

ARCO Channelview Explosion

By: Christina Meyer

<https://www.ogj.com/articles/print/volume-89/issue-2/in-this-issue/gas-processing/arco-spells-out-cause-of-channelview-blast.html>

Activity

In Channel View, Texas sits the ARCO chemical plant. The plant includes a 900,000-gallon wastewater tank, which contains wastewater from propylene oxide and styrene processes. Thousands of feet of piping upstream from the tank allow for peroxides and caustic to mix. A nitrogen purge was used to keep the vapor space inert and the off-gas compressor pulled the hydrocarbon vapors off before the waste was disposed of in a deep well.

Hazards

The peroxides that can be found inside the tank have a Safety Data sheet warning of:

- Causes serious eye damage
- Harmful if swallowed or inhaled
- May cause respiratory irritation
- Causes skin irritation
- May cause or intensify fire; oxidizer



Preventative Actions and Safeguards

Ensure proper procedures for all parts of the process are covered, even the wastewater. Be fully aware of all hazards.

Contingency Plan/ Mitigating Actions

Conduct management of change to cover possible hazards when needing to take a part in or out of service.

Initiating Event

The wastewater tank was taken out of service so the nitrogen compressor could be fixed. While maintenance was being performed, the normal flow of nitrogen purge gas to the tank was at a minimum. A temporary oxygen analyzer was installed between two roof beams in the tank in order to detect if high oxygen levels were present and if a nitrogen purge was needed.

Incident

Within the tank, the peroxides decomposed creating dangerous levels of oxygen. These high levels were not detected due to the fact the air in the headspace was stagnant and the oxygen buildup was in a dead zone so it was not being detected by the analyzer. Intermittent nitrogen purging was insufficient to prevent the formation of this high oxygen level atmosphere in the headspace and piping to the compressor. On July 5, 1990 once the maintenance was completed, there was a failed attempt to restart the compressor, which drew flammable vapors in the suction line of the compressor. Once the compressor was successfully restarted, the vapors were ignited and flashed back to the tank, causing an explosion. 17 were killed due to the explosion, while there was around \$100 million dollars worth of damages to the plant.

Lessons Learned

Since the wastewater tank was not considered to be part of the operating plant no proper hazard analysis was conducted, so the workers did not understand that there was generation of oxygen. With lack of understanding the whole process, a series of bad decisions were made such as withdrawing the nitrogen purge, poor design and location of the oxygen probe, no management of change review for any decision, and no pre-startup safety review. It is important to understand even chemicals that are a part of the wastewater tank are still susceptible to reaction. With a proper management of change done before doing maintenance would prepare the workers and give them an understanding of the dangers of oxygen building up in the tank.