Accidental Release Prevention Requirements: Risk Management Programs Under Clean Air Act Section 112(r)(7)

Jeffrey Hahn, P.E., D.E.E., Q.E.P.
Executive Vice President, Ogden Energy Group
Past Chairman, Health & Safety Committee
Integrated Waste Services Association
40 Lane Road
Fairfield, New Jersey 07007

INTRODUCTION

The Occupational Safety and Health Administration promulgates and enforces regulations that govern the health and safety of our workers. OSHA rules often are considered to govern what happens "inside the fence line," or within the physical boundaries of the facility.

In some ways, the U.S. Environmental Protection Agency takes over where OSHA leaves off. The U.S. EPA is responsible for environmental programs "outside the fence line." The concept is as simple as drawing a line, or is it?

Anyone developing and implementing compliance programs, whether for OSHA or EPA, will tell you nothing is that simple. EPA's recent promulgation of rules pertaining to risk management programs is a case in point.

A new EPA rule is intended to compliment OSHA requirements under the Process Safety Management (PSM) rule. Under the OSHA rule, plant operators developed programs that ensure safe measures are in use when handling certain chemicals. During the past three years, waste-to-energy facilities faced difficult decisions when complying with the PSM requirements.

Plant operators developed programs in particular for the continued use of anhydrous ammonia and chlorine. Anhydrous ammonia is used as part of the Thermal DeNOx systems that clean flue gasses of nitrogen oxides. Some plant operators, after completing the PSM requirements, switched from chlorine because of the added regulatory burden placed on the regulated community by PSM in handling this chemical and the ready availability of substitute chemicals.

Earlier this year, the U.S. EPA promulgated its 112 (r) (7) rule that is intended to "compliment" OSHA's PSM requirements. This is not always the case. Unfortunately, these new Clean Air Act requirements do not always complement, but may instead confuse plant operators. For example, EPA's 112 (r) rule may force plant operators to change, once again, their decisions on the use of selected chemicals.

The U.S. EPA estimates that approximately 66,000 facilities, including the 114 waste-to-energy facilities nationwide, may be affected by the list and risk management planning rules. The facilities include chemical and many other manufacturers, cold storage facilities with ammonia refrigeration systems, public water treatment systems, wholesalers and distributors of these chemicals, propane retailers, utilities, and federal facilities.

REQUIREMENTS OF 112(r)

Section 112(r) of the Clean Air Act calls for regulations that prevent the accidental release of listed chemicals and further minimize the consequences of any such release. The owners and operators of stationary sources producing, processing, handling, or storing such substances have a general duty to identify hazards which may result from such releases using appropriate hazard assessment techniques, to design and maintain a safe facility taking such steps as necessary to prevent releases and to minimize the consequences of accidental releases which do occur.

The U.S. EPA provided a list of substances which, according to the Agency, are known to cause or may reasonably be anticipated to cause death, injury, or serious adverse effects to human health or the environment. The list is amended to this paper. In compiling the list, the U.S. EPA considered the severity of any acute adverse health effect, the likelihood of accidental release, and the potential magnitude of human exposure to the accidental releases of the substances. The list also includes a threshold quantity for the substance. In establishing the threshold quantity, the U.S. EPA considered the volatility, dispersibility, combustibility, and flammability of the substance and the amount of the substance which, as a result of an accidental release, is known to cause or may reasonably be anticipated to cause death, injury or serious adverse effects to human health.

The list EPA promulgated includes 77 acutely toxic chemicals, 63 flammable gases and volatile flammable liquids, and Division 1.1 high explosive substances. The final rule established threshold quantities for toxic substances ranging from 500 to 20,000 pounds. For all listed flammable substances, the threshold quantity is 10,000 pounds, while all explosive substances have a threshold quantity of 5,000 pounds.

REQUIREMENTS OF 112(r)(7)

Section 112(r)(7) requires the U.S. EPA to promulgate release prevention, detection, and correction requirements including monitoring, recordkeeping, reporting, training, vapor recovery, secondary containment, and other design, equipment, work practice, and operational requirements, The regulations make distinctions between various types, classes, and kinds of facilities, devices and systems by taking into account the size, location, process, process controls, quantity of substances handled, potency of substances, and response capabilities present at any stationary source.

