mixtures: DAP, research applications, aluminum foundries.

8. Formaldehyde:

Probable location(s): Hospitals, biological laboratories, museums, shops.

Threshold (pounds): 15,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Adhesives, sealers, gels, stabilizers and replenishers, paints and enamels, fixation and embalming fluids, resins, reduction solutions, Aqua-kem, formo-cresol, hexaphene, Bouin's fluid, developers, fixatives, hardeners, fireproofing, formalyne.

9. Hydrazine:

Probable location(s): Ordnance manufacturing plants, rockets, ordnance.

Threshold (pounds): 15,000.

Comments: May be present at open burning/open detonation sites.

May be Present in the Following Mixtures: (concentration range: 1-100%): Various hydrazine solutions, Fairzine, propellants.

10. Hydrochloric acid:

Probable location(s): Shops, chemical laboratories.

Threshold (pounds): Anhydrous: 5,000; conc. greater than 30 percent: 15,000.

Comments: Unlikely to be present in any significant amounts on Army installations, in concentration greater than 30 percent.

May be Present in the Following Mixtures: Arsenous acid solutions, some metal cleaners, some plasma standards. (Acid concentration greater than 30%): Coil conditioners/cleaners, some metal

cleaners, some descalers.

11. Nitric acid:

Probable location(s): Shops, chemical laboratories.

Threshold (pounds): 15,000 (conc. greater than 80%).

Comments: Unlikely to be present in any significant amounts on Army posts at threshold quantities.

May be Present in the Following Mixtures: (concentration range: greater than 80%): Fuming nitric acid.

12. Nitric oxide:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comment: Emissions from boilers, engines, turbines would not qualify for RMP consideration. Unlikely to be present in any significant amounts on Army posts. Not found in any mixture.

May be Present in the Following Mixtures: UNK.

13. Phosgene (Carbonic dichloride):

Probable location(s): Chemical agent arsenals.

Threshold (pounds): 500.

Comments: Component in mustard gas.

May be Present in the Following Mixtures: UNK.

14. Toluene 2,4 diisocyanate:

Probable location(s): Chemical laboratories, shops.

Threshold (pounds): 10,000.

Comments: This chemical is NOT pure toluene.

May be Present in the Following Mixtures: (concentration range: 1-100%): Urethanes, catalysts, Mondur TD-80, coatings, hardeners, resins, primers, Select Seal hand mix, Stepanfoam.

15. Toluene 2,6 diisocyanate:

Probable location(s): Chemical laboratories, shops.

Threshold (pounds): 10,000.

Comments: This chemical is NOT pure toluene.

May be Present in the Following Mixtures: (concentration range: 2-100%): Mondur, Stepanfoam, prepolymer, Conathane, Chempol, various toluene compounds.

16. Methyl chloride:

Probable location(s): Shops, chemical laboratories, printers.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-33%): The PDS, foam adhesive (100% concentration), Formula 1070, ink.

17. Carbon disulfide:

Probable location(s): Chemical laboratories, janitorial shops.

Threshold (pounds): 20,000.

Comments: Substances routinely used in janitorial maintenance are not included in RMPs.
May be Present in the Following Mixtures: (concentration range: 10-100%): Various cleaning compounds, lemon polish.

18. Sulfur trioxide:

Probable location(s): Shops, chemical laboratories.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Cement mixing, oleum, fuming sulfuric acid, some coal fired boiler operations.

19. Oleum (fuming sulfuric acid):

Probable location(s): Chemical laboratories.

Threshold (pounds): 10,000.

Comments: Not found in any mixture, only as fuming sulfuric acid or oleum.

May be Present in the Following Mixtures: UNK.

20. Hydrogen sulfide:

Probable location(s): Chemical laboratories.

Threshold (pounds): 10,000.

Comments: Wastewater treatment emissions would not qualify for RMP considerations.

May be Present in the Following Mixtures: (concentration range: 2-100%): Acetylene, various hydrogen sulfide compounds.

21. Bromine:

Probable location(s): Chemical laboratories, shops, medical facilities.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 10-100%): E-313 part A, various bromine compounds, specialty greases and lubricants.

22. Hydrogen fluoride (hydrofluoric acid):

Probable location(s): Shops, chemical laboratories.

Threshold (pounds): 1,000.

Comments: None.

