

# The Need for Process Safety Management Regulatory Reform

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**O**n Sunday, March 17, 2019, a massive fire erupted at the Intercontinental Terminals Company, LLC, (ITC) bulk liquid storage terminal located in Deer Park, Texas. The fire originated in the vicinity of Tank 80-8, an 80,000-barrel aboveground atmospheric storage tank that held a blend of naphtha and butane product, a flammable liquid. Once the fire began, ITC was unable to isolate or stop the release. As a result, the fire spread to the other 14 tanks located in the same containment area. The fire caused substantial property damage to the ITC Deer Park terminal, including the destruction of fifteen 80,000-barrel aboveground atmospheric storage tanks and their contents. The fire burned for three days, until it was extinguished on Wednesday, March 20, 2019.

This article examines how current regulatory gaps can amplify environmental health and safety hazards caused by chemical disasters and suggests potential regulatory remedies.

Like many major process safety incidents, this incident significantly impacted the environment. A containment wall around the tanks was breached and released an estimated 21 million gallons of hydrocarbon and petrochemical products, firefighting aqueous film forming foam, and contaminated water into Tucker Bayou and adjacent water, sediments, and habitats. From there, the released materials flowed into Buffalo Bayou, and streamflow and tides carried them into the Houston Ship Channel and surrounding waters. The contamination closed a seven-mile stretch of the Houston Ship Channel adjacent to the ITC Deer Park terminal and several waterfront parks in Harris County and the city of LaPorte. While the incident did not result in any injuries, it resulted in property damage to the facility exceeding \$150 million.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) is an independent federal agency charged under the Clean Air Act (CAA), 42 U.S.C. section 7412(r)(6), with

investigating, determining, and reporting to the public in writing the facts, conditions, and circumstances and the cause or probable cause of any accidental release resulting in a fatality, serious injury, or substantial property damage. The CSB issues safety recommendations based on data and analysis from investigations and safety studies and advocates for these changes to prevent the likelihood or minimize the consequences of accidental chemical releases. The CSB investigated the ITC incident and determined that the cause of the massive fire was the release of flammable butane-enriched naphtha vapor from the failed Tank 80-8 circulation pump. The flammable vapor accumulated near the pump and ignited, resulting in the fire. The absence of a flammable gas detection system to alert the operators to the flammable mixture before it ignited approximately 30 minutes after the release began, and the absence of remotely operated emergency isolation valves to effectively stop the release from a safe location, allowed this event to escalate to a massive fire that gained national media attention.

The CSB also determined that due to the atmospheric storage tank exemption contained in the Occupational Safety and Health Administration (OSHA) Process Safety Management (PSM) standard, and the flammability provision contained in the U.S. Environmental Protection Agency (EPA) Risk Management Program (RMP) rule, ITC was not required to develop and implement a formal PSM program for Tank 80-8 and its associated equipment that could have provided a means of identifying and controlling the specific hazards that resulted in this incident. Had ITC effectively applied specific elements of these regulations, such as Mechanical Integrity and Process Hazard Analysis, to its atmospheric storage tanks in highly hazardous chemical service, the company would have been required to identify and control hazards through multiple layers of protection, and the incident could have been prevented. Instead, these regulatory gaps allowed the serious

risks associated with Tank 80-8 and its associated equipment to remain unmitigated.

## OSHA PSM Standard Atmospheric Storage Tank Exemption

The OSHA PSM standard employs a performance-based approach to process safety and the prevention of major process safety incidents. The regulation requires the implementation of 14 process safety elements and applies to any process that involves highly hazardous chemicals, at or above the specified threshold quantities. OSHA defines a process under 29 C.F.R. § 1910.119(b) as “any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or on-site movement of such chemicals, or combination of these activities.” OSHA included an exception, however, at 29 C.F.R. § 1910.119(a)(1)(ii)(B) for flammable liquids with a flashpoint below 100°F stored in atmospheric tanks that are kept below their normal boiling point without the benefit of chilling or refrigeration. OSHA defines an atmospheric tank under 29 C.F.R. § 1910.119(b) as “a storage tank which has been designed to operate at pressures from atmospheric through 0.5 p.s.i.g. (pounds per square inch gauge. . .).” According to OSHA’s preamble for the PSM standard, this atmospheric storage tank exemption was included because “OSHA did not believe that the flammable liquids as described in the exemption have the same potential for a catastrophe as those proposed . . . [and] an OSHA standard already regulates the treatment of the exempted flammable liquids (1910.106, flammable and combustible liquids).” OSHA, Final Rule on Process Safety Management of Highly Hazardous Chemicals; Explosives and Blasting Agents, 57 Fed. Reg. 6356 (Feb. 24, 1992). The regulation, 29 C.F.R. § 1910.106, *Flammable liquids*, was adopted in 1974 and intended to address fire and explosion hazards of flammable liquids, unlike the PSM standard, which has the goal of preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals.