The regulations require an owner or operator of a facility to detail the use, operation, repair, replacement, and maintenance of equipment and periodic inspections at a facility. Regulations also require an owner or operator to provide procedures and measures for emergency response after an accidental release of a regulated substance in order to protect human health and the environment.

The regulations requires owners and operators of stationary sources to carry out the following six elements of risk management planning:

(1) An offsite consequence analysis that evaluates specific potential release scenarios, including worst-case and alternative scenarios;

(2) A five-year history of certain accidental releases of regulated substances from covered processes;

(3) An integrated prevention program to manage risk;

(4) An emergency response program;

(5) An overall management system to supervise the implementation of these program elements; and,

(6) A Risk Management Program, revised at least once every five years, that summarizes and documents the above activities for all covered processes.

The Risk Management Program is intended to detect and prevent or minimize accidental releases of a stationary source and to provide a prompt emergency response to any release. The Program consists of numerous requirements that need to be completed by plant operators within three years. First, plant operators need to provide a hazard assessment to assess the potential effects of an accidental release of any regulated substance. This assessment includes an estimate of potential release quantities and a determination of downwind effects, including potential exposures to affected populations. Such assessment includes previous release history of the past five years, including the size, concentration, and duration of releases, and shall include an evaluation of worst case accidental releases.

Second, the Risk Management Program includes a program for preventing accidental release of regulated substances, including safety precautions and maintenance, monitoring, and employee training measures to be used at the source.

Third, a response program must be included that provides for specific actions that will be taken in response to an accidental release of a regulated substance so as to protect human health and the environment. The response program need include procedures for informing the public and local agencies responsible for responding to accidental releases, emergency health care, and employee training.

Several waste-to-energy facilities currently are conducting the analysis necessary to prepare the Risk Management Program. Waste-to-energy facility operators are looking in particular at the impact from the use of ammonia and propane.

After preparation of the Risk Management Program, an owner or operator must register the plan with the U.S. EPA. The Program also is submitted to the Chemical Safety and Hazard Investigation Board, to the State in which the stationary source is located, and to any local agency or entity having responsibility for planning or responding to accidental releases. In addition, the Program must be available to the public.

The U.S. EPA regulations will have added meaning for waste-to-energy facilities as MACT regulations are implemented and the use of either anhydrous or aqueous ammonia, or urea is selected for DeNOx systems.

The U.S. EPA currently is working to develop a reporting mechanism and form to collect the information required by stationary sources under this rule and make the risk management programs available to the general public via "electronic transmission." The detailed information required, potentially complex information to be transmitted, coupled with the wide distribution anticipated make the 112(r) rule an extremely important requirement for the waste-to-energy industry.

Alphabetical Listing of Toxic Substances and Threshold Quantities (TQ) for Accidental Release Prevention (OSHA vs. EPA)

CAS No.	Chemical Name	OSHA PSM TQ (lbs) (from 29 CFR 1910.119 Appendix A)	EPA RMP TQ (lbs) (from Table 1 of 40 CFR 68.130)
75-07-0	Acetaldehyde	2500	
107-02-8	Acrolein (2-Propenal)	150	5000
107-13-1	Acrylonitrile		20,000
814-68-6	Acrylyl chloride	250	5000
Varies	Alkylaluminums	5000	
107-18-6	Allyl alcohol		15,000
107-05-1	Allyl chloride	1000	
107-11-9	Allylamine	1000	10,000
7664-41-7	Ammonia (anhydrous)*	10,000	10,000
7664-41-7	Ammonia (aqueous solution)*	15,000 (>44% concentration)	20,000 (≥20% concentration)
7790-98-9	Ammonium perchlorate	7500	
7787-36-2	Ammonium permanganate	7500	
7784-34-1	Arsenous trichloride		15,000
7784-42-1	Arsine (arsenic hydride)	100	1000
542-88-1	Bis (chloromethyl) ether or Chloromethyl ether	100	1000
10294-34-5	Boron trichloride	2500	5000
7637-07-2	Boron trifluoride	250	5000
353-42-4	Boron trifluoride compound with methyl ether (1:1)		15,000
7726-95-6	Bromine*	1500	10,000
13863-41-7	Bromine chloride	1500	
7789-30-2	Bromine pentafluoride	2500	
7787-71-5	Bromine trifluoride	15,000	
75-91-2	Butyl hydroperoxide (tertiary)	5000	
614-45-9	Butyl perbenzoate (tertiary)	7500	
75-15-0	Carbon disulfide		20,000
353-50-4	Carbonyl fluoride	2500	

