

Details Matter in Process Safety!

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There was an exothermic reaction in a drum of radioactive waste material in a nuclear waste repository. The drum ruptured, releasing small amounts of radiation, exposing other waste drums to elevated temperature, and contaminating 20 workers with low levels of radiation. Other drums containing similar waste material may also be in danger of rupture. The facility had to be shut down and the recovery cost is expected to be several hundred million dollars.

A chemical reaction occurred in the drum, which contained acidic waste material and oxidizing chemicals including nitrate salts, as well as an organic absorbent. This mixture can react to generate heat and pressure.

While a final determination of causes has not been made, newspaper reports indicate that a typographical error in a revision to a facility policy may have resulted in the use of the wrong absorbent! The revised policy specifically stated that an organic absorbent should be used, when it should have specified the use of an inorganic absorbent (a clay based absorbent). The error was not recognized and the absorbent was changed, resulting in the incident. Details matter! Those two letters, “i” and “n,” make a huge difference in the characteristics of the absorbent!



Some Other Examples

- ❖ Small diameter tubing connecting a pressure gauge to process piping ruptured releasing flammable material which ignited. The resulting fire destroyed a plant (October 2012 *Beacon*). The detail – a few inches of small tubing in thousands of feet of pipe!
- ❖ An ungrounded instrument probe in a duct built up a static electric charge. The duct was air conveying a combustible solid powder. A spark ignited a dust explosion. The detail – a single ungrounded conductive piece of equipment out of thousands of components that were properly grounded!
- ❖ There was a significant fire on an offshore oil platform when a small hose failed releasing methanol, which ignited. The hose was leaking and had been repaired with duct tape (July 2007 *Beacon*)! The detail – a single small hose leak on a platform containing large piping and equipment!
- ❖ Many explosions have resulted from running a centrifugal pump with both the suction and discharge valves closed, allowing temperature and pressure to build up in the pump (October 2002 and August 2013 *Beacons*). The detail – one or two valves out of hundreds in the plant were in the wrong position!

What can you do?

- ❖ Whatever your job – operations, maintenance, supervision, engineering, management – pay attention to the details in your work. There are no unimportant details in process safety. You never know which apparently minor detail can initiate a major event, so you have to pay attention to all of them!
- ❖ If you are asked to review a procedure or other process safety information, really review it. Don't regard the review as a formality, go over it carefully.

Pay attention to details in your job – they are important!

Questions:

1. **(5 min)** What was the greatest hazard of combining the waste and the organic absorbent? Discuss in 2-3 sentences.
2. **(10-15 min)** *What did you learn?*
What fundamental lessons have you learned from this article and how can you apply them to your chemical engineering career? Consider: Besides being vigilant and detail-oriented with your work, what procedural changes could have been in place to prevent the adsorbent, tubing leak, ungrounded instrument probe, hose leak, and valve closure mistakes? Discuss in 5-6 sentences.