## The U.S. Chemical Safety and Hazard Investigation Board has long advocated for the removal of the atmospheric storage tank exemption in the OSHA Process Safety Management standard.

Since the adoption of the PSM standard in 1992, the atmospheric storage tank exemption persists despite many

opportunities for change. In 1995, an administrative law judge ruled that PSM coverage does not extend to stored flammables in atmospheric tanks even if they are connected to other equipment that is considered to be a process and covered under the PSM standard. *See U.S. Sec’y of Lab. v. Meer Corp.*, OSHRC Docket No. 95-0341 (1995). This ruling was contrary to consistent OSHA interpretations of the standard at the time, and as such, OSHA has repeatedly expressed intent since then to clarify this exemption. On April 17, 2013, a catastrophic explosion occurred at a fertilizer storage facility in West, Texas. The incident resulted in the deaths of 12 volunteer firefighters and two members of the public and caused hundreds of injuries. In response to this incident, on August 1, 2013, Former President Barack Obama issued Executive Order 13650, *Improving Chemical Facility Safety and Security*, which, among other things, directed OSHA and EPA to review the PSM standard and RMP rule, respectively, and determine if these regulations can and should be expanded to address additional regulated substances and types of hazards. In 2013, OSHA released an updated regulatory agenda that included proposed rulemaking on “Process Safety Management and Flammable Liquids” and stated that OSHA was “considering revising” its PSM standard to address gaps in safety coverage, which included clarifying the PSM exemption for atmospheric storage tanks. Following this update, OSHA issued a Request for Information in December 2013 on potential revisions to the PSM standard. The CSB submitted extensive comments on March 31, 2014, that urged OSHA to eliminate the exemption. On September 20, 2022, OSHA issued a Federal Register Notice (87 Fed. Reg. 57,520) to announce an informal stakeholder meeting regarding the rulemaking project for the PSM standard, and inviting public comments related to potential changes to the PSM standard. The potential changes to the scope of the current PSM standard that OSHA is considering include clarifying the exemption for atmospheric storage tanks. The CSB submitted written comments on this Notice on November 9, 2022, and once again urged OSHA to eliminate the atmospheric storage tank exemption. Despite the many opportunities in the wake of the West incident to update the PSM standard, the Department of Labor’s Spring 2023 Unified Agenda still shows OSHA as being in the “Prerule Stage” for Process Safety Management and Prevention of Major Chemical Accidents.

The CSB has long advocated for the removal of the atmospheric storage tank exemption in the PSM standard. The CSB has repeatedly found through its investigative work that this regulatory gap has contributed to several major process safety incidents in the last few decades. As a result of its Motiva Enterprises Sulfuric Acid Tank Explosion investigation, the CSB issued a recommendation to OSHA in 2002 to expand coverage under the PSM standard to include atmospheric storage tanks. During the CSB’s Motiva public meeting, which took place on August 28, 2002, then-U.S. Senator Joseph R. Biden said that “these recommendations, these policies, procedures and practices are so basic that they should have been in place long before 2001. . . .” In addition to the 2001 Motiva incident, which resulted in one fatality and eight injuries, this exemption issue was a factor in the 2009 Caribbean Petroleum Refining Tank

Explosion and Fire (CAPECO) incident. During this incident, a large explosion occurred at the CAPECO facility in Bayamon, Puerto Rico, during offloading of gasoline from a tanker ship to the CAPECO tank farm onshore. A five-million-gallon above-ground storage tank overflowed into a secondary containment dike, forming a large vapor cloud that ignited. The explosion significantly damaged the facility, severely damaged homes and businesses up to 1.25 miles from the site, and caused over \$5 million in damages to the nearby Fort Buchanan military facility. Petroleum products also leaked into the soil, nearby wetlands, and navigable waterways in the surrounding area. The CSB found that OSHA's exemption of atmospheric storage tanks from the PSM standard meant CAPECO personnel were not required to develop hazard assessments and management of change (MOC) reviews to analyze the hazards posed by terminal operations. As a result, the CSB made a recommendation to OSHA to revise 29 C.F.R. § 1910.106 to establish process safety elements for bulk aboveground storage tanks that are akin to those in the PSM standard. As of the date of the ITC incident, OSHA had not implemented this recommendation.

