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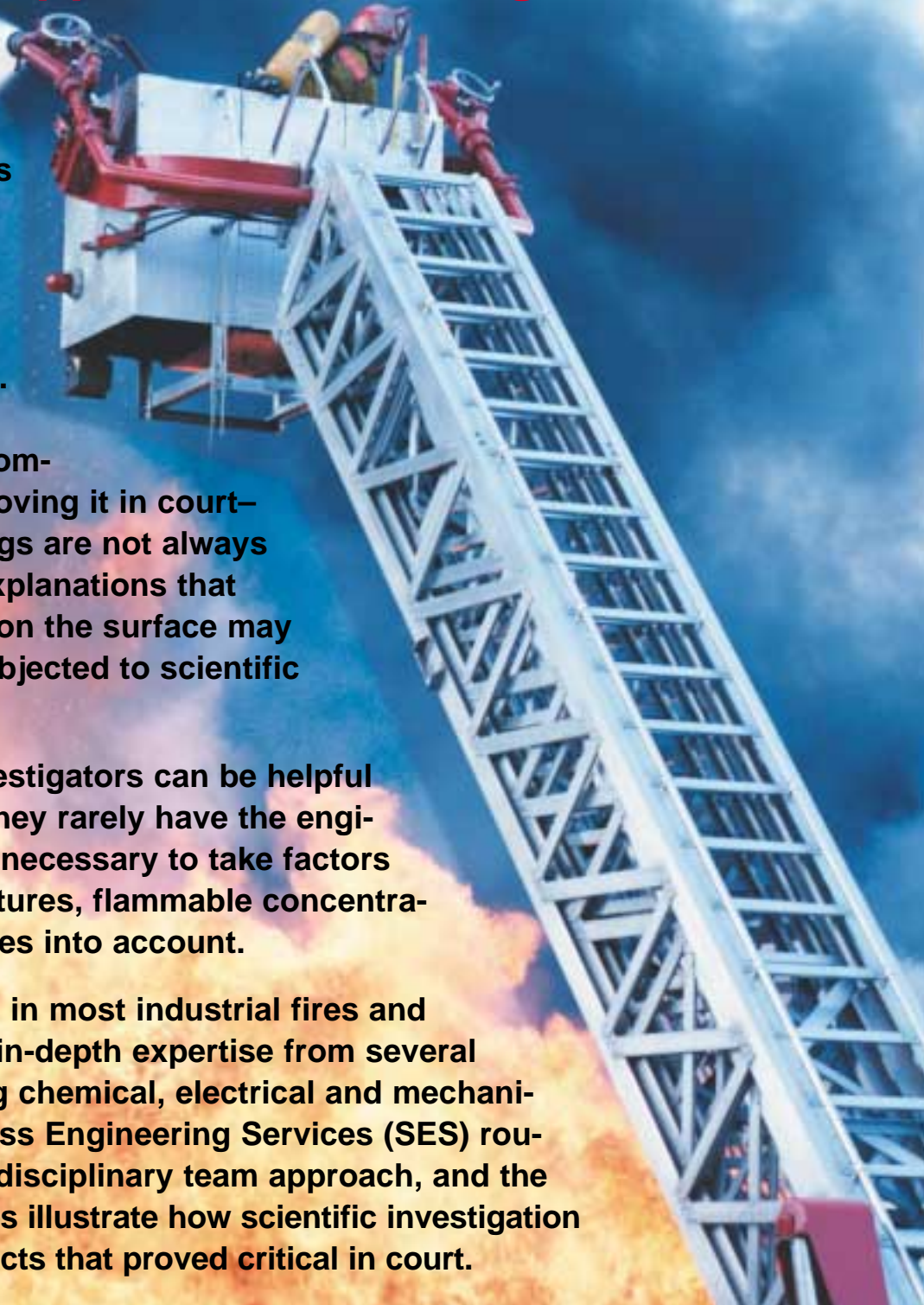
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Industrial Fires & Explosions... A Scientific Approach to Finding the Facts

For insurance companies, attorneys and the clients they serve, knowing the 'why' and 'how' of industrial fires and explosions is critical. But understanding the cause of these complex events – and proving it in court – can be difficult. Things are not always as they seem, and explanations that appear to be logical on the surface may not hold up when subjected to scientific investigation.

