Focus & Agenda

- **Focus**
  - Applicability of Clean Air Act (CAA) Section 112(r) & 40 CFR Part 68
- **Agenda**
  - U.S. chemical accident prevention & preparedness laws
  - CAA Section 112(r)
    - Basic requirements
    - General duty clause
    - Regulated substances
    - Threshold criteria
  - 40 CFR Part 68 Risk Management Program rule
    - Applicability criteria
    - Definitions
    - Exemptions
    - Requirements
    - Overview of regulated facility locations, industry sectors & chemicals
  - Applicability of Program Levels
**Risk Management Program**

**Relevant U.S. Laws**

- Emergency Planning and Community Right-to-Know Act — EPCRA (1986)
- Clean Air Act Amendments — CAA (1990)
  - U.S. Chemical Safety and Hazard Investigation Board — CSB (1998)
- Chemical Safety Information, Site Security, and Fuels Regulatory Relief Act — CSISSFRA (1999)

**Clean Air Act Section 112(r)**

- Established a General Duty Clause
- Required EPA to list at least 100 regulated substances known to cause death or serious adverse effects to human health or the environment
- Required EPA to promulgate regulations and guidance to prevent, detect, and respond to accidental releases of regulated substances
- Regulations to include a risk management plan (RMP) available to government officials and the public
**General Duty Clause**

- Owners and operators have a general duty to:
  - Identify hazards associated with a potential accidental release of an "extremely hazardous substance" using appropriate hazard assessment techniques
  - Design and maintain a safe facility, taking steps to prevent releases
  - Minimize the consequences of accidental releases which do occur
- Not limited to a specific list of chemicals or threshold quantities

**CAA Section 112(r)(3) - Listing Criteria**

- List at least 100 substances known to cause death, injury, or serious adverse effects to human health or the environment if accidentally released
- Required EPA to use, but not be limited by, EPCRA EHS list, with appropriate modifications
- 16 specific substances mandated by statute
- Listing criteria
  - Severity of acute adverse health effects
  - Likelihood of accidental releases
  - Potential magnitude of human exposure
Substances Mandated for Listing by CAA

- 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
- Sulfur trioxide

Final List of Regulated Substances

- 77 toxic & 63 flammable substances listed based on:
  - Toxicity:
    - Inhalation LC$_{50}$ ≤ 50 mg/L air
    - Dermal LD$_{50}$ ≤ 50 mg/kg body weight
    - Oral LD$_{50}$ ≤ 25 mg/kg body weight
  - Ambient physical state
    - Gas
    - Liquid with vapor pressure > 10 mm Hg
  - Flammability: NFPA 4 flammability (Flash point < 73°F, Boiling point < 100°F)
  - Production volume & accident history
Mixtures & Solutions

- Listed toxic mixtures containing > 1% listed toxic substance w/partial pressure > 10 mm Hg
- Listed flammable mixtures containing > 1% listed flammable substance w/mixture exceeding NFPA 4 flammability criteria
- Substances with specified concentrations:
  - Nitric Acid (≥ 80%)
  - Hydrofluoric Acid (≥ 50%)
  - Hydrochloric Acid (≥ 37%)
  - Aqueous Ammonia (≥ 20%)

CAA Section 112(r)(3) - Threshold Quantity Criteria

- Threshold quantities established by regulation
- Thresholds must account for:
  - Toxicity, reactivity, volatility, dispersibility, combustibility, or flammability of the substance
  - 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 for which the substance was listed
Threshold Methodology - Toxics

• Relative ranking factor method used IDLH/volatility ranking index
  – Mammalian toxicity data (LC50, etc.) used if no IDLH
• Thresholds assigned by order of magnitude ranges in ranking factor
  – General TQ range informed by other methods & lists
  – Assigned higher TQ than EPCRA Threshold Planning Quantity for same substance
  – Minimum TQ (500 lbs) representative of drum-size containers
  – Maximum TQ (20,000 lbs) representative of typical large handling quantities
  – TQ categories: 500, 1000, 2500, 5000, 10000, 15000, 20000

Threshold Methodology - Flammables

• Reviewed accident history information
• Evaluated relative hazards of vapor cloud explosions, BLEVEs, vapor cloud fires & pool fires
  – Vapor cloud explosion was of greatest concern
• Threshold quantity basis
  – Quantity associated with vapor cloud explosion risk
  – Lethal blast effects at 100 meters from site of detonation
• Threshold for all flammables set at 10,000 lbs
40 CFR Part 68 Risk Management Program

• The Risk Management Program is designed to:
  – Prevent accidental chemical releases to the air
  – Minimize the consequences of releases that do occur
  – Provide information about chemical hazards to the public and government officials in order to promote a dialogue with industry to reduce risk