*Required to be on EPA's list by the 1990 Clean Air Act Amendments.

Alphabetical Listing of Toxic Substances and Threshold Quantities (TQ) for Accidental Release Prevention (OSHA vs. EPA)

CAS No.	Chemical Name	OSHA PSM TQ (lbs) (from 29 CFR 1910.119 Appendix A)	EPA RMP TQ (lbs) (from Table 1 of 40 CFR 68.130)
9004-70-0	Cellulose nitrate (concentration > 12.6% nitrogen)	2500	
7782-50-5	Chlorine*	1500	2500
10049-04-4	Chlorine dioxide	1000	1000
13637-63-3	Chlorine pentafluoride	1000	
7790-91-2	Chlorine trifluoride	1000	
97-00-7	1-Chloro-2,4-dinitrobenzene	5000	
96-10-6	Chlorodiethylaluminum (diethylaluminum chloride)	5000	
67-66-3	Chloroform		20,000
107-30-2	Chloromethyl methyl ether	500	5000
76-06-2	Chloropicrin	500	
None	Chloropicrin and methyl bromide mixture	1500	
None	Chloropicrin and methyl chloride mixture	1500	
123-73-9	Crotonaldehyde (trans-2-butenal)		20,000
4170-30-3	Crotonaldehyde		20,000
80-15-9	Cumene hydroperoxide	5000	
460-19-5	Cyanogen	2500	
506-77-4	Cyanogen chloride	500	10,000
675-14-9	Cyanuric fluoride	100	
108-91-8	Cyclohexylamine		15,000
110-22-5	Diacetyl peroxide (concentration > 70%)	5000	
334-88-3	Diazomethane	500	
94-36-0	Dibenzoyl peroxide	7500	
19287-45-7	Diborane	100	2500

*Required to be on EPA's list by the 1990 Clean Air Act Amendments.

Alphabetical Listing of Toxic Substances and Threshold Quantities (TQ) for Accidental Release Prevention (OSHA vs. EPA)

CAS No.	Chemical Name	OSHA PSM TQ (lbs) (from 29 CFR 1910.119 Appendix A)	EPA RMP TQ (lbs) (from Table 1 of 40 CFR 68.130)
110-05-4	Dibutyl peroxide (tertiary)	5000	
7572-29-4	Dichloro acetylene	250	
4109-96-0	Dichlorosilane	2500	
557-20-0	Diethylzinc	10,000	
105-64-6	Diisopropyl peroxydicarbonate	7500	
105-74-8	Dilauroyl peroxide	7500	
124-40-3	Dimethylamine (anhydrous)	2500	
75-78-5	Dimethyldichlorosilane	1000	5000
57-14-7	1,1-Dimethylhydrazine	1000	15,000
97-02-9	2,4-Dinitroaniline	5000	
106-89-8	Epichlorohydrin		20,000
1338-23-4	Ethyl methyl ketone peroxide (methyl ethyl ketone peroxide; concentration > 60%)	5000	
109-95-5	Ethyl nitrite	5000	
75-04-7	Ethylamine	7500	
371-62-0	Ethylene fluorohydrin	100	
75-21-8	Ethylene oxide*	5000	10,000
107-15-3	Ethylenediamine		20,000
151-56-4	Ethyleneimine	1000	10,000
7782-41-4	Fluorine	1000	1000
50-00-0	Formaldehyde (formalin)	1000 (≥37% concentration based on a PSM interpretation letter dated 7/28/92)	15,000 (solution; no concentration given)
110-00-9	Furan	500	5000
684-16-2	Hexafluoroacetone	5000	
302-01-2	Hydrazine		15,000

*Required to be on EPA's list by the 1990 Clean Air Act Amendments.

