

TerranearPMC Safety Share

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Week of April 1, 2019 – The 1988 PEPCON Disaster

On May 4, 1988, a fire mysteriously began which then was followed by several explosions occurring at the Pacific Engineering and Production Company of Nevada (PEPCON) chemical plant in Henderson, Nevada, just outside of Las Vegas, Nevada. The disaster caused two fatalities, 372 injuries, and an estimated \$100 million of damage. A large portion of the Las Vegas Valley within a 10-mile radius of the plant was affected, and several agencies activated disaster plans.

The PEPCON plant was one of the only US producers of the chemical, ammonium perchlorate; a key ingredient in the rocket fuel used for space shuttle boosters and Titan missiles. This white granular compound is a powerful oxidizer, and its purpose is to accelerate rocket fuel combustion. Also present at the facility were bulk quantities of other hazardous materials used in manufacturing, such as hydrochloric acid and nitric acid.

The main mission associated of PEPCON was to support NASA's space shuttle project, which had its initial launch in April 1981, with the shuttle Columbia. In January 1986, the U.S. witnessed the devastating event of the Space Shuttle Challenger breaking apart 73 seconds after take-off. As a result, the space shuttle program was halted until a thorough investigation was completed. This caused PEPCON to halt deliveries of ammonium perchlorate to NASA, even though – possibly due to contractual agreement – production continued. This resulted in a stockpile of over four thousand tons of ammonium perchlorate stored at PEPCON. High-density polyethylene (HDPE) plastic and steel drums were used for additional storage.

Based on accident investigations, housekeeping at the PEPCON facility was evaluated to be poor as it was noted the entire facility had ammonium perchlorate residue scattered throughout. Meanwhile the facility was constructed directly on top on a natural gas line: a 16-inch, high-pressure gas transmission line running underneath it; carrying natural gas at 300 psi to the Las Vegas Community. The invoice for this pipe, which was installed in 1956, characterized it as "limited service." To this day, it is still uncertain how PEPCON could have been situated at such a location. In addition, investigations could not determine if this underground utility was part of the initial event or not. However, once the fire propagated, it was a significant contributing factor.

To this day, there are conflicting reports as to the origin of what initiated the PEPCON disaster. One report (issued by the United States Fire Administration – USFA) proposed that the fire originated around a drying process at the plant. However, another report issued by the United States Department of Labor insisted that a fire was already occurring in a barrel that was located at the west side of the southern portion of the building partition. This partition separated the batch dryer from the batch tanks in the process building. A fire was also reported on the north wall of the batch dryer section of the process building. Meanwhile, the Las Vegas area was experiencing windstorms which caused significant damage to a fiberglass structure. This required immediate repairs and necessitated welding torch operations to repair the steel frame. The USFA report stated that it was this activity that caused the initial fire that spread rapidly in the fiberglass material, which was then accelerated by the ammonium perchlorate residue that was present due to a lack of diligent housekeeping. At this point, investigations (developed after-the-fact) suggested that this scenario caused the fire to propagate, resulting in a fireball that was supplied by the high-pressure



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underground natural gas line, which – as investigators believed - was ruptured by one of the explosions.

Eye witnesses stated that there were five high-order detonations, one north of the batch dryer, one in the storage area south of the administration building, two on the loading dock. The final detonation – which was the largest – occurred in the eastern storage area, where the gas line burned after the detonations occurred. These explosions produced seismic waves measuring between 3.0 and 3.5 on the Richter scale. The last detonation created a crater 15 feet deep and 200 feet long in the eastern storage area. A significant quantity of AP remained on the ground after the incident and was subsequently recovered and recycled within 1 year. The largest explosion released estimated energy of approximately 1.0 kilotons of TNT.

The incident response was initiated by an employee who stayed in the facility as the rest of the work forced evacuated. Unfortunately, while calling the local fire department, he sustained life-threatening injuries.

Meanwhile, the Fire Chief of the City of Henderson, who was leaving the main fire station about 1.5 miles (2.4 km) north of the PEPCON facility, spotted the huge smoke column and immediately ordered his units to the scene. As he approached the plant, he could see a massive white and orange fireball about 100 ft in diameter with dozens of people fleeing the scene. As he approached the site, the first of the two major explosions sent a shock wave that shattered the windows of his car and showered him and his passenger with glass. The driver of a heavily damaged vehicle coming away from the plant then advised the chief about the danger of subsequent larger explosions, which prompted the chief to turn around and head back toward his station. The other units also stopped heading toward the site after the explosion.

This event is frequently presented at safety and health conferences and seminars throughout the country. While the specific initiation of the fire is still unknown, the PEPCON incident is used to illustrate how an event can grow to such devastation, while, at the same time, discuss the various methods that, if employed, could have controlled the scenario to a manageable incident. Experts agree that the abundance of AP storage was perhaps the most significant factor. Once NASA placed a halt on receiving this material, minimizing the amount of AP in any one storage location needed to be considered. Possibly numerous storage locations – situated safe distances apart from each other should have been implemented. Proper housekeeping also needed to be practiced, as the residue that persisted throughout the plant was identified as contributing to the spread of fire in the plant. Then, there was in the underground gas line. To this day, it has never been explained how a manufacturer of flammable/explosive materials could be placed on top of a conduit of natural gas. Lastly, the actual response scenario was insufficient. The only thing available to fight the fire was a simple garden hose, while at the same time, the local fire department response seemed to have been reactionary instead of first making an assessment for the purpose of ensuring the safety of the community and crew. As is the case with many rescue attempts that are not properly planned, it is the would-be-rescuer that becomes an unfortunate statistic.

Those who can make you believe absurdities can make you commit atrocities - Voltaire