Applicability Criteria

• Facilities meeting all of the following criteria are subject to 40 CFR Part 68:
  – Stationary source
  – With one or more regulated substances
  – Contained in a process
  – Above a threshold quantity
**Definitions - Stationary Source**

- “…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 accidental release may occur” (CAA Section 112(r)(2))

**Definitions - Process**

- Any activity involving a regulated substance, including any use, storage, manufacturing, handling, or on-site movement of such substances, or combination of these activities
  - 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
Risk Management Program

### RMP Regulation - Exemptions

- Mixtures < 1% concentration (flammable and toxic)
- Gasoline used as fuel for internal combustion engines
- Naturally occurring hydrocarbon mixtures prior to processing
- "Articles"
- Specified uses:
  - As a structural component of the stationary source
  - For routine janitorial maintenance
  - As foods, drugs, cosmetics, or other personal items
  - In process water, non-contact cooling water, compressed air or air used for combustion
- Activities in laboratories
- Anhydrous ammonia held by farmers for use as a nutrient
- Flammable substances used as fuel or held for retail sale
- Outer continental shelf sources
- Transportation

### RMP Regulation - Requirements

- Owner/operator requirements:
  - Conduct a hazard assessment (offsite consequence analysis & five-year accident history)
  - Develop a management system and implement an accident prevention program (except Program 1 processes)
  - Implement an emergency response program or plan
  - Submit a Risk Management Plan (RMP) to EPA
- RMPs available to government, limited public access
Applicability of Program Levels

• Program 1
  – Eligibility Criteria
    • No public receptors in worst-case scenario zone
    • No accidents with specified OFF-SITE consequence in the last five years (68.10)
  – Requirements
    • Limited hazard assessment requirements
    • Minimal prevention and emergency response requirements
  – Flammable storage most common
Applicability of Program Levels

• **Program 3**
  - Eligibility Criteria
    • Ineligible for Program 1
    • Either subject to OSHA PSM (Federal or state) or one of 10 NAICS codes specified in Part 68
  - Requirements
    • Imposes OSHA’s PSM standard as the prevention program
    • Plus additional hazard assessment, management, and emergency response requirements
  - Usually complex chemical processes

Applicability of Program Levels

• **Program Level 3 NAICS Codes**
  - 32211 Pulp mills
  - 32411 Petroleum refineries
  - 32511 Petrochemical manufacturing
  - 325181 Alkali and chlorine manufacturing
  - 325188 All other basic inorganic chemical manufacturing
  - 325192 Cyclic crude and intermediate manufacturing
  - 325199 All other basic organic chemical manufacturing
  - 325211 Plastics material and resin manufacturing
  - 325311 Nitrogenous fertilizer manufacturing
  - 32532 Pesticide & other agricultural chemical manufacturing
Applicability of Program Levels

- **Program 2**
  - Eligibility Criteria
    - Ineligible for Program 1 and not covered by Program 3
  - Requirements
    - Streamlined prevention program requirements
    - Additional hazard assessment, management, and emergency response requirements

Facilities likely to have one or more Program 2 Processes:
- Agricultural fertilizer retailer
- A publicly owned facility in a state that does not have a delegated OSHA program (e.g., municipal waste and wastewater treatment facilities)
- Use of regulated acids in solution in activities that do not fall into one of the ten NAICS codes specified for Program 3
- Petroleum Distillate/Natural Gasoline Stored at atmospheric pressure without cooling
**Applicability of Program Levels**

- Are public receptors within the distance to the endpoint for a worst-case release? 
  - No → Process Eligible for Program Level 1
  - Yes → Is the process subject to the OSHA PSM Standard?
    - No → Process Subject to Program Level 2
    - Yes → Is the process classified in one of the listed NAICS codes?
      - No → Process Subject to Program Level 2
      - Yes → Process Subject to Program Level 3

**RMP Facility Locations**
Risk Management Program

RMP Chemical Processes

- ~ 14,000 facilities with
- ~ 19,000 processes containing
- ~ 24,000 vessels

- Ammonia 34%
- Chlorine 16%
- Flammable Mixture 13%
- All Others

- Butane 2%
- Ammonia (aq) 2%
- Sulfur Dioxide 3%
- Propane 4%
- Isobutane
- Pentane
- Formaldehyde (iso)
- Isopentane
- Hydrogen Fluoride
- All Others

RMP Chemical Quantities

- There are over 75 billion pounds of hazardous chemicals regulated under the RMP rule

- Flammable Mixture 43%
- Propane 14%
- Ammonia 13%
- Butane 11%
- Ethane 2%
- Ethylene 2%
- Isobutane 3%
- 2-Methylpropene
- Pentane
- Chlorine
- Vinyl Chloride
- 1,3-Butadiene
- All Others
RMP Industry Sectors

Agriculture 28%
Chemical Manufacturing 21%
Energy 16%
Water & Wastewater 16%
Food & Beverage 14%
Other 5%

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