Alphabetical Listing of Toxic Substances and Threshold Quantities (TQ) for Accidental Release Prevention (OSHA vs. EPA)

CAS No.	Chemical Name	OSHA PSM TQ (lbs) (from 29 CFR 1910.119 Appendix A)	EPA RMP TQ (lbs) (from Table 1 of 40 CFR 68.130)
7647-01-0	Hydrochloric acid (solution, concentration ≥30%)		15,000
74-90-8	Hydrocyanic acid (hydrogen cyanide, anhydrous)*	1000	2500
10035-10-6	Hydrogen bromide	5000	
7647-01-0	Hydrogen chloride (hydrochloric acid, anhydrous)*	5000	5000
7664-39-3	Hydrogen fluoride (hydrofluoric acid, anhydrous)*	1000	1000 (≥50% concentration)
7722-84-1	Hydrogen peroxide (concentration ≥52%)	7500	
7783-07-5	Hydrogen selenide	150	500
7783-06-4	Hydrogen sulfide*	1500	10,000
7803-49-8	Hydroxylamine	2500	
78-82-0	Isobutyronitrile		20,000
108-23-6	Isopropyl chloroformate		15,000
75-31-0	Isopropylamine	5000	
463-51-4	Ketene	100	
78-85-3	Methacrylaldehyde	1000	
126-98-7	Methacrylonitrile (methyl acrylonitrile)	250	10,000
920-46-7	Methacryloyl chloride	150	
30674-80-7	Methacryloyloxyethyl isocyanate	100	
74-83-9	Methyl bromide	2500	
74-87-3	Methyl chloride*	15,000	10,000
79-22-1	Methyl chloroformate	500	5000
453-18-9	Methyl fluoroacetate	100	
421-20-5	Methyl fluorosulfate	100	

*Required to be on EPA's list by the 1990 Clean Air Act Amendments.

Alphabetical Listing of Toxic Substances and Threshold Quantities (TQ) for Accidental Release Prevention (OSHA vs. EPA)

CAS No.	Chemical Name	OSHA PSM TQ (lbs) (from 29 CFR 1910.119 Appendix A)	EPA RMP TQ (lbs) (from Table 1 of 40 CFR 68.130)
60-34-4	Methyl hydrazine	100	15,000
74-88-4	Methyl iodide	7500	
624-83-9	Methyl isocyanate*	250	10,000
74-93-1	Methyl mercaptan*	5000	10,000
556-64-9	Methyl thiocyanate		20,000
79-84-4	Methyl vinyl ketone	100	
74-89-5	Methylamine (anhydrous)	1000	
75-79-6	Methyltrichlorosilane	500	5000
13463-39-3	Nickel carbonyl (nickel tetracarbonyl)	150	1000
7697-37-2	Nitric acid	500 (≥94.5% concentration)	15,000 (≥80% concentration)
10102-43-9	Nitric oxide	250	10,000
100-01-6	Nitroaniline (paranitroaniline)	5000	
10102-44-0	Nitrogen oxides (NO; NO_2; N_2O_4; N_2O_3)	250	
10544-72-6	Nitrogen tetroxide (nitrogen peroxide)	250	
7783-54-2	Nitrogen trifluoride	5000	
10544-73-7	Nitrogen trioxide	250	
75-52-5	Nitromethane	2500	
8014-95-7	Oleum (fuming sulfuric acid)	1000 (65% to 80% SO_3 concentration)	10,000 (SO_3 concentration not specified)
20816-12-0	Osmium tetroxide	100	
7783-41-7	Oxygen difluoride (fluorine monoxide)	100	
10028-15-6	Ozone	100	
19624-22-7	Pentaborane	100	
13463-40-6	Pentacarbonyl-iron	250	2500

*Required to be on EPA's list by the 1990 Clean Air Act Amendments.

