

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF RELEASE PREVENTION
TOXIC CATASTROPHE PREVENTION ACT (TCPA) PROGRAM

Guidance Document on Identifying Process Safety Incidents

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The owner or operator of a facility subject to the TCPA Program rules must investigate process safety incidents. Also, facilities are required to report these incidents as part of the annual report pursuant to N.J.A.C. 7:31-4.9(b)4. However, personnel of many facilities may not understand what incidents are covered under the TCPA rules. This guidance is intended to assist TCPA facilities in understanding what incidents must be investigated and how to improve their management systems to identify those incidents when they occur.

What incidents are required to be investigated for the TCPA rules?

Incidents covered by the TCPA rules include all Extraordinarily Hazardous Substance (EHS) accidents and potential catastrophic events (more commonly known as “near misses”) pursuant to 40 CFR 68.81(a) incorporated with changes at N.J.A.C. 7:31-4.1(c)16. An EHS accident is defined at N.J.A.C. 7:31-1.5 as an unplanned, unforeseen or unintended incident, situation, condition, or set of circumstances which directly or indirectly results in an EHS release. An EHS release is a discharge or emission of an EHS from a piece of EHS equipment in which it is contained, excluding discharges or emissions occurring pursuant to and in compliance with the conditions of any State permit or regulation.

A potential catastrophic event is defined at N.J.A.C. 7:31-1.5 as an incident that could have reasonably resulted in a catastrophic release of an EHS. The Department has stated that it equates the term “potential catastrophic event” with that of “near miss,” which has a long history of use by process safety professionals and organizations such as American Institute of Chemical Engineers Center for Chemical Process Safety (see the July 20, 1998, TCPA rule adoption document, Comment/Response 53 and Agency-Initiated Changes Items 2., 4., and 6., and the March 16, 2009, TCPA rule adoption document, Comments/Response 65 and 66).

The American Institute of Chemical Engineer’s Center for Chemical Process Safety (CCPS) defines near miss as “an occurrence in which an accident (that is, property damage, environmental impact, or human loss) or an operational interruption could have plausibly resulted if circumstances had been slightly different.” [1] In another CCPS publication, near miss is defined as an undesired event that under slightly different circumstances could have resulted in harm to people, damage to property, equipment or environment or loss of process. [2] Finally, the United Nations Environment Programme (UNEP) DTIE Sustainable Consumption and Production (SCP) Branch, defines near miss as “any unplanned event which, but for the mitigation effects of safety systems or procedures, could have caused harm to health, the environment, or property, or could have involved a loss of containment possibly giving rise to adverse effects involving hazardous substances.” [3]

Examples of incidents may help facilities understand what a near miss is. CCPS states that some common examples of near miss incidents might include [1]:

- Excursions of process parameters beyond pre-established critical control limits;
- Activation of layers of protection such as relief valves, interlocks, rupture disks, blowdown systems, halon systems, vapor release alarms, and fixed water spray systems; and
- Activation of emergency shutdowns (in some instances).

This list of near miss examples is not comprehensive. The Department recommends that facilities review the CCPS guidelines book and the CCPS process safety metrics publication for a more detailed explanation of near misses.

Why is it important to identify and investigate incidents?

The introductory paragraph of the New Jersey Toxic Catastrophe Prevention Act states that the single most effective effort to be made toward the prevention of catastrophic accidents is by anticipating the circumstances that could result in their occurrence and taking those precautionary and preemptive actions required. Facilities' investigation and documentation of near miss incidents is one aspect of a risk management program to meet this goal of the TCPA. The lessons learned from investigating smaller incidents are extremely valuable in preventing the occurrence of larger incidents.

Case studies of some major industry companies show the effectiveness of implementing a near miss management system. [4] As the companies reported more near misses over time, they had significant reductions in the number of lost time injuries, other process safety incidents, and process safety management audit scores (less process safety management deficiencies).

Also, there are many examples of major accidents in industry in which earlier near miss incidents were ignored. Michael Dolan, senior vice president of Exxon Mobil Corporation, in his key note speech at the 2013 American Institute of Chemical Engineers Spring Meeting stated, "Each and every one was preventable with good engineering practice and attention to detail. And beneath each of these is a pyramid of near misses in many plants that could have been equally disastrous." [4]

How many incidents should a facility expect to have?

Many facilities have indicated that they have no accidental releases and near misses. This is highly unlikely. CCPS provides an illustration of the pyramid relationship among accidents, near misses, and non-incidents. [1] This pyramid provides a typical relationship showing that for each accident in a process, there would be about 100 near misses and about 9,900 errors or failure conditions. However, processes vary in their complexity, and a more complex process has a greater number of potential failure mechanisms. CCPS provides a general corollary, "as the process gets simpler, and the path off occurrences to reach harm becomes shorter, there are fewer near misses and errors per accident."

How can facilities improve identification of incidents?

Many facilities are not effectively identifying and investigating incidents. The importance of identifying all incidents must be instilled in the safety culture of the organization from the first-line workers to the upper management. CCPS lists several obstacles to near miss reporting and solutions to overcome these obstacles. [1] Obstacles that must be overcome include fear of disciplinary action, fear of embarrassment, lack of understanding of near miss versus non-incident, lack of management commitment and follow through, high level of effort to report and

investigate, disincentives for reporting near misses, and not knowing which investigation system to use.

To improve identification of incidents, the lack of understanding of near miss versus non-incident must be overcome. CCPS provides several solutions to overcome this obstacle:

1. Develop a list of in-context examples that illustrate high-learning-value incidents, particularly near misses. This list should be specific for the facility and its process and should provide a clear distinction of what are accidents and near misses and what are non-incidents.
2. Train personnel on the list of examples.
3. Differentiate between a near miss and a behavior-based management observation, which includes observations by peers to try to correct behaviors by coaching or other means. Examples of these types of observations, which typically are considered non-incidents, should be included in the list of 1. above.
4. Use safety meetings to communicate near misses that previously were not identified.

What information must be provided in the incident investigation?

Once an incident has been identified, a system must be implemented for its investigation and management. An eight-step management process incorporating key factors to address incidents was developed as part of the Wharton Risk Center Study. [4] The steps include identification, disclosure (reporting), prioritization, distribution, identification of causes (causal analysis), solution identification, dissemination, and resolution (tracking). These steps parallel the incident investigation requirements of 40 CFR 68.81 incorporated with changes at N.J.A.C. 7:31-4.1(c). The report, investigation, and method of documenting may not be as detailed for some near misses as would be required for a larger EHS accidental release, but each of the rule requirements still must be addressed.

References

[1] Center for Chemical Process Safety (CCPS) of the American Institute of Chemical Engineers, Guidelines for Investigating Chemical Process Incidents, Second Edition, March 2003.

[2] Center for Chemical Process Safety (CCPS) of the American Institute of Chemical Engineers, "Process Safety Leading and Lagging Metrics – You Don't Improve What You Don't Measure," January 2011.

[3] United Nations Environment Programme (UNEP) DTIE Sustainable Consumption and Production (SCP) Branch, "A Flexible Framework for Addressing Chemical Accident Prevention and Preparedness - A Guidance Document," 2010.

[4] Oktem, U.G. and Atay, I. (2013). "Business and Regulatory Aspects of Effective Near-Miss Management Implementation". American Institute of Chemical Engineers 9th Global Congress on Process Safety, 2013 Spring Meeting. April 28 – May 1, 2013.