

“Explosions in the Courts: The Intersection of Law and Science”

Abstract of a Proposed Presentation by

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Presentation Overview

The focus of this presentation will be on the role and effective use of science in the courtroom in cases arising from industrial explosions. Subsidiary topics that will be discussed include: the role of the explosion expert in the litigation process; significant differences in the concepts of scientific proof and legal proof; standard processes for reviewing and ensuring the scientific accuracy of expert testimony; restrictions on opportunities for experimentation and verification often faced in the litigation context; and the divergent presentation approaches necessitated by differences in learned versus lay audiences. These topics will be addressed in the context of three (3) real-world case studies involving actual court actions arising from industrial explosions. (Note: Although each of the case studies is based upon real court action, some of the names and dates may be changed to protect the innocent and the not-so-innocent.) In each case, we will examine the alleged cause(s) of the explosion as theorized by the parties' experts, the critical scientific issues presented by the alternative causation theories, the legal ramifications of the parties' alternative theories, some of the methods employed by the parties to present their respective theories to the judge and jury, and the final outcome. The presentation will make frequent use of actual case photographs, expert reports, computer simulations, and physical evidence to illustrate important points.

Case Study Summaries

Case Study No. 1 - Explosion at a Personal Care Products Manufacturing Facility

Facts: This case arose from an explosion/flash-fire on an automated manufacturing line that produced stick anti-perspirant. At the time of the incident, workers were attempting to clear a blockage in a metal pipe containing semi-molten anti-perspirant product by using a handheld propane torch to heat the suspected area of the blockage. The ensuing explosion/flash-fire severely burned one employee (the one using the propane torch) over 70 percent of his body. A subsequent examination of the incident scene failed to locate any breach in the piping, but identified an eight inch (8") diameter hole that had developed in the side of an nearby aluminum warm-air duct that served to heat some of the process equipment. An accumulation of burnt stick anti-perspirant residue was found inside the duct adjacent to a nichrome wire heating unit. An open pail of an unidentified liquid also appeared under the manufacturing line in a series of photographs taken shortly after the explosion. An eyewitness to the incident described the explosion as a fireball that erupted at floor level when a single burning droplet fell to the floor from the burned employee's propane torch. The employee sued the suppliers of three constituent elements of the stick anti-perspirant product (stearyl alcohol, silicone fluid, and castorwax) on the ground that they had failed to disclose the potentially explosive characteristics of their respective

products in “atomized” form.

Causation Theories: The explosion expert for the plaintiff/burned employee theorized that the explosion resulted when small, burning particulates of stick anti-perspirant product became entrained in the flow of warm air circulating through the air duct and eventually exploded. The explosion ruptured the side of the air duct and enveloped the employee in a cloud of burning particulates. Experts for the defendant suppliers theorized that the explosion/flash fire resulted from the ignition of floor-level isopropyl alcohol vapors originating from a nearby open container of isopropyl alcohol that occasionally was used as a cleaning solvent on the manufacturing line. The hole in the air duct resulted from a secondary fire ignited by an explosion-induced short circuit of the nichrome wire heating coil.

Critical Scientific Issues: Some of the critical scientific issues included: what constitutes as “explosion”; the degree to which is “unusual” for combustible materials to explode in atomized form; and the ability of an already-burning material to erupt in an explosion.

Final Outcome: To be announced during the presentation.

Sample Photos:



Case Study No. 2 - Explosion at a Metal Refining and Processing Plant

Facts: This case arose from an explosion at a specialized metals refining and processing plant. The refining process involved mixing molten metallic sodium (Na) with the metal ore and allowing the sodium to chemically combine with the unwanted constituents of the ore, leaving a relatively pure form of the base metal. Left-over sodium from the refining process was disposed of by burning it in an isolated, explosion-proof chamber in the facility that also was used for washing equipment. A sodium explosion and fire occurred in the chamber when a larger-than-usual quantity of left-over sodium in a barrel somehow came into contact with water while the burning process was underway. Members of the local fire department responded to the scene of the initial explosion. Notwithstanding the explicit warnings of various plant employees, a group of firefighters opened the chamber doors and attempted to extinguish the sodium fire that continued to burn in the barrel. Moments later, a second, massive explosion occurred injuring the firefighters, some of them seriously. The most seriously injured firefighter was blinded and received second and third degree burns over 85 percent of his body. The

