

Selected Accident Investigations

Vitoria, Brasil, 2015. On February 11th, 2015 an explosion occurred on the Cidade São Mateus FPSO. The explosion occurred in the vessel's pump room, which caused extensive damage to the pump room, the neighboring engine room, and to the accommodation area.

Gexcon was retained by the facility owner to perform an engineering investigation into the root cause of the incident. This included site inspections, sample collection and testing, and an advanced blast modeling study to evaluate the blast effects associated with the observed chain of events leading to the incident. This included reconciling ventilation, leak observations, gas detection, cause and effect analysis, and the resulting vapor cloud build up and explosion.



FPSO - Brazil

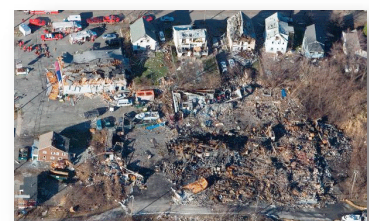
West, Texas, USA, 2013. On April 17th, 2013 explosion that occurred at the West Fertilizer Company. A fire initially occurred and spread to an ammonium nitrate storage bin, where approximately 30 tons of ammonium nitrate detonated.

The subsequent explosions killed 15 people and injured over 250. The force of the blast caused damage to structures over a ½ mile away from the plant. Gexcon was engaged by one of the facility owners to perform an engineering investigation of the explosion. We performed an extensive blast modeling study to evaluate the blast effects associated with the reported quantities of ammonium nitrate and to ascertain if these quantities are capable of producing blast overpressures or “air blasts” consistent with the observed damage.



West, TX

Danvers, MA, USA, 2006. On November 22, 2006 the largest explosion in the history of Massachusetts occurred in Danvers, MA. Using the computational fluid dynamics tool FLACS, GexCon was able to investigate the chain of events leading to the explosion, including: (1) evaluating various leak scenarios by modeling the dispersion of vapors within the facility, (2) evaluating potential ignition sources within the facility of the flammable fuel-air mixture, and (3) evaluating the explosion itself by comparing the resulting overpressures of the exploding fuel-air cloud with the observed blast damage.



Danvers, MA

Buncefield UK 2005. A massive explosion occurred in a fuel storage depot due to the significant overfilling of an unleaded gasoline storage tank. A large vapor cloud formed and eventually ignited causing surprisingly high explosion loads and extensive material damage. Gexcon was engaged by one of the facility owners as expert witnesses and was instrumental in explaining the high blast pressures. Gexcon performed CFD simulations using FLACS to demonstrate that surrounding dense vegetation was likely responsible for the high explosion pressures. Gexcon also performed experimental testing to verify this conclusion



Buncefield, UK

Skikda, Algeria, 2004. On January 19, 2004 a vapor cloud explosion at train 40 of the Skikda LNG plant resulted in a fire which rapidly engulfed train 40, 30 and 20. This accident left 27 dead, 72 injured, extensive damage. Our investigation revealed the explosion was due to a large and sudden cold hydrocarbon leak in vapor or liquid form, which indicates the need to remove strong ignition sources on confirmed gas detection.



Skikda, Algeria

Montcoal, West Virginia, USA 2010. On April 5, 2010, there was a catastrophic underground explosion at Performance Coal Company's Upper Big Branch Mine-South in Montcoal, West Virginia. 29 out of 31 miners lost their lives as a result of a flammable concentration of methane built up in the enclosed space and ignited, resulting in a methane explosion that transitioned into a coal dust explosion.



Upper Big Branch Mine, WV

Gexcon investigated the root cause of the incident, which included numerous site visits and documentation of the damage caused by the explosion. The explosion propagated over 1 km within the mine and resulted in extensive damage. As a result of the accident investigation, unique explosion patterns were found in the mine where certain "blast indicators" within the mine shafts were deformed in such a manner that was inconsistent with the likely direction of the blast wave. Advanced tools were used to evaluate the chain of events leading to the blast

TWA 800, explosion in central wing tank Boeing 747, 1996.

A Boeing 747 operated by Trans World Airlines as flight 800 from New York to Paris crashed just off the coast of Long Island. All 230 people aboard perished. Using FLACS simulations, Gexcon evaluated the location of the ignition source in the central wing tank. Based on the simulation results and the observations made from the wreckage, a better understanding of what likely occurred was established.



TWA 800

Bayamón, Puerto Rico 2009. The Cataño oil refinery fire was a fire that began with an explosion at the Caribbean Petroleum Corporation oil refinery and oil depot. There were no fatalities, but three people were injured. The initial explosion destroyed eleven storage tanks at the facility, and quickly spread to other nearby tanks. The tanks contained gasoline, jet fuel and diesel. The resulting explosion was measured as equivalent to a 2.8-magnitude earthquake on the Richter scale. The tanks exploded at approximately 12:23 a.m. and could be heard as far as 11 miles away and shook windows and doors over two miles away. At some point the flames reached a height of 100 feet (30m) above the refinery.



Bayamón, Puerto Rico