May be Present in the Following Mixtures: (hydrogen fluoride concentration range: 1-100%): Most etchants, brighteners, metal cleaners, 2192 LMX coil cleaner, erusticator, welding flux, strippers, electrical joint compounds, pickling paste, Oakite, Alodine, Zep-a-lume, Bonderite, hydro-foam, various hydrogen fluoride solutions. (Hydrofluoric acid concentration greater than 50%): Most hydrofluoric acids, fluoric acid, Coil Brite.

23. Vinyl acetate:

Probable location(s): Shops.

Threshold (pounds): 15,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Paints.

24. Epichlorohydrin:

Probable location(s): Shops.

Threshold (pounds): 20,000.

Comments: Unlikely to be present at even 1 percent in mixture, and therefore not subject to RMP.

May be Present in the Following Mixtures: (concentration range: up to 1%): Adhesives, photoprocessing solutions.

25. Acrolein:

Probable location(s): Janitorial shops.

Threshold (pounds): 5,000.

Comments: Substances routinely used in janitorial maintenance are not included in RMPs.

May be Present in the Following Mixtures: (concentration: 10%): Lemon polish.

26. Acrylonitrile:

Probable location(s): Shops.

Threshold (pounds): 20,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 10%): Resins, adhesives, sealants.

27. Ethylenediamine:

Probable location(s): Shops.

Threshold (pounds): 20,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Plating and stripping substances.

28. Allyl alcohol:

Probable location(s): UNK.

Threshold (pounds): 15,000.

Comments: Unlikely to be present at even 1 percent in mixture and therefore not subject to RMP.

May be Present in the Following Mixtures: (concentration range: up to 1%): Index matching liquid.

29. Cyclohexylamine:

Probable location(s): Shops.

Threshold (pounds): 15,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-90%): Corrosion inhibitor, line treatments.

30. Piperidine:

Probable location(s): Printers.

Threshold (pounds): 15,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-3%): Writing fluid.

31. Crotonaldehyde:

Probable location(s): UNK.

Threshold (pounds): 20,000.

Comments: Unlikely to be present in significant quantities on Army installations.

May be Present in the Following Mixtures: (concentration range: UNK): Fluorobrene.

32. Methacrylonitrile:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

33. Ethyleneimine:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 30%): Catalyst for Aquarius Plastite II.

34. Tetranitromethane:

Probable location(s): Landscape maintenance.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 20%): Crabgrass stopper.

35. Hydrocyanic acid:

Probable location(s): Shops, chemical laboratories.

Threshold (pounds): 2,500.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-15%): Crest 1700, pump chamber fluid, Hycar.

36. Methyl mercaptan:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: Used to add odor to natural and propane gas. This use would not be considered for RMP reporting since the gas would trigger RMP first.

May be Present in the Following Mixtures: UNK.

37. Titanium tetrachloride:

Probable location(s): UNK.

Threshold (pounds): 2,500.

Comments: Not found in any mixtures. Comprises 100 percent of Smoke Bottle.

May be Present in the Following Mixtures: UNK.

38. Propylene oxide:

Probable location(s): Shops, chemical laboratories.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Solder, Microstop, windshield sealer, various propylene oxide compounds.

39. Trimethylchlorosilane:

Probable location(s): Chemical laboratories.

Threshold (pounds): 10,000.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

40. Dimethyldichlorosilane:

Probable location(s): Chemical laboratories.

Threshold (pounds): 5,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 5%): Sylon-CT Pint.

41. Methyltrichlorosilane:

Probable location(s): UNK.

Threshold (pounds): 5,000.

Comments: Comprises 100 percent of Silane Z.

May be Present in the Following Mixtures: UNK.

42. Boron trifluoride:

Probable location(s): Shops, chemical laboratories.

Threshold (pounds): 5,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 14-100%): Welding/casting flux, various boron trifluoride compounds.

43. Phosphorous trichloride:

Probable location(s): UNK.

Threshold (pounds): 15,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 4-100%): Accelerator.

44. Sulfur tetrafluoride:

Probable location(s): UNK.

Threshold (pounds): 2,500.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

45. Arsenous trichloride:

Probable location(s): UNK.

Threshold (pounds): 15,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Various arsenous trichloride compounds.

46. Arsine:

Probable location(s): Welding shops, chemical laboratories.

Threshold (pounds): 1,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 2%, some UNK): Acetylene.

47. Peracetic acid:

Probable location(s): Chemical laboratories.