Alphabetical Listing of Toxic Substances and Threshold Quantities (TQ) for Accidental Release Prevention (OSHA vs. EPA)

CAS No.	Chemical Name	OSHA PSM TQ (lbs) (from 29 CFR 1910.119 Appendix A)	EPA RMP TQ (lbs) (from Table 1 of 40 CFR 68.130)
79-21-0	Peracetic acid	1000 (> 60% concentration of acetic acid; peroxyacetic acid)	10,000
7601-90-3	Perchloric acid (concentration > 60% by weight)	5000	
594-42-3	Perchloromethyl mercap n	150	10,000
7616-94-6	Perchloryl fluoride	5000	
75-44-5	Phosgene (carbonic chloride; carbonyl chloride)*	100	500
7803-51-2	Phosphine (hydrogen phosphide)	100	5000
10025-87-3	Phosphorus oxychloride (phosphoryl chloride)	1000	5000
7719-12-2	Phosphorus trichloride	1000	15,000
110-89-4	Piperidine		15,000
106-96-7	Propargyl bromide (3-bromopropyne)	100	
107-12-0	Propionitrile		10,000
109-61-5	Propyl chloroformate		15,000
627-3-4	Propyl nitrate	2500	
75-55-8	Propyleneimine		10,000
75-56-9	Propylene oxide		10,000
107-44-8	Sarin	100	
7783-79-1	Selenium hexafluoride	1000	
7803-52-3	Stibine (antimony hydride)	500	
7446-09-5	Sulfur dioxide*	1000 (liquid)	5000
5714-22-7	Sulfur pentafluoride	250	
7783-60-0	Sulfur tetrafluoride	250	2500
7446-11-9	Sulfur trioxide (sulfur anhydride)*	1000	10,000
7783-80-4	Tellurium hexafluoride	250	

*Required to be on EPA's list by the 1990 Clean Air Act Amendments.

Alphabetical Listing of Toxic Substances and Threshold Quantities (TQ) for Accidental Release Prevention (OSHA vs. EPA)

CAS No.	Chemical Name	OSHA PSM TQ (lbs) (from 29 CFR 1910.119 Appendix A)	EPA RMP TQ (lbs) (from Table 1 of 40 CFR 68.130)
116-14-3	Tetrafluoroethylene	5000	
10036-47-2	Tetrafluorohydrazine	5000	
75-74-1	Tetramethyl lead	1000	10,000
509-14-8	Tetranitromethane		10,000
7719-09-7	Thionyl chloride	250	
7550-45-0	Titanium tetrachloride		2500
26471-62-5	Toluene diisocyanate (mixed isomers)*		10,000
584-84-9	Toluene 2,4-diisocyanate*		10,000
91-08-7	Toluene 2,6-diisocyanate*		10,000
1558-25-4	Trichloro (chloromethyl) silane	100	
27137-85-5	Trichloro (dichlorophenyl) silane	2500	
10025-78-2	Trichlorosilane	5000	
79-38-9	Trifluorochloroethylene	10,000	
75-77-4	Trimethylchlorosilane		10,000
2487-90-3	Trimethyoxysilane	1500	
108-05-4	Vinyl acetate monomer		15,000

*Required to be on EPA's list by the 1990 Clean Air Act Amendments.

