TerranearPMC Safety Share

Week of April 22, 2013 – Ammonium Nitrate

Last week, the country was absorbed in the events surrounding the terrorist attack at the Boston Marathon. All other stories, including the President (as well as other elected officials) receiving a ricin-tainted letter, and the murders of a Texas District Attorney, took a back seat in the national news. This includes the tragedy of the industrial accident in the small town of West, Texas where a massive explosion at the local fertilizer plant rocked the community. According to the latest information, more than 160 people have been wounded by the blast; while as many as 14 are dead. The plant, owned by West Fertilizer Co. produces fertilizer, where industry experts are calling the massive explosion the result of ñthe perfect storm.ò This reference is based on the story (of the same name) involving the fishing vessel, the Andrea Gail, where specific events and actions all coincided, to pave the way for a disaster (see the March 11, 2013 *SafetyShare*, ñSwiss Cheese and the Perfect Stormò).

Typically, fertilizers are made with anhydrous ammonium nitrate which uses ammonia as the starting ingredient. When we think of ammonia, we think of an aqueous solution that is 90% water. In the production of fertilizer, anhydrous ammonia (that is, ammonia without water) must be generated. The process involves extreme heat (about 1500 F) which produces hydrogen; a very explosive gas (remember the Hindenburg?). Obviously, this process must be stringently controlled. At this time, it is unclear as to what events transpired to cause the explosion; however we know that such events are created through what we refer to as the fire triangle principle. That is, fires are started through a specific mixture of a fuel source, oxygen and heat.

Combining ammonium nitrate with an organic material, such as diesel fuel or gasoline can produce a devastating explosion, as was the case in the now infamous Oklahoma City Bombing in 1995. In this terrorist attack, there were two thousand pounds of ammonium nitrate used to blow up the Murrah building. State records show that the West, Texas facility has a permit to store nearly 50-thousand pounds. Because of its explosive property, ammonium nitrate has been used to make bombs and terrorize populations throughout the world, including places like Afghanistan, where our troops have suffered numerous casualties.

Aside from the initial explosion, the release of anhydrous ammonia can cause severe burns and even death to those within the not-so-distant proximity. Anhydrous ammonia is a colorless, highly irritating gas with a sharp, suffocating odor. People will notice the pungent odor at levels ranging from 5 ï 50 parts per million (ppm). Irritating effects generally begin at levels between 25-50 ppm. More serious effects generally will not occur until levels are greater than 100 ppm. Occupational exposure limits, such as OSHA permissible exposure limits and ACGIH threshold limit values have been established at 25 ppm (based on an eight-hour time weighted average).

Symptoms include burning of the eyes, nose, and throat after breathing even small amounts. With higher doses, coughing or choking may occur. Exposure to high levels of anhydrous ammonia can cause death from a swollen throat or from chemical burns to the lungs (causing pulmonary hemorrhage).

While a disaster of similar magnitude has never before occurred at the West Fertilizer Co., the plant has long had a checkered history when it comes to workplace safety and regulatory compliance. In August 2006, the Environmental Protection Agency (EPA) fined the company $2,300 for failing to comply with federal safety regulations. The EPA had found that the plant did not have an adequate risk management plan to guard against chemical accidents.

Around the same time, the Texas Commission on Environmental Quality investigated West Fertilizer Co. over complaints of a ñstrong ammonia smellò of a nearby residential area. In response to questioning from federal and local authorities, the company said there was no risk of a fire or explosion at the plant. Though the EPA fined the plant, it was allowed to continue its operations.

While the company failed to meet compliance to government regulations, other agencies failed to inspect it at all. The Occupational Safety and Health Administration has not investigated the plant since 1985. Records (reviewed by The Associated Press) show that OSHA issued the West Chemical & Fertilizer Co., as the plant was called at the time, a $30 fine for a serious violation for storage of anhydrous ammonia. In addition, OSHA cited the plant for four other serious violations of respiratory protection standards but did not issue fines. The maximum fine for a serious violation was $1,000.

It should be evident that enforcement of workplace safety and health through OSHA regulatory requirements is generally fairly weak. The fact is, OSHA lacks the resources to aggressively police workplaces. Because of its limited personnel resources, OSHA can inspect a workplace on average once every 129 years, while a typical state OSHA program could inspect one every 67 years (note: Texas does not have a state OSHA program)..

It seems that if any industrial plant has an occupational safety and health (S&H) program solely to ensure they meet compliance to laws that mandate their participation, only the minimal amount of effort will be provided. This means that the safety and health of workers and the community will not be given the necessary priority. Regulations are, for the most part, minimum requirements; and in many instances, ensuring the safety of workers may need controls and work practices that exceed OSHA regulations. For instance, while fall protection may be required at six feet under certain circumstances, that does not mean, people working above a surface at five feet should not be provided measures to protect themselves from falling. To ensure workplace safety, proper assessments by safety and health professionals need to be conducted ï not just during the initial phase, but throughout the task duration. In addition, each organization must insist that S&H have the ability to implement protective and/or corrective actions, superseding production deadlines or even bottom line economics. While, it may be, that the West Fertilizer Co took it upon itself to place workplace safety in a secondary capacity and therefore ignore warnings, today it has finally paid a very dear price: one that no excuse to those who suffered in this tragedy can ever accept.

Affliction comes to us, not to make us sad but sober; not to make us sorry but wise.

H. G. Wells