Threshold (pounds): 10,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 4-35%): Sterilant concentrates, reverse osmosis membranes.

48. Methyl chloroformate:

Probable location(s): UNK.

Threshold (pounds): 5,000.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

49. Phosphine:

Probable location(s): UNK.

Threshold (pounds): 5,000.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

50. Phosphorous oxychloride:

Probable location(s): UNK.

Threshold (pounds): 5,000.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

51. Chlorine dioxide:

Probable location(s): UNK.

Threshold (pounds): 1,000.

Comments: Disinfectants used for routine janitorial purposes are not considered for RMP.

May be Present in the Following Mixtures: (concentration range: UNK): Disinfectants.

52. Boron trichloride:

Probable location(s): UNK.

Threshold (pounds): 5,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: UNK): Various boron trichloride compounds.

53. Diborane:

Probable location(s): UNK.

Threshold (pounds): 2,500.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

54. Toluene diisocyanate:

Probable location(s): Shops, chemical laboratories.

Threshold (pounds): 10,000.

Comments: Do not consider pure toluene as this chemical.

May be Present in the Following Mixtures: (concentration range: 1-100%): Resins, hardeners, activators, polyurethanes, sealants, flatroofing, Stafoam, Uralite, Mondur, Stathane.

Flammable Substances

1. Acetylene (ethyne):

Probable location(s): Shops, especially welding shops, chemical laboratories.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Welding gas, calibration gas.

2. Butane:

Probable location(s): Shops, motor pools, clean fuel areas, cooking facilities.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 2-4%): Propanes, fuel cells, Snapback, starting fluid, propellant.

3. Ethane:

Probable location(s): Shops, motor pools, clean fuel areas, cooking facilities.

Threshold (pounds): 10,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 1-100%): Propanes, liquid petroleum gas.

4. Hydrogen:

Probable location(s): Shops, chemical laboratories, fuel operations.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: UNK.

5. Methane:

Probable location(s):

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 90%): Ethene.

6. Pentane:

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 10-80%): Adhesives, petroleum spirits.

7. Propane:

Probable location(s): Vehicle fueling stations, clean fuel areas, shops, cooking facilities.

Threshold (pounds): 10,000.

Comments: Also used for field and recreational cookstoves, heat and light.

May be Present in the Following Mixtures: (concentration range: 1-100%): Frequently present in aerosol cans, clean fuels, MAP gas, starting fluid, v-belt dressing, Snapback, Dermastat.

8. Isobutane (2-methyl propane):

Probable location(s): Vehicle fueling stations, clean fuel areas, shops, cooking facilities.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Propanes, paints, primers, lacquers, adhesives, insulation, Teflon lube, Snapback, mold release, calibration mix, 3M Super 77, Statebuf.

9. Isopentane (2-methyl butane):

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 1-100%): Petroleum spirits, calibration mix, airbrush propellant, N-pentane.

10. Ethylene:

Probable location(s): Shops, motor pools, chemical laboratories.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 6-100%): Engine starting fluid.

11. Ethyl ether:

Probable location(s): Shops, motor pools, chemical laboratories.

Threshold (pounds): 10,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 1-100%): Starting fluid, varnish, solvent/thinner, N910023 9247, collodion, correction fluid, ethers.

12. Butene:

Probable location(s): Chemical laboratories, shops.

Threshold (pounds): 10,000.

Comments: Unlikely to be present in even 1 percent of mixture and therefore not considered for RMP.

May be Present in the Following Mixtures: (concentration range: up to 1%): 1- butene in nitrogen.

13. Silane:

Probable location(s): Shops, dental clinics.

Threshold (pounds): 10,000.

Comments: Also present in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 1-100%): Binding agents, dental restoratives, fiberglass fabric F-72, Megatech.

14. 1,3 Butadiene:

Probable location(s): Shops, motor pools.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-10%): Fuel cylinders, Crest 1700A.

15. 2-Butene:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: Not found in any mixtures.

May be Present in the Following Mixtures: UNK.

16. Methyl formate:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: Not found in any mixtures.

May be Present in the Following Mixtures: UNK.

17. Vinyl ethyl ether:

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 3-7%): Adhesives.

18. Propylene:

Probable location(s): Vehicle fueling stations, clean fuel areas, motor pools, shops, cooking facilities.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Various propylene compounds, propane, clean fuels, fuel cells, FG-2, Xerox developer.