As the PSM standard has undergone little reform since its adoption in 1992, updating this regulation continues to be an extremely important topic to the CSB. For the last decade, the CSB has continually listed the modernization of U.S. Process Safety Regulations as one of its most wanted safety improvements, noting that more must be done to protect workers, the public, and the environment from catastrophic process safety incidents. Over the last two decades, the CSB has issued several recommendations to OSHA to update the PSM standard to not only eliminate the atmospheric storage tank exemption, but also expand its coverage and requirements for reactive chemical hazards, and update and expand its list of highly hazardous chemicals in Appendix A. This includes adding to the list Fertilizer Grade Ammonium Nitrate, which was involved in the massive explosion in West, Texas. To date, OSHA has not implemented these recommendations, and the PSM standard remains unchanged.

As a result of its recent investigation of the massive 2019 ITC storage tank fire, the CSB concluded that the OSHA PSM standard continues to allow for catastrophic incidents to occur because necessary safeguards are not being implemented for equipment that should otherwise be covered under the PSM standard. Had it not been for the atmospheric storage tank exemption, ITC's Tank 80-8 would have been subject to the requirements contained in the PSM standard. One such requirement is Mechanical Integrity, which would have required ITC to maintain the mechanical integrity of Tank 80-8 and its associated equipment, including the Tank 80-8 circulation pump, which failed and allowed butane-enriched naphtha product to release from the pump while it continued to operate. Additional PSM requirements include Process Hazard Analysis and MOC, which would have provided ITC with additional opportunities to evaluate risks associated with product storage and circulation, including potential loss of containment, and identify and implement safeguards, including engineering safeguards such as flammable gas detection systems and remotely operated emergency isolation valves, to help prevent the spread

of the initial fire. Based on these findings, the CSB superseded its recommendations from Motiva and CAPECO and issued a new recommendation to OSHA to eliminate its atmospheric storage tank exemption from the PSM standard.

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### EPA RMP Rule Flammability Rating Exemption

The CAA Amendments require EPA to promulgate regulations to prevent accidental releases of regulated substances and reduce the severity of those releases that do occur. 61 Fed. Reg. 3667, at 1 (Feb. 2, 1996). Congress provides under the CAA Amendments that EPA must “promulgate reasonable regulations and appropriate guidance to provide, to the greatest extent practicable, for the prevention and detection of accidental releases of regulated substances and for response to such releases by the owners or operators of the sources of such releases.” CAA Amendments, Pub. L. No. 101-549, sec. 301, 104 Stat. 2399, 2570 (Nov. 15, 1990) (amending Clean Air Act sec. 112(r)(7)(B)(i)). Under the authority of CAA section 112, EPA adopted the RMP regulations (the RMP rule) at 40 C.F.R. part 68. The RMP rule requires facilities that contain more than a threshold quantity of any of the listed toxic or flammable substances in a process to prepare and submit to EPA a risk management plan containing emergency contact information, descriptions of processes and hazardous chemicals onsite, an accident history, and worst-case release scenarios. 40 C.F.R. § 68.12. Unlike the PSM standard, the RMP rule does not exempt the atmospheric storage of flammable liquids. The RMP rule defines three different Program levels (Program 1, 2, or 3) based on a process unit's potential for impact to the public and the requirements to prevent incidents. *Id.* § 68.10. Program 3 processes are subject to additional, more stringent prevention program requirements, including MOC reviews, mechanical integrity, training, and process hazard analyses. These prevention program elements are based primarily on the OSHA PSM

standard, and much of the language contained in each element is identical to the PSM standard.

