

## Management of Change Prevents Accidents

**M**aking a seemingly small change without conducting an adequate management of change (MOC) review can lead to a serious event. Two examples illustrate the risk.

**Incident 1: Modification to a tank vent system.** The vent system on a low-pressure, 20-ft (~ 6-m) wide, 30-ft (~ 9-m) tall storage tank was modified to reduce environmental emissions. The tank had operated for 20 years with a nitrogen blanket and a simple hinged breather vent that provided overpressure and vacuum protection. The new vent system included a compressor and additional piping, making it much more complex.

The tank was returned to service and filled. During the first emptying, it collapsed because it was not properly vented (Image 1). Fortunately, there were no leaks or injuries, but the tank did have to be replaced.

**Incident 2: Modification to a tanker nitrogen hose.** A trucking company modified its tank truck with tubing so that a nitrogen hose could be connected to the tank without requiring someone to climb a ladder on the truck. A valve in the nitrogen line on the top of the truck was mistakenly left closed. The truck was emptied using a plant pump, and with no nitrogen

flowing to the tank, a vacuum formed and the tank catastrophically collapsed (Image 2). The tanker was equipped with a pressure/vacuum relief device, but it also failed.



### References:

Sanders, R. E., "Human Factors: Case Histories of Improperly Managed Changes in Chemical Plants," *Process Safety Progress*, 15 (3), pp. 150–155 (1996).

Sanders, R. E., "Chemical Process Safety: Learning from Case Histories," 4th Ed., Elsevier, Amsterdam, Netherlands, pp. 23–27, 31–37 (2015).

### Did you know?

In Incident 1, the MOC was conducted, but all of the necessary operator training was not completed. The training focused on the new vent compressor and condenser, but did not stress the critical importance of the 1/2-in. (13-mm) valve on the instrument tubing that controlled pressure/vacuum protection. After the collapse, the tubing valve was found to be in the closed position. This key piece of protective equipment should have been locked or otherwise sealed open. The design of the system and the training could have been simplified to reduce the likelihood of human error.

In Incident 2, there was no MOC review, perhaps because the change seemed to be so minor or because the plant was not aware of the change by the truck owner. The truck driver misunderstood the operation of the new type of valve, and he inadvertently left the nitrogen valve on the top of the truck in the closed position when preparing to unload.

### What can you do?

- Make sure you are trained on any changes to your plant, and that you understand how to operate the modified equipment. Get help if you are required to operate modified equipment without training.
- Never make changes to piping or equipment without following your plant's MOC process.
- If any existing or modified equipment is complex and subject to human error, determine whether the equipment can be simplified.
- Ensure you completely understand any changes made to equipment owned by others, such as a trucking company, when it is used at your plant.
- When transferring material, make sure that all valves are in the correct position. Read the August 2015 Beacon for more information on operational readiness.

**A minor change can have a big impact!**

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