19. Methyl ether:

Probable location(s): Shops, motor pools.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Polycel, flat fixer, aerosol sprays, adhesives, spray paints, epoxy primer, paints, rust treatment, insulation, dry film Vydax, mold treatment, FANTS-Zs.

20. 2-methylpropene:

Probable location(s): Shops, maintenance facilities.

Threshold (pounds): 10,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 10-100%): Aerosols, silencer strip.

21. Tetrafluorethylene:

Probable location(s): Shops, laboratories, copier storage/maintenance.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-100%): Teflon, sealants and lubricants with teflon, fluorobestos sheet, style number 1123, active #2331, pyrotechnic igniter, urafilm TFE, RF 1688 grommet, halon resins, CW 1649 release agent, DLX 6000, Bakerseal T40, molybdenum disulfide, TEX PTFE insulation, dry film Vydax, synthetic blood control, fluon G series, transfer recording cartridge for telecopiers, Fluoroglide spray, Centripacs, 6 Chem-pac, Pasite 4300, pipe tape, Mogul C-47, 48, and 49, Lubri-pack anaerobic LO-399.

22. Dimethylamine:

Probable location(s): Landscape maintenance, chemical laboratories.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 2-100%): Herbicides, various dimethylamine compounds.

23. Cyanogen:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration: 29%): Copper cyanide.

24. Propadiene:

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: UNK): Impulse fuel cell.

25. Carbon oxysulfide:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: Not found in any mixtures.

May be Present in the Following Mixtures: UNK.

26. 1,3-Pentadiene:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 90%): Piperylene.

27. 2-Penetene (Z):

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: Not found in any mixtures.

May be Present in the Following Mixtures: UNK.

28. 2-Pentene (E):

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: Not found in any mixtures.

May be Present in the Following Mixtures: UNK.

29. Methylamine:

Probable location(s): Chemical laboratories.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 40-100%): Various methylamine compounds.

30. Propyne:

Probable location(s): Vehicle fueling stations, clean fuel areas, motor pools, shops, cooking facilities.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-44%): Clean burn fuel, methylacetylenes.

31. Ethyl chloride:

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 4-100%): Polystyrene insulation, v-belt dressing.

32. Vinyl chloride:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: greater than 3%): Dolflex CC-

1022.

33. Ethylamine:

Probable location(s): UNK.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 1-20%): Megatech, Turco 4366.

34. Acetaldehyde:

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: greater than 1%): Anhydrol solvent.

35. Ethyl mercaptan:

Probable location(s): Vehicle fueling stations, clean fuel areas, shops, cooking facilities, chemical laboratories.

Threshold (pounds): 10,000.

Comments: Also found in pure form (100%).

May be Present in the Following Mixtures: (concentration range: 1-100%): Propane.

36. Isopropylamine:

Probable location(s): Landscape maintenance, shops.

Threshold (pounds): 10,000.

Comments: Also found in pure form (100%). If substances used for routine janitorial work, then not subject to RMP.

May be Present in the Following Mixtures: (concentration range: 1-100%): Herbicides, Bix Tuff-job, dual spot concentrate.

37. Difluoroethane:

Probable location(s): Shops, insecticide maintenance, medical clinics.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 10-100%): Precor fogger, 47 percent Dichlorvos 1 percent Propoxur Total Release, Freon 500, Cramolin sprays, medical adhesive spray, Derma Stat, Forane 500, SUVA MP66, R-500, Genetron 152A/isobutane, De-ox it-D5, Preservit-P5, Progold spray, Static All spray, Dymel aerosol propellant, air brush propellant, SUVA MP39.

38. Vinylidene chloride:

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: 4-10%): Foam coat concentrate, primer for parylene, 1001 vapor barrier.

39. Trimethylamine:

Probable location(s): Chemical laboratories.

Threshold (pounds): 10,000.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

40. Tetramethylsilane:

Probable location(s): Chemical laboratories.

Threshold (pounds): 10,000.

Comments: Not found in any mixture.

May be Present in the Following Mixtures: UNK.

41. Isoprene:

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: None.

May be Present in the Following Mixtures: (concentration range: greater than 1%): Resin bonded aluminum, resin bonded silicon abrasive.

42. Trifluorochloroethylene:

Probable location(s): Shops.

Threshold (pounds): 10,000.

Comments: Comprises 100 percent of oxweld anti-friction compound.

May be Present in the Following Mixtures: UNK.