On January 6, 1998, EPA modified the RMP rule by adding a provision for the threshold determination of flammable substances in a mixture intended to “better focus accident prevention activities on stationary sources with high hazard operations and reduce duplication with other similar requirements.” This provision, contained in 40 C.F.R. § 68.115(b)(2)(i), states the following:

[I]f the concentration of the substance is one percent or greater by weight of the mixture, then, for purposes of determining whether a threshold quantity is present at the stationary source, the entire weight of the mixture shall be treated as the regulated substance unless the owner or operator can demonstrate that the mixture itself does not have a National Fire Protection [NFPA] flammability hazard rating of 4.

The criteria for the NFPA-4 flammability rating are contained in the 1996 edition of NFPA 704, and the 1996 edition of NFPA 30. The RMP rule incorporates both standards by reference. In NFPA 704, NFPA-4 rating criteria are defined as a liquid having a flash point below 73°F and boiling point below 100°F. Prior to the incident, ITC submitted its most recent risk management plan to EPA on March 12, 2018. The plan did not include the naphtha and butane mixture contained in Tank 80-8, which contained approximately 1.4 million pounds of butane at the time of the incident. ITC asserted, however, that the butane-enriched naphtha product contained in Tank 80-8 was not subject to the RMP rule because it was an NFPA-3 rated material rather than an NFPA-4 rated material. As such, ITC did not apply the RMP rule’s requirements to Tank 80-8.

Although the RMP rule does not regulate NFPA-3 rated liquids, these materials are hazardous based on their inherent properties. The CSB has investigated several high-consequence chemical incidents that involved materials rated lower than an NFPA “4”. The Motiva incident, which is mentioned above, occurred when flammable vapors inside a storage tank containing spent sulfuric acid were ignited, causing an explosion and killing one worker. Despite the severity of the incident, the spent sulfuric acid has a flammability rating that can range between a “0” and a “3”, and the tank was not covered by the RMP rule. One of the most notable recent incidents resulting in several recommendations in the United Kingdom (UK) is an explosion and fire that occurred on December 11, 2005, at the Buncefield oil storage depot in Hemel Hempstead, Hertfordshire, UK. During this incident, a vapor cloud explosion and multiple tank fires occurred after a tank was overfilled with gasoline. The fire damaged 22 tanks, severely damaged nearby commercial and residential property, and injured 43 people.

Like the CAPECO and ITC incidents, Buncefield involved a substance, gasoline in this case, that is typically considered an NFPA-3 rated material.

Ultimately, ITC’s application of this regulatory provision resulted in the company not developing and implementing an effective PSM program, including a comprehensive hazard review and MOC review for its Tank 80-8 operations. The CSB concluded in its investigation report on the incident that had the RMP rule applied to Tank 80-8, this incident should not have occurred. The CSB also noted that NFPA-3 flammability-rated materials have resulted in significant explosions and fires similar to those contemplated to occur from NFPA-4 rated materials. The CSB stated that the language contained in 40 C.F.R. § 68.115(b)(2)(i) does not appear to be in alignment with the congressional mandates set out in the CAA Amendments to prevent accidental releases and mitigate the consequences of such releases. Finally, the CSB also noted that in response to this incident, the Texas Commission on Environmental Quality (TCEQ) issued a proposed rulemaking entitled Chapter 338—Aboveground Storage Vessel Safety Program. This proposed rule, which is scheduled to be adopted as a final rule in the fall of 2023, would provide additional requirements for certain aboveground storage vessels in Texas. It proposes to incorporate by reference certain sections of the EPA RMP rule, including the NFPA flammable rating provision at 40 C.F.R. § 68.115(b)(2)(i). As such, had TCEQ’s proposed rule been in effect at the time of the incident, it would not have applied to ITC’s Tank 80-8, and thus would not have ultimately helped prevent the incident. As a result of these findings, the CSB issued a recommendation to EPA to modify 40 C.F.R. § 68.115(b)(2)(i) to expand coverage of the RMP rule to include all flammable liquids, including mixtures, with a flammability rating of NFPA-3 and higher.

The CSB continues to investigate chemical incidents that highlight the need to challenge and ultimately address existing exemptions and regulatory gaps that currently exist in the PSM standard and RMP rule. This article simply touches upon two such regulatory gaps, but others exist. To better align with what Congress envisioned with the adoption of these process safety regulations, and to better protect communities, workers, and the environment, OSHA and EPA must make addressing these gaps a higher priority. As then-Senator Biden stated in 2002, employees and the many members of the public whose communities surround high-hazard facilities should be “free from the threat of physical harm on the job or in their neighborhood, and we should expect nothing less.”

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