

Anhydrous Ammonia and Risk Management Program, Process Safety Management and California Accidental Release Prevention Regulations

Introduction

Risk Management Plans in California are required for all ammonia refrigeration systems with over 500 lbs (100 gallons) of inventory. The intent of the regulation is to encourage responsible management, maintenance and operation of processes that could be dangerous. Originally the RMP program targeted large complex industrial processes and refineries that manufactured or used toxic or flammable chemicals. Anhydrous ammonia used in closed loop refrigeration systems was drawn into the regulations by definition. It's interesting to note that on most days in a rural area you can see several thousand pound tanks of anhydrous ammonia sitting on the side of a road unattended with a hose discharging into the ditch water or irrigation system. No fences, traffic barriers, ammonia sensors or daily logs.

Ammonia is a naturally occurring environmentally friendly chemical that you can purchase in the local grocery store for cleaning. It's also used to green up lawns and garden plants every spring. In concentrated forms used in industrial refrigeration it's harmful in high concentrations. The good news is that if you have two feet that work you'll find the nearest door and fresh air long before there are any lasting health problems. "Gas may ignite at vapor concentrations between 16-25%. However, ammonia-air mixtures are difficult to ignite and burn with little vigor."

Anhydrous ammonia is also 7 times more efficient at transferring heat per lb and 1/6 the cost of its closest ozone depleting substitute HCFC 22. That means without ammonia, you would need twice as much refrigerant charge, larger piping to handle the higher flows, 6 times the cost, and the additional cost of construction using copper or stainless vs. carbon steel. Then the reality is that the more expensive, ozone depleting HCFC 22 can leak without detection.

Regulations

The Clean Air Act (CAA), as amended in 1990, requires the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) to address concerns that chemical accidents could pose a risk to employees, the public, and the environment. The objective of these regulations is to prevent accidental chemical releases and minimize their impact if they do occur. The three regulations and dates are;

1. OSHA published its Process Safety Management (PSM) Standard (29 CFR 1910.119) on February 24, 1992 and it became effective May 26, 1992. The focus of the PSM Standard is protection of employees and on-site contractors with more than 10,000 lbs of ammonia in a single refrigeration system.
2. EPA published the List Rule (40 CFR Part 68) on January 31, 1994, and Risk Management Program (RM Program) regulations (40 CFR Part 68) on June 20, 1996. This regulation focused on protection of the public and the environment. It required a prevention component based on the previous PSM standard.
3. The State of California established a California Accidental Release Prevention Program (Cal ARP) regulations ((CCR title 19 Sections 2735-2785) on November 16, 1998. It combined both federal programs and reduced the threshold to 500 lbs of ammonia in a

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single process. Facilities with < 10,000 lbs of ammonia that are exempt in other states are required to comply with Cal ARP.

Very few ammonia refrigeration facilities were aware of the 1992 regulations since they were federal programs with little local representation. The effective date for implementation of the RM Program was June 21, 1999. This date was much more significant because of \$28,500 /day penalty for non-compliance and the administering agency in California was county government. It was much easier for local government to find and notify refrigeration facilities of compliance requirements. No penalties that we are aware of occurred as facilities learned of the regulations and came into compliance even within the last several years.

Facilities in California with less than 10,000 lbs are required to comply after notification and an agreed upon time frame from 12 months to 3 years. County government has been actively finding and notifying these facilities.

In 2006 we noticed a shift in County and EPA activity in compliance enforcement. County representatives were better trained and some counties along with the EPA began to send out violations and financial penalties for non-compliance.

Procedures for RMP/PSM/Cal ARP Program Compliance

The procedures for complying with the Federal Risk Management Program or California Accident Release Prevention (Cal ARP) regulations are outlined by the following major steps:

1. Identify Covered Processes
2. Determine Program Level
3. Establish a Management System
4. Conduct a 5 year Accident History
6. Perform Hazard Assessments
7. Develop an Accident Prevention Program
8. Develop an Emergency Response Program and
9. Prepare a Risk Management Plan (RMP)

Facilities with a refrigeration system inventory over 10,000 lbs or refrigeration system with less than 10,000 lbs that had major accidents are considered Program Level 3. Program 3 requires a Risk Management Program consisting of 6 Chapters and an Accident Prevention Program consisting of 14 Chapters. The 14 Chapter prevention program was previously known as Process Safety Management Standard and was designed by OSHA to protect workers. In 1999 it became the prevention component to the more comprehensive RMP to minimize onsite and offsite consequences.

RMP Chapters

Chapter 1 - Overview

Chapter 2 - Management System

Chapter 3 - Accident History

Chapter 4 - Hazard Assessment

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Chapter 5 - Emergency Planning & Response

Chapter 6 - Risk Management Plan

PSM Chapters (Prevention Program)

Chapter 1 - Overview

Chapter 2 – Employee Participation

Chapter 3 – Process Safety Information

Chapter 4 – Process Hazard Analysis (PHA)

Chapter 5 – Pre-Startup Safety Review

Chapter 6 – Standard Operating Procedures (SOP)

Chapter 7 - Training

Chapter 8 – Management of Change (MOC)

Chapter 9 – Mechanical Integrity Program

Chapter 10 – Hot Work Permit

Chapter 11 – Contractor Qualifications

Chapter 12 – Incident Investigation

Chapter 13 – Compliance Audits

Chapter 14 – Trade Secrets

The Program 2- RM Program consists of 12 chapters included below. Program 2 requires coordination with the County only and does not require Federal filing. Ammonia inventories for Program 2 are from 500 lbs to 10,000 lbs.. Note that several sections are similar to the previous program 3.

CAL ARP Chapters

Chapter 1 - Overview

Chapter 2 - Management System

Chapter 3 – Hazard Assessment

Chapter 4 - Accident History

Chapter 5 – Process Safety Information

Chapter 6 – Process Hazard Analysis (PHA)

Chapter 7 – Standard Operating Procedures (SOP)

Chapter 8 - Training

Chapter 9 – Maintenance

Chapter 10 – Compliance Audits

Chapter 11 – Incident Investigation

Chapter 12 – Emergency Planning and Response

No ammonia refrigeration facilities so far have met requirements for Program 1 since there is usually at least one public receptor (residence or public area) in the distance to toxic endpoint.

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Impacts

Impacts on facilities with ammonia refrigeration systems have been an initial cost to develop or purchase a Risk Management Plan, the cost of implementing process recommendations to reduce hazards and documentation of maintenance and training activities. Depending on the age and size of the facility these costs vary. An older facility might need additional engineering time to document equipment, refrigeration drawings, IOM manuals, Standard Operating Procedures or more ventilation to prevent build-up of explosive concentrations. A newer facility would have this documentation and equipment as part of the plan review.

The most obvious changes are replacement of Safety Relief Valves every 5 years, written daily inspections and recording of maintenance activities. The plan is updated every 5 years, internal compliance audits occur at least every 3 years along with refresher training for operators and mechanics. Some of these records must be kept for the lifetime of the process.

The last impact is a non-financial risk. Someone at the facility must accept responsibility for implementation of the RMP program. In the event of a hazardous waste spill or toxic release this person is criminally liable for the facility. While not common these events can result in a felony conviction.

Compliance Options

Facilities are given the option of developing a program themselves or hiring a consultant/contractor to help them. The government developed Industry specific guides to assist in this process and some Trade Associations developed commercially available templates to help a facility develop one for themselves. Even with a third party developed program, the facility is still responsible for compliance.

Cold Storage Technologies in an effort to assist customers with compliance attended training and utilized Industry specific guides to develop a program for their customers. It includes;

- Onsite training
- RM program customized for a specific facility
- Process Hazards Analysis leadership, support and What-if-checklist questions
- Materials for EPA and County filing
- Standard Operating Procedures for a specific facility
- Process Safety Information including inventory calculations and IOM manuals
- All necessary forms and sample letters
- Emergency Response Plan with NH₃ mitigation requirements
- Support for Compliance Audits and PHA revalidations
- Updates and revision support

Cold Storage Technologies works on a time and material basis allowing the customer to manage and minimize their development cost. Our unique background and experience provides a very efficient approach that is substantially less than other companies, includes necessary training and is complete. As one of our customers your employees are also welcome to attend our training programs and safety days. Call now to get on our schedule, it fills up quickly.