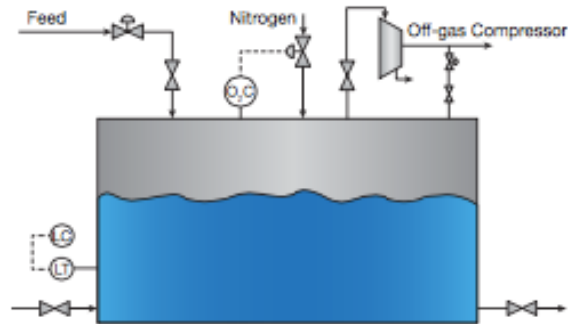


Process Safety Incident of the Week ARCO Channelview explosion

<https://www.aiche.org/sites/default/files/cep/20150323.pdf>

A wastewater tank at the ARCO chemical plant in Channelview, TX, exploded during the restart of a compressor on July 5, 1990. The 900,000 gallon wastewater tank contained process wastewater from propylene oxide and styrene processes.



There were thousands of feet of piping upstream of the tank where peroxides and caustic could mix. A nitrogen purge kept the vapor space inert, and an off-gas compressor drew the hydrocarbon vapors off before the waste was disposed of in deep well. The tank was taken out of service so the nitrogen blanket compressor could be repaired. During this time, the normal flow of nitrogen purge gas to the tank was reduced to a minimum. Workers installed a temporary oxygen analyzer between two roof beams in the tank, and they planned to add a nitrogen purge if a high oxygen level was detected. Within the tank, decomposition of the peroxides generated dangerous levels of oxygen. However the air in the headspace of the tank was stagnant and the analyzer did not detect oxygen buildup because it was in a dead zone. Occasional nitrogen purging was inadequate to prevent the formation of a flammable atmosphere in the headspace and in the piping to the compressor. After maintenance was completed, a failed attempt to restart the compressor drew flammable vapors into the suction line of the compressor. When the compressor was successfully restarted, the flammable vapors were ignited and flame flashed back to the tank, causing an explosion. This explosion killed 17 people causing an estimated 100 million dollars in damages.

Causes

The wastewater tank was not considered part of the operating plant. Hence, the management and workers did not understand that a chemical reaction was taking place in the tank, generating oxygen. The lack of understanding enabled a series of poor decisions, such as discontinuing the nitrogen purge, poor design and location of the temporary oxygen probe, no management of change review of these decisions, and no pre-startup safety review.

Key Lessons

Keep in mind that the chemicals that enter any wastewater tank are still prone to reaction. Ensure that proper MOC procedures are followed before any maintenance work is performed.