Management failings led to near-catastrophic explosion at refinery

An investigation into a huge explosion and fire at a ConocoPhillips refinery in 2001 has highlighted a series of operational and management failures.

The Health and Safety Executive (HSE) report describes the causes of the incident when 170 tonnes of highly flammable liquefied petroleum gas (LPG) were released from Conoco's saturate gas plant at its oil refinery in South Killingholme in Lincolnshire. Owing to the failure of a pipe, a gas cloud developed which was then ignited, causing a massive explosion. As the fire burned it caused failures of other pipework, resulting in further fires.

The HSE said it was a very serious event and had the potential to be catastrophic. The immediate area of the refinery was devastated, many buildings on site were badly damaged and there was widespread damage to surrounding properties.

Fatalities and serious injuries were avoided only because the incident occurred on a bank holiday and at shift changeover time when there were very few people on site.

Kevin Allars, head of HSE's hazardous installations chemical industries division, said: "It shows the potential harm that arises from major hazard plant. Our investigation revealed that as well as failing to inspect pipework adequately, the company's management had not correctly analysed the effects of an operating

change, nor recorded it. This led to operators, inspection and monitoring staff not having a common understanding of the actual operating arrangements."

The primary cause of the explosion was the corrosion of the 6-inch diameter pipe that carried the overhead line from the de-ethaniser to the heat exchanger in the saturate gas plant.

Examination showed that the pipe elbow had failed owing to "erosion-corrosion" damage which, over time, had reduced the wall thickness at the outside of the elbow. The wall thickness at the point of failure had been reduced from 7-8mm to a minimum of 0.3mm. When the pipe failed it burst open catastrophically, causing a "full bore" type of release of its contents.

The HSE said the report emphasised the vital need for companies that operate high-hazard sites, such as oil refineries and chemical plants, to ensure they have in place robust and appropriate systems for inspecting pipework to detect corrosion and other defects.

Last December, ConocoPhillips pleaded guilty to breaches of the Health and Safety at Work Act in relation to the incident. The company was fined £895,000 with £218,854 costs.

Allars said: "Lessons have been learned, both by ConocoPhillips and by the regulators, and actions have been taken to improve safety performance at the refinery complex."