Professional fire investigators can be helpful in some cases, but they rarely have the engineering background necessary to take factors like ignition temperatures, flammable concentrations and shock waves into account.

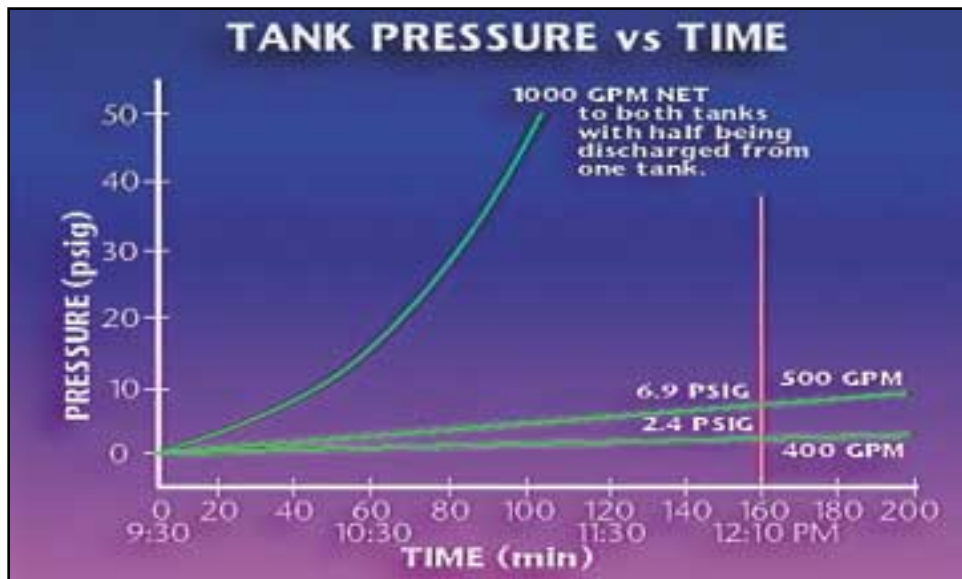
Uncovering the facts in most industrial fires and explosions requires in-depth expertise from several disciplines, including chemical, electrical and mechanical engineering. Stress Engineering Services (SES) routinely uses this interdisciplinary team approach, and the following case studies illustrate how scientific investigation revealed important facts that proved critical in court.



Arson or Accident? - a case study.

When a piece of heavy equipment was destroyed by fire, investigators for the plaintiff concluded that accelerants were used, the owner was behind on payments, and that the cause was obviously arson. This conclusion was based largely on a ruptured water tank located on top of the cab for the purpose of fire prevention, which fire investigators claimed had been filled with flammable liquid and then ignited. Further investigation by SES engineers, however, revealed a different picture.

Accelerants were indeed present in the form of hydraulic fluid and diesel fuel. The equipment had been in use shortly before the fire and engine temperatures routinely reach 700 or 800 degrees during normal operation...far above the auto ignition temperatures of both hydraulic fluid and diesel fuel spray. A more plausible explanation based on scientific evidence--and the explanation accepted by the court-- was that a spontaneous leak had sprayed accelerant on the hot manifold, resulting in auto ignition. The ruptured water tank, cited by fire investigators for the plaintiff as evidence of arson, was simply the result of steam which was generated after the fire had engulfed the machine.



Combustion or Pressure?

Two men were killed when the roof of the low pressure atmospheric storage tank on which they were doing repair work suddenly blew off. Because the men had welding equipment and because there was combustible gas present in the tank, it was assumed that an explosion was responsible for the tragedy. Although an explosion could not be completely ruled out, upon further investigation SES engineers determined that there was strong scientific evidence suggesting another likely cause: over-pressurization of the tank.

In this situation the tank was fed with liquid hydrocarbon that was stored deep below ground, where the pressure was many times that of atmospheric pressure. As the liquid traveled toward the surface gasses were released and the pressure within the tank increased. Finite Element Analysis showed that tank's roof structure would fail at 3psi...well below the pressure created by gasses being released from the incoming hydrocarbon. Additional analysis work indicated that the concentration of gas inside the tank at the time of the incident was too rich to burn. These scientifically derived data were supported by the fact that there was no fire damage or carbon residue on the tank, and by witnesses near the scene who described a white cloud, which suggested no unburned hydrocarbons. Based largely on evidence provided by SES a favorable settlement was achieved.

**For more information on our fire and explosion investigation capabilities,
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