

Common Cause Failures

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Hartsfield-Jackson International Airport in Atlanta, Georgia is the busiest airport in the world, serving an average of 275,000 passengers each day. At about 1 PM on Sunday December 18, 2017, during one of the busiest travel times of the year, a fire disabled the airport's main power supply and also the backup power supply. This resulted in a complete airport power outage which lasted 11 hours. Approximately 30,000 people were in the airport at the time. Hundreds of people were stuck in airplanes on the ground or diverted in the air, including a former US Secretary of Transportation. Over 1000 flights were canceled over two days, flight schedules were disrupted throughout the United States, and one airline reported a cost of 50 million dollars.



Failure of an electrical switch in a utility tunnel in the airport started a fire. The airport had two separate power supplies from separate sub-stations from the electric company, but the cables for both power supplies went through the utility tunnel near the failed switch. The fire disabled both the main power supply and the alternate power supply. This is called a "common cause failure." A single event – the "common cause", in this case the fire from the switch – results in the failure of two or more other pieces of equipment or systems – the main power supply and the alternate (backup) power supply for the airport.

Common cause failures can occur in process plants, both in normal operations and in emergency situations. For example, a reactor has two high temperature shutdown sensors. Both are calibrated at the same time by the same technician following the same procedure. Unfortunately the technician is not properly trained and does the calibration incorrectly for both sensors, so both give an incorrect temperature reading.

In the 1984 Piper Alpha North Sea oil platform disaster, fire water pumps which pumped water from the sea had been set to "manual start" because divers were in the sea near the platform. A gas leak on the platform ignited, starting a fire, and the fire made it impossible to reach the switches to turn on the fire water pumps. The fire was a common cause – it created the need for fire water, and also prevented access to the fire water pump switches. There was no alternate location to turn on the fire water pumps.



What can you do?

- Look for common cause failures which can disable multiple systems (particularly a primary system and its backup) in your plant at the same time – both in normal operations, and also in emergency response systems and procedures.
- When you are involved in an emergency drill, look for common cause failures – things that can both initiate the emergency and also prevent you from following established emergency procedures or using required emergency response equipment. For example, if you have to start an emergency generator after a power failure at night, will you be able to see well enough to start the generator if the lights are not working because of the power failure?
- Look at safety systems and backup safety equipment in detail and consider potential common cause failures. In particular, if primary and backup systems are located in the same room or physically close together, consider the potential for a fire, flood, or other major event disabling both the primary system and the backup.
- Report common cause concerns to your management and technical staff so they can evaluate measures to eliminate conditions that result in a common cause failure.

Look for common cause failures in normal operations and emergency response!

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