The PEPCON Disaster: Man-Made Earthquake and Inferno

An Online Continuing Education Course for Engineers

Course Number: H-1006

Credit: 1 Hour / 1 PDH / 1 CPD

The PEPCON Disaster
Man-Made Earthquake and Inferno

Edward P. Brunet, Jr., P.E.

PROLOGUE

> "Henderson resident Joe Hedrick was on PEPCON's loading dock when a thick cloud began moving through the facility.
>
> "Everyone was curious as to what it was," Hedrick said, adding he remembered the event as if it were yesterday. "We didn't see any flames. In the past when we had a fire, it was handled."
>
> At that moment, Hedrick's wife, 6-year-old daughter and brother-in-law were nearing the plant in a van, bringing him lunch.
>
> "There was a stream of people coming out of the administration building and then there was the first explosion. I ducked in a little corner," he said. "After that I took off in the truck. I picked up a department supervisor and another gentleman and the only thought going through my mind was, `Don't get stuck.' "
>
> The second explosion sent a shock wave across the terrain that sucked in the side of Hedrick's truck. His supervisor, bleeding from the wrist, was courteous enough to try to prevent his blood from staining the seats. Then there was an odd silence. Hedrick said he really wasn't sure whether he was still alive.
>
> "Then the final explosion went off and it (PEPCON) basically disappeared. Boulder Highway looked like a war zone. There was glass everywhere and very few people were out. When I got to the hospital I saw my wife's van, how it had been caved in, and that's when I lost it.""[1]

Witnesses reported seeing a visible shockwave rushing across the desert. The blasts were felt in high-rise buildings in downtown Las Vegas, 11 miles away. Smoke from the fire rose thousands of feet into the air and was visible 100 miles away.

Windows shattered in homes and buildings throughout the area. Tiles were blown off some roofs, while other roofs and walls collapsed altogether. School children huddled in fear in their classrooms as tiles fell from the ceiling.[2] Garage doors buckled and cars overturned. The flying glass from their vehicles' windows lacerated motorists.

A truck damaged by the shockwave. Source: U.S. Fire Administration

Football-sized burning shrapnel fell from the sky and the airborne debris ignited small fires.

> Former Henderson firefighter Jim Blackford was driving a city fire truck to the scene when the third explosion -- "the one everyone remembers" -- shattered the vehicle's windows.
>
> "It actually picked the truck up and moved it over two lanes. I looked over at my captain and his face was completely covered with blood."
>
> "I had about 10 customers in the store, and we went out to see what happened," (Steve) Catalanotto said. "There was this roll of dust going across the desert.
>
> "It was a good thing we did," he said. "The second explosion blew out my windows and the third collapsed the ceiling. Then it started snowing.""[3]

INTRODUCTION

The Pacific Engineering and Production Company (PEPCON) factory in Henderson, NV was one of two companies in the United States that produced solid rocket fuel for the space shuttle program and military missiles. On May 4, 1988, sparks from a welder's torch used during routine maintenance ignited a fire in the batch dryer building and it quickly spread to the 8.5 million pounds[4] of finished ammonium perchlorate (AP) stored on the grounds. The inferno and

series of seven explosions ruptured a natural gas line that ran directly underneath the facility, escalating the magnitude of the catastrophe.

Two of the man-made "earthquakes" measured 3.0 and 3.5 on the Richter scale and the blasts left an enormous crater at the factory site.

Two of the 77 PEPCON employees died in the disaster and 300 others from the area were injured. Fifteen firefighters were injured, eight from flying broken glass and seven from respiratory problems.[5] Five thousand property damage claims were filed with the government and final damage estimates range from over $70 million[6] to $100 million.[7] In 1988, it was estimated that $15-20 million would be required to rebuild the plant, excluding property acquisition costs.[8]

COURSE OBJECTIVES

This course will examine the engineering design and operations and management practices that lead to the catastrophe in Henderson, NV. It draws from studies by the U.S. Department of Energy, the Federal Emergency Management Administration National Fire Data Center and NASA Safety Center to identify contributing factors and suggest lessons learned.

Numerous factors have been identified as contributors to the disaster and it is said that proper design, procedures and management practices would have prevented the disaster. PEPCON continued to produce and stockpile enormous quantities of AP throughout the period that the shuttle program was suspended following the Challenger disaster. Poor material storage procedures resulted in a densely packed inventory of AP that was stored in containers that were inappropriate for oxidant storage. The buildings were constructed of combustible materials and lacked the fire control systems required by codes and regulations. Housekeeping and safety procedures were lax or non-existent. No evacuation plans had been devised and there was no coordination with local emergency managers.

PEPCON

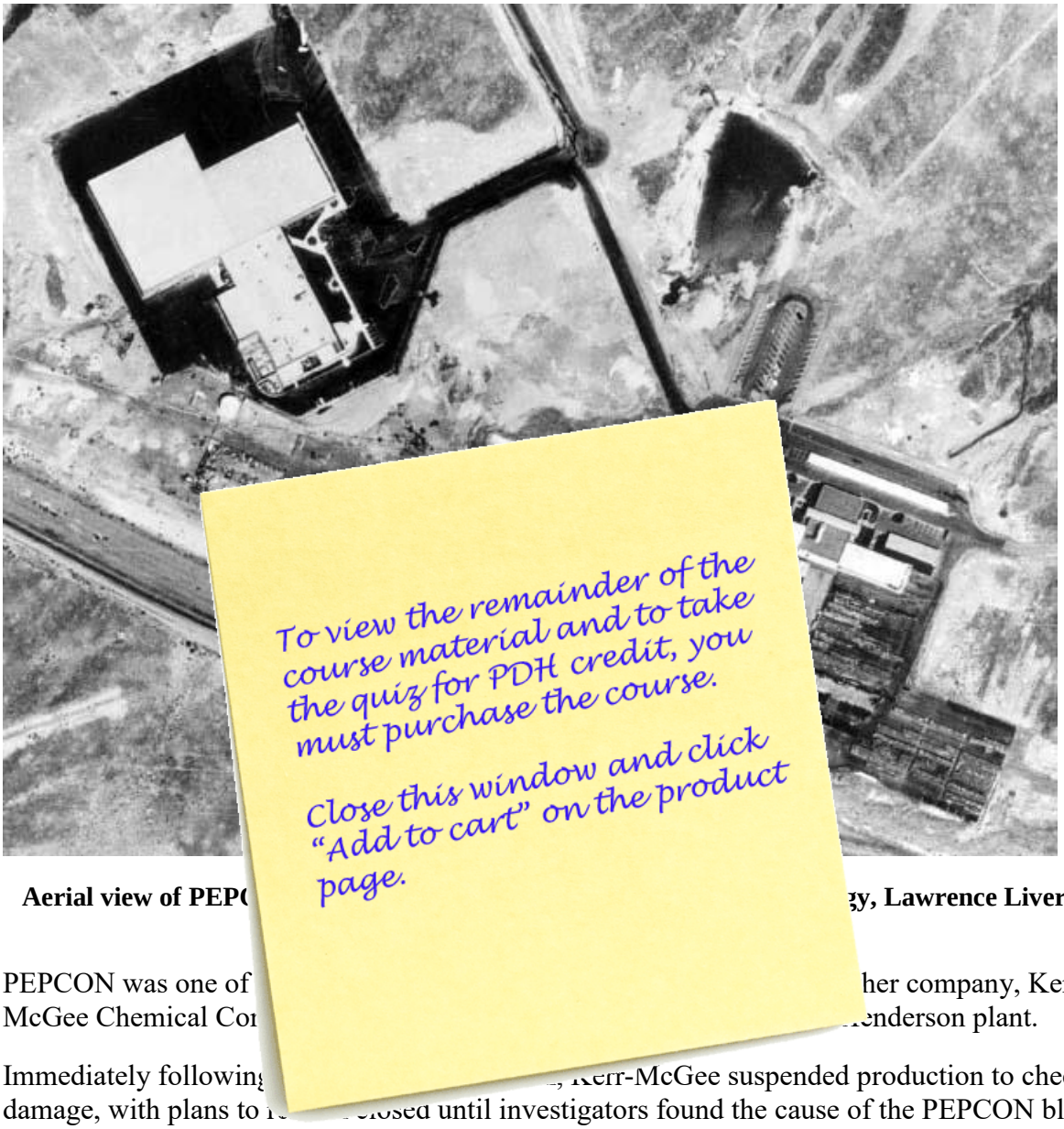
PEPCON processed solid propellants for the space shuttle program and the military's tactical and strategic missiles. The company produced AP, an oxidizer used to help solid rocket fuel burn.

PEPCON was owned by American Pacific Corporation and began manufacturing AP in 1958. The Henderson location was chosen because inexpensive power was available from the nearby Hoover Dam and the dry climate made handling and storage easier. The U.S. Department of Commerce named the company Exporter of the Year four years before the disaster.[9]

At the time the facility was constructed in the 1950's the plant site was in an isolated desert location. However, growth in the Las Vegas area caused development to move into the area and the nearest residences were two miles away from the plant.[10]

AP was used in the space shuttle program. Source: NASA

The Space Shuttle Challenger exploded January 28, 1986. Afterwards, NASA suspended shuttle launches for over two and one-half years. However, it did not suspend its contracts for the production of ammonium perchlorate. PEPCON continued full production of the chemical and stored the product on its property in a variety of storage containers.



Aerial view of PEPC **gy, Lawrence Livermore**

PEPCON was one of her company, Kerr-McGee Chemical Cor enderson plant.

Immediately following , Kerr-McGee suspended production to check for damage, with plans to r closed until investigators found the cause of the PEPCON blast. It later moved storage of its AP 17 miles out of the valley, but continued to produce a more stable liquid form of the chemical at the Henderson site.

Kerr-McGee later discontinued its involvement with AP and sold its manufacturing processes to the parent company of PEPCON. Production was shifted to Utah.[11]

Following the Henderson explosion, PEPCON applied for a temporary restraining order, preventing the fire department and other agencies from removing or performing tests on evidence. Under District Judge Donald Mosely, the order was in place for a week. Mosely later created an access pact between state, employee and environmental agencies. Under the pact, five groups of inspectors were permitted to visit the site under the supervision of the fire department.