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Process Safety Beacon

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Messages for Manufacturing Personnel

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Management of Change

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A seemingly small change, without an adequate Management of Change (MOC) review, can lead to a serious event. Here are two examples.

Incident 1: The vent system on a low pressure storage tank 20 ft (~ 6 m) diameter and 30 ft (~ 9 m) high was modified to reduce environmental emissions. The tank had operated for 20 years with a nitrogen blanket and a simple hinged breather vent to provide overpressure and vacuum protection. The new system was much more complex, including a compressor and more complex piping. The tank was returned to service and filled. The first time it was emptied, the tank collapsed (Fig. 1) because it was not properly vented. Fortunately there were no leaks or injuries, but the tank had to be replaced.

Incident 2: A tank truck owned by a trucking company had been modified with tubing so that a nitrogen hose could be connected to the tank without somebody climbing a ladder on the truck. There was a valve in the nitrogen line on the top of the truck, and it was mistakenly left closed. The tank truck was pumped out using a plant pump and, with no nitrogen flowing to the tank, a vacuum was created and the tank catastrophically collapsed (Fig. 2). The tanker did have a pressure/vacuum relief device, but it failed.

Figure 1: Collapsed Tank

Did you know?

In Incident 1, the MOC review was done, but all operator training was not completed. The training focused on the new vent compressor and condenser. The training did not stress the critical importance of a ½ inch (13 mm) valve on instrument tubing which controlled pressure/vacuum protection. After the collapse, that tubing valve was found closed, and it was key to protection of a complex system. The valve should have been locked or otherwise sealed open. The design and training could have been simplified to reduce the likelihood of human error. Small details can provide opportunities for human error which have big consequences.

In Incident 2, there was no MOC review for what seemed to be a minor change, which was made by the truck owner. The truck driver misunderstood the operation of a new type valve and he inadvertently left the nitrogen valve on top of the truck in a closed position when preparing to unload the truck.

Figure 2: Collapsed Truck

What can you do?

- Make sure you are trained on any changes to your plant, and that you understand how to operate modified equipment. Get help if you are required to operate modified equipment without training.
- Never make changes to the piping or equipment in your plant without following your plant's MOC process.
- If any equipment, existing or as modified by a change, is complex and likely to result in human error, tell management and engineering and ask them if the equipment can be simplified.
- Completely understand any changes made to equipment owned by others, such as a trucking company, when it is used in your plant.
- When transferring material, make sure that ***all*** valves are in the correct position (see the August 2015 *Process Safety Beacon*).

References: Sanders, R. E.., *Process Safety Progress* **15** (3), pp. 150-155 (1996) and Sanders, R. E., *Chemical Process Safety: Learning from Case Histories*, 4th Edition, Elsevier (2015) pp. 23-27 and 31-37.

A minor change can have a big impact!

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