Brief Summary of Buncefield Incident

• 10 December 2005
  • Approx 17.00 Tank starts to receive product from pipeline
  • Flow rate 550 m³/hr
• 11 December 2005
  • Approx 3.00am Gauge Level reading did not change and it went undetected
  • Around 5.20am it was calculated tank would overflow
  • Around 5.30am Vapour visible in CCTV footage
  • Approx 6.01am First explosion
Buncefield Incident Animation
Buncefield Before December 10, 2005
Surveillance Camera Pictures of Vapor Cloud

5:32 a.m. 30 min before blast

5:54 a.m. 8 min before blast

Coloring in RH picture presumed to be caused by vapor cloud and photo exposure – this is 8 minutes before explosion

Note, parked car covered by vapor cloud
Buncefield, England, 11 Dec 05
Buncefield – the Aftermath
3:00 a.m.  Level gauge stopped showing increase  
*Flow ex P/L still 550 m³/hr (3,500 bbl/hr, 2,400 US gpm)*

5:20 a.m.  Calculated overflow begins

5:50-6:00  Flow rate increases to 890 m³/hr

6:01  First Explosion of several -- then tank fires

“Evidence suggests that the protection system which should have shut off the supply of petrol to the tank to prevent overfilling -- did not operate.”
Buncefield Investigation

• Major Incident Investigation Board (MIIB)
  – Government Appointed
  – 25 Key Recommendations
• Buncefield Standards Task Group (BSTG)
  – Independent of MIIB
  – Regulators, Industry, Experts
  – Practical guidance for Industry
• Petrochemical Process Safety Leadership Group (PPSLG)
  – Maintain progress of BSTG
  – Regulators, Experts, Industry
  – Leadership and standards
  – Legacy items from BSTG
MIIB/BSTG Key Recommendations

- The Overfill Prevention system must be
  - High Integrity
  - Automatic operating
  - Independent of the ATG
  - Physically and Electrically Separate
  - Meet requirements of BS EN 61511 Part 1
Kansas City, Kansas
Magellan Pipeline, June 4, 2008

A tank containing unleaded gasoline caught fire after lightning struck the terminal
Kansas City Magellan Fire, June 2008

After the fire...
A petrol tank farm at the Tanjung Langsat Oil Port Terminal containing unleaded gasoline had a fire. A second fuel storage tank containing about 8,000 cubic metres of highly flammable naptha caught after overheating.
Tanjung Langsat Oil Port Terminal
Caribbean Petroleum, Puerto Rico, United States, October 23-25, 2009
The fire at the Caribbean Petroleum facility began with an explosion that destroyed 11 storage tanks, but quickly spread to other nearby tanks. The tanks contained gasoline, jet fuel, and diesel. There were no fatalities, but 3 people were injured. The gasoline overfill from the tank was not detected. As the material spilled, it vaporized and spread across the facility to a 2,000-foot diameter until it reached an ignition source in the northwest section of the facility. The liquid level in the tank could not be determined because the facility's computerized monitoring system was not fully operational. The operators used a mechanical gauge on the tank's exterior wall to monitor the fuel level in the tank, and the employees in the facility's control room were not aware of the situation. The U.S. Chemical Safety and Hazard Investigation Board announced that a malfunctioning tank fuel gauge led to the explosion. The faulty equipment prevented workers from noticing that one of the tanks was overflowing before the fuel vapors ignited.
Caribbean Petroleum, Puerto Rico, United States, October 23-25, 2009
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The fire and explosion at the Jaipur Terminal occurred when petrol was being transferred from the Indian Oil Corporation's oil depot to a pipeline on October 29, 2009 at the Indian Oil Corporation in Jaipur, Rajasthan. The fire and explosion killed 12 people and injured over 200. The blaze continued to rage out of control for over a week after it started and during the period half a million people were evacuated from the area. The fire was caused by human negligence, along with defective piping that leaked and led to the explosion. Timely action could have prevented the scale of damage because witnesses noticed alarms, and the smell of oil that should have been enough to warn officials. On 2 July 2010, nine senior company officials from the Indian Oil Corp (IOC), including its General Manager, were arrested by the police on charges of criminal negligence. Government Officials later also blamed both 'corporate neglect’ and ‘severe radiant heat’ in addition to the defective piping leak.
A fire at the Miami International Airport Tank Farm may have been caused by a short circuit at one of the pumps in the hydrant piping system that pumps fuel to hundreds of planes each day. The fuel comes to the airport via Everglades Pipeline and transmits about 55,000 barrels of jet fuel each day to six large fuel tanks on the southeast side of the airport that hold over 8 million gallons of fuel. The exact cause of the problems unknown. The blaze led to cancellations of 179 flights.
Miami International Airport, Florida, March 27, 2011
Chevron Refinery in Richmond, California – August 11, 2012
Chevron Refinery in Richmond, California – August 11, 2012

From piping corrosion
Caused by a Olefin gas leak from a pump system connected to an Olefin pressure vessel. 51 people killed. A pump seal is the suspected source of the gas leak.
Why Isn’t There More Information About Fires, Explosions, Overfills, and Leaks from Bulk Storage Terminals with Aboveground Storage Tanks?

1. Lawyers for Tank Owners
2. Lawyers for Insurance Companies
3. General Company Concerns about Liability
4. No Central Database for Information
5. Lack of Regulation in Some Countries
6. Information is Often Provided by Media Sources
7. Sometimes the Evidence is Destroyed
8. Sometimes the Answer is Truly Unknown…
What Events are Going to Continue to Occur that We Cannot Eliminate or Prevent?

1. Weather Related – Lightning, Hurricanes, Floods and Tornados
2. Seismic Events and Tsunamis
3. Human Error
4. Events from a Combination of Factors – The Usual Problem

We Can Only Do our Best to Minimize these Risks – We Cannot Eliminate Them