SMC
11/22/91

2511 Building
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Reactive Chemicals review conducted on 11-18-91

Incident Investigation--Glycol 2 T-11 Distillation Column Fire 11-15-91

INCIDENT DESCRIPTION:
On Friday, Nov 15, 1991 a fire occurred in the T-11 Glycol Recovery Still which was out of service for maintenance. This column separates glycol and triethanolamine: the glycol stream is taken overhead while the TEA stream is taken from the bottom. The column is driven by an external reboiler.

At approximately 7 p.m. Glycol 2 personnel observed smoke coming from the column. A thermocouple located in the top packed section pegged out at the upper range of 468 deg C. The upper temperature was probably in excess of 1000 deg C due to evidence of melted Dowpack Structured 304 stainless steel packing. In addition a portion of the column was glowing red at the time of the incident. The fire was extinguished by nitrogen purge and by filling with water. The high efficiency packing was damaged and the outside wall of T-11 was buckled in the area that was glowing red. The column packing in T-11 is very similar to the Koch Sulzer high efficiency stainless steel packing that was involved in the September 1990 Triethanolamine distillation column fire at the Ethanolamines Plant.

The cause of this incident is attributed to spontaneous ignition of organics from T-11 OH and T-11 Btms which were dispersed on the high surface area structured packing. ARC data supports this conclusion. There were also several contributing problems:

1. The packing was partially plugged with what appeared to be an iron-TEA-high molecular wt glycol complex. This material was not soluble in water, methanol or methylene chloride. The plugging allowed more organics to be retained on the packing and it also

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served to prevent cooling.
2. A hole was found near the center of the packing probably caused by long term rusting. This allowed channeling to occur.
3. The distributor above the high efficiency packing was plugged over the area that burned. The plugged section of the distributor channeled the cooling water through the hole in the center of the packing. The resulting "dead spot", where the incident occurred, remained hot during this cooling procedure.

RECOMMENDATIONS/ACTIONS FROM INVESTIGATION:

1. Consider amending column maintenance procedures to include filling T-10 and T-11 with water before opening. This will not wash out all the deposits on the packing but it should serve as a mechanism for dissipating heat.

2. Since spontaneous ignition fires of organics on high surface area materