Oil&Gas
ENVIRONMENTAL
CONFERENCE

THE FACES OF RISK MANAGEMENT

Tony Robledo
U.S. Region 6
Inspector and Enforcement Officer
Dallas, TX

Clean Air Act §112(r) History

Bhopal, India – December 1984

Clean Air Act Amendments of 1990, Section 112r required EPA to publish regulations and guidance for chemical accident prevention at facilities using substances that posed the greatest risk of harm from accidental releases.

Required companies of all sizes that use certain listed regulated flammable and toxic substances to develop a Risk Management Program.

June 1999, a summary of the facility's risk management program (known as a "Risk Management Plan" or "RMP") was to be submitted to EPA.

December 2008, EPA had RMPs from about 14,000 facilities. The plans must be revised and resubmitted every five years.

What is Clean Air Act §112(r) ?

CAA §112(r)(1) – General Duty Clause

CAA §112(r)(6) – Chemical Safety Board

CAA §112(r)(7) – Risk Management Program

What is the General Duty Clause?

In the Clean Air Act Amendments of 1990, Congress enacted Section 112(r)(1), also known as the General Duty Clause (GDC):

It shall be the objective of the regulations and programs authorized under this subsection to prevent the accidental release of any substance listed pursuant to paragraph (3) or any other extremely hazardous substance. The owners and operators of stationary sources producing, processing, handling, or storing in the same manner and to the same extent as Section 654 of Title 29.

Who is covered by the General Duty Clause?

The General Duty Clause applies to **any stationary source producing, processing, handling, or storing regulated substances or other extremely hazardous substances.**

- Regulated Substances – identified in 40 CFR Part 68.130
- "Other extremely hazardous substances" are any other substances which may be considered extremely hazardous. Examples could include:
  - Toxics
  - Flammables
  - Acute Health Effects
  - Dust
  - Water (under high temperature and pressure)

Requirements of the General Duty Clause

- Identify hazards that may result from the accidental release of EHS using appropriate hazard assessment techniques.
- Design and maintain a safe facility taking necessary steps to prevent releases.
- Minimize the consequences of accidental releases which do occur.

What is CAA §112(r)(7) ?

A Risk Management Program, which includes a(n):

- Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases scenarios;
- Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and
- Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g., the fire department) should an accident occur.

Three levels of regulation in the Risk Management Program

There are **three levels of regulation** under the Risk Management Program. These levels apply to individual processes:

- Program 1: for facilities that have relatively safe processes and low risk, which would not affect the public.
- Program 2: imposes streamlined prevention program requirements, as well as additional hazard assessment, management, and emergency response requirements. and
- Program 3: the highest level of risk requiring rigorous prevention program requirements, as well as hazard management and emergency response requirements.

GDC/RMP Differences

- GDC deals with stationary sources with listed substances or other extremely hazardous substances at any quantity
- RMP deals with Listed Substances (toxics and flammables listed in 40 CFR 68.130) held above a threshold quantity in a covered process

General Duty Clause - Examples

- Welding near flammable vapors
- Failures involving hot work permits
- Operating procedures not followed
- Failure to follow Standard Operating Procedures
- Failure to write Standard Operating Procedures
- Failure to purge appropriately
- Failure to safely drive machinery near pipes
- Failure to properly ground
- Failure to use equipment appropriate for hazardous environments

Failure to have lightning protection

Failure to properly follow Recognized and Generally Accepted Good Engineering Practices (RAGAGEP)

Failure to use manufacturers recommended specifications and materials

Failure to follow Standard Operating Procedure during maintenance procedures

Failure to have adequate communication causing a release

Risk Management Program - Examples

- Program Determination/Applicability - 68.10 - Listed as Program 2, Should be Program 3
- Management – 68.15 – not adequately defined
- Offsite Consequence Analysis – 68.39 – No documentation to make determination
- Five Year Accident History – 68.42 – accidents meeting criteria are not reported to RMP
- Safety Information/Process Safety Information 68.48/68.65 – Safety information does not match design specification
- Hazard Review 68.50/68.67 – Process Hazard Analysis – failure to identify hazards – stationary source siting
- Compliance Audit – 68.58/68.79 – Not Completed every 3 years; Facility has not documented corrections of deficiencies

Operating Procedures – 68.69– Inadequate operation procedures

Training Program – 68.71 – Refresher training not completed within 3 years

Mechanical Integrity – 68.73 – Inspections and tests not performed on process equipment

Management of Change 68.75 – No documentation on employee training; no documentation of updated Process Safety Information

Incident Investigation - 68.81- No system to promptly address findings/recommendations; Date investigation began not listed on report

Emergency Response Program Applicability - 68.90 – not an adequate plan

Areas not covered by OSHA PSM that are covered in the RMP regulations are often overlooked by facilities

EPA Region 6 - RMP Overview

- 2,293 facilities in Region 6 are required to develop Risk Management Plans (RMPs) [18% of national total].
- Region 6 represents 75 percent of the petrochemical production, 50 percent of refining capacity and 70 percent of all-natural gas production.
- Each year, Region 6 experiences around 2,000 accidental releases to the air as reported to the National Response Center and state reports.

Accident Description
Accident: Enterprise Pascagoula Gas Plant Explosion and Fire
Location: Location: Moss Point, MS
Accident Occurred On: 06/27/2016 |
Final Report Released On: 02/13/2019
Accident Type: Chemical Distribution - Fire and Explosion
Investigation Status: The CSB's final report was released on February 13, 2019.
On June 27, 2016, explosions and fire occurred at the Enterprise Pascagoula Gas Plant in Moss Point, Mississippi.

Incident Synopsis

- During the night of June 27, 2016, the two personnel on duty — a control board operator and an outside operator were stopping production of natural gas liquids due to pipeline problems downstream of the facility. Although this was a non-routine activity the control board operator had experience conducting the procedure.

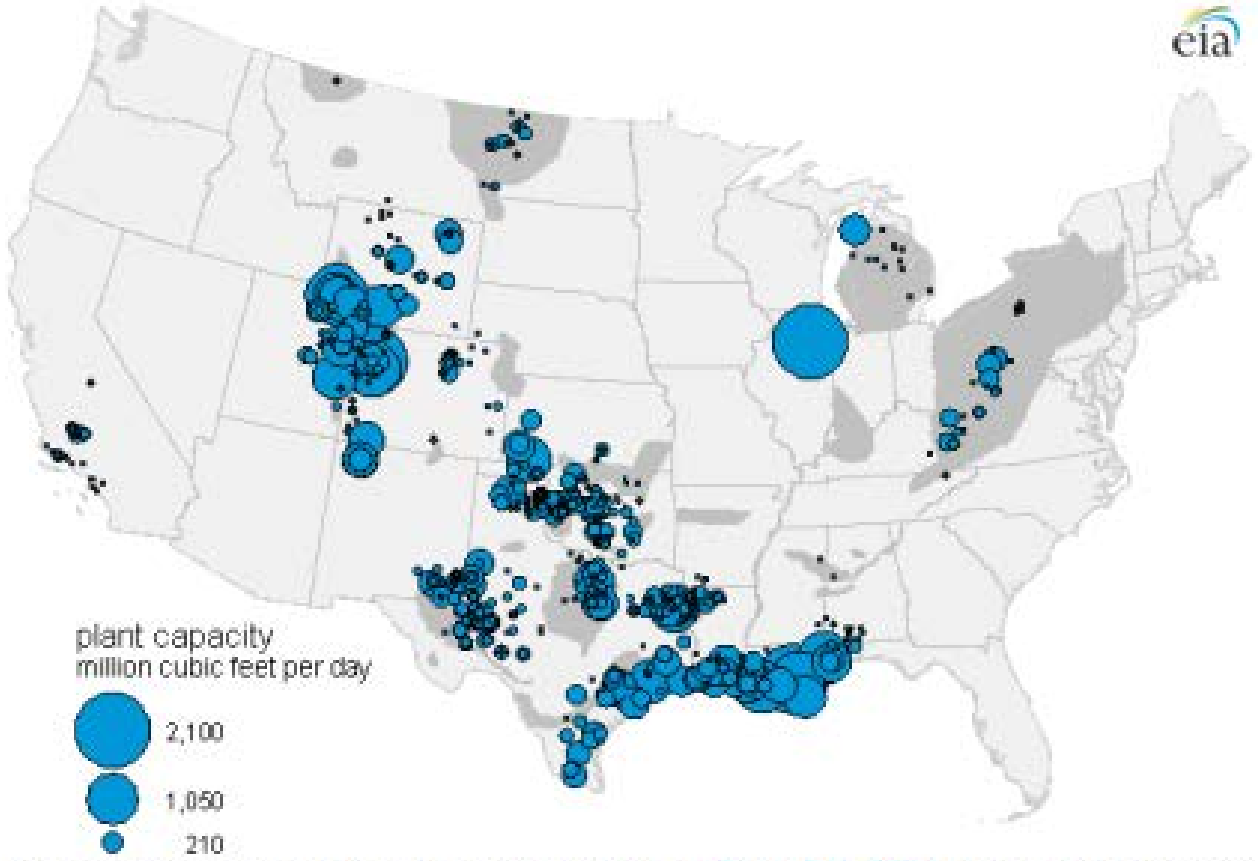
- At 11:22 p.m. the operators initiated the necessary steps from the control room when, at a sudden explosion and fire occurred. No abnormal alarms or other indicators warned the two personnel of any problems. Within a minute of the initial explosion, the operators activated the emergency shut down systems at the plant and sheltered in the control room.

- Over the course of the incident, the site experienced 13 different ruptures of piping and equipment. The CSB concluded that the first loss of containment most likely originated at a Brazed Aluminum Heat Exchanger (BAHX) when it lost core mechanical integrity due to accumulated thermal fatigue

Two separate trains (A & B) after the fire and explosion incident.

Damage Mechanisms	Analysis	Contributing Cause?
Over-pressurization of the active layers of the BAHX core or its headers due to process upset	For the ACSR, the maximum allowable working pressure[a] for the A and B passes, respectively, are 1,200 and 570 pounds per square inch gauge (psig). A review of the DCS data indicates that in the hour leading up to the incident, there were no large increases in pressure. It is unlikely the exchanger exceeded the maximum allowable working pressure (1,200 psig for A pass and 570 for B pass), with the highest readings at less than 1,050 psig for A pass and 480 psig for B pass (see Section 2.2 for BAHX configuration).	No
Water accumulation and ice formation[b]	A dedicated process unit to remove any moisture in the feed to the cryogenic unit was operating normally. PGP has moisture analyzers in the process to indicate high amounts of water, but none of them alarmed in the 24 hours before the incident.	No
Thermal shock[c]	Analysis of the DCS data on the night of the incident does not indicate thermal shock. All temperature changes were slow, around 3°F/min, peaking at 6°F/min.	No
Weakening of the fin matrix as a result of corrosion[d]	As recently as September 2015, headers from the ACSR were removed and inspected. None of the repair reports by either PGP employees or the repair technicians noted any signs of corrosion.	No
Mercury embrittlement	Post-incident tests performed on the two BAHXs on B-Train, which operated under conditions similar to those on A-Train, discovered only trace amounts of mercury. Additionally, metallurgical testing of the ACSR found no evidence of embrittlement.	No
Thermal fatigue	Analysis of the operational history of the ACSR, repair records, historical process data, and a post-incident laboratory examination of the exchanger reveal evidence of service-related thermal fatigue in several areas within the core of the exchanger. Section 4.3 provides details of this analysis.	Yes

Natural gas processing plant data now available



Source: U.S. Energy Information Administration, Form EIA-757A, Natural Gas Processing Plant Survey Schedule A: Baseline Report

Note: Gray-shaded areas represent current U.S. shale plays.

Requirements for a Risk Management Program

Off-site Consequences analysis

Management system to oversee the implementation of the risk management program elements

Prevention Program

- Safety information
- **Hazard review (PHA)**
- Operating procedures
- Training
- Maintenance
- Compliance audits
- Accident investigation
- Periodic audits

Mechanical integrity program

Case Study

Published: February 13, 2019

KEY ISSUES:

- Exchanger Failure Due to Thermal Fatigue
- Service Life Determination of Brazed Aluminum Heat Exchangers
- Social Media Use in Emergency Response

Chemical Safety Board Report

https://www.csb.gov/enterprise-pascagoula-gas-plant-explosion-and-fire-/

Questions?

Tony Robledo
(214) 665-8182
Robledo.Tony@epa.gov