Alphabetical Listing of Regulated Flammable Substances for Accidental Release Prevention (from Table 3 of 40 CFR 68.130)

CAS No.	Chemical Name	CAS No.	Chemical Name
75-07-0	Acetaldehyde†	78-79-5	Isoprene
74-86-2	Acetylene	75-31-0	Isopropylamine†
598-73-2	Bromotrifluorethylene	75-29-6	Isopropyl chloride
106-99-0	1,3-Butadiene	74-82-8	Methane
106-97-8	Butane	74-89-5	Methylamine†
106-98-9	1-Butene	563-46-2	2-Methyl-1-butene
107-01-7	2-Butene	563-45-1	3-Methyl-1-butene
25167-67-3	Butene	115-10-6	Methyl ether
590-18-1	2-Butene-cis	107-31-3	Methyl formate
624-64-6	2-Butene-trans	115-11-7	2-Methylpropene
463-58-1	Carbon oxysulfide	504-60-9	1,3-Pentadiene
7791-21-1	Chlorine monoxide	109-66-0	Pentane
557-98-2	2-Chloropropylene	109-67-1	1-Pentene
590-21-6	1-Chloropropylene	646-04-8	2-Pentene, (E)-
460-19-5	Cyanogen†	627-20-3	2-Pentene, (Z)-
75-19-4	Cyclopropane	463-49-0	Propadiene
4109-96-0	Dichlorosilane†	74-98-6	Propane
75-37-6	Difluorethane	115-07-1	Propylene
124-40-3	Dimethylamine†	74-99-7	Propyne
463-82-1	2,2-Dimethylpropane	7803-62-5	Silane
74-84-0	Ethane	116-14-3	Tetrafluoroethylene†
107-00-6	Ethyl acetylene	75-76-3	Tetramethylsilane
75-04-7	Ethylamine†	10025-78-2	Trichlorosilane†
75-00-3	Ethyl chloride	79-38-9	Trifluorochloroethylene†
74-85-1	Ethylene	75-50-3	Trimethylamine
60-29-7	Ethyl ether	689-97-4	Vinyl acetylene
75-08-1	Ethyl mercaptan	75-01-4	Vinyl chloride*
109-95-5	Ethyl nitrite†	109-92-2	Vinyl ethyl ether
1333-74-0	Hydrogen	75-02-5	Vinyl fluoride
75-28-5	Isobutane	75-35-4	Vinylidene chloride
78-78-4	Isopentane	75-38-7	Vinylidene fluoride
		107-25-5	Vinyl methyl ether

NOTE: All EPA flammable liquids and gases have a common TQ of 10,000 lbs. Materials marked with a dagger (†) are also in Appendix A of toxic and reactive materials under OSHA's PSM rule (29 CFR 1910.119) with TQs less than or equal to 10,000 lbs. Materials marked with an asterisk (*) are required to be on EPA's list by the 1990 Clean Air Act Amendments.

Summary of Coverage Differences Between EPA's RMP Rule and OSHA's PSM Regulation

Chemical Name	OSHA Limits		EPA Limits	
	Threshold Concentration	Threshold Quantity (lb)	Threshold Concentration	Threshold Quantity (lb)
SUBSTANCES ADDED BY EPA				
Arsenous trichloride				15,000
Boron trifluoride with methyl ether				15,000
Chloroform				20,000
Hydrazine				15,000
Isopropyl chloroformate				15,000
Methyl thiocyanate				20,000
Tetranitromethane				10,000
Titanium tetrachloride				2,500
Toluene diisocyanate				10,000
SUBSTANCES WITH LOWER EPA THRESHOLD QUANTITY				
Methyl chloride		15,000		10,000
SUBSTANCES WITH LOWER EPA CONCENTRATION LIMIT				
Ammonia, aqueous	44%	15,000	20%	20,000
Formaldehyde	37%	1,000	none given	15,000
Hydrogen chloride	anhydrous	5,000	30%	15,000
Hydrogen fluoride	anhydrous	1,000	50%	1,000
Nitric acid	94.5%	500	80%	15,000
Oleum	65%	1,000	none given	10,000
EPA's rule for toxic and flammable mixtures not having a specified lower concentration limit will likely cause more process areas to be covered than under OSHA's PSM regulation				
OSHA EXEMPTIONS NOT CURRENTLY ALLOWED BY EPA				
Atmospheric storage and transfer of flammable liquids (ASTFL)	Flammable gas or liquids used solely as hydrocarbon fuels in the workplace	Retail facility	Normally unoccupied remote facility	Oil and gas well drilling or servicing