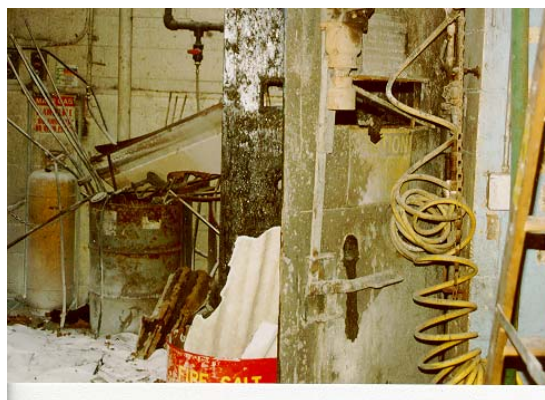
injured firefighters and their spouses sued the owners of the plant alleging, among other things, that they had not been warned of the presence of water in and around the chamber.

Causation Theories: The explosion expert for the plaintiff firefighters theorized that the second explosion occurred when a small amount of moisture on a shovel being used by one of the firefighters was transferred to the salt that the firefighters were shoveling into the barrel in an effort to extinguish the burning sodium. Experts for the defendant metal refining facility theorized that the second explosion was the result of a substantial amount of molten metallic sodium being dumped into standing water beneath the barrel as the firefighters attempted to shift the position of the barrel in order to make application of the salt easier.

Critical Scientific Issues: Some of the critical scientific issues included: what amount of water is necessary to trigger a sodium explosion of the magnitude observed; could a moist shovel impart a sufficient amount of water to a shovel-full of salt to trigger such an explosion; what were the expected physical damage effects of an explosion in the barrel versus an explosion beneath the barrel; and how did those expectations match the available physical evidence.

Final Outcome: To be announced during the presentation.

Sample Photos:



Case Study No. 3 - *Explosion at a Flock Fabric Textile Mill*

Facts: This case arose from an explosion and subsequent fire that destroyed a series of large, multi-story mill buildings at a textile production facility on a bitterly cold winter night. The initial explosion took place in or around the main mill building that produced nylon “flocked” fabric. Flocked fabric consists of short lengths of fiber precisely applied to an adhesive-coated base material, thereby giving one side of the finished fabric a “plush” or velvet-like feel. Workers in the main building felt a concussion and thereafter observed waves of blue flame rolling across the ceiling of one floor of the building. The fire inside the main building was extinguished by the building’s sprinkler system. A stubborn fire in the “Boiler Room” attached to the rear of the main mill building was not extinguished, however, and eventually reignited the main structure and various adjacent buildings. The total value of the lost property alone exceeded US \$500,000,000. The mill owner and its insurers sued the mill’s primary nylon suppliers and numerous other parties for the loss alleging, in part, that the mill owner

had not been adequately warned of the unreasonable risk and danger associated with the use of nylon fiber in manufacturing flocked fabric.

Causation Theories: The explosion experts for the plaintiff mill-owner theorized that the explosion resulted from the ignition, by means of an electrostatic discharge, of a cloud of fine nylon fibers in a “flocking room” in the main mill structure. They concluded that the initial concussion dislodged substantial additional quantities of nylon fiber that had accumulated on surfaces through the main building, thereby providing a fuel source that permitted the explosion to propagate outside of the flocking room and through the remainder of the building. The explosion experts for the defendant nylon suppliers theorized that the explosion resulted from the leakage of a large quantity of natural gas into the main mill building from a separated pipe union in the Boiler Room. A similar pipe separation, believed to be an attempt at arson, had occurred in the same location approximately one week earlier.

Critical Scientific Issues: Some of the critical scientific issues included: is nylon “explosive”; if so, under what conditions can nylon fiber be made to explode; did the conditions for a nylon dust explosion exist in the main mill building; and what, if anything, caused the pipe union in the Boiler Room to separate.

Final Outcome: To be announced during the presentation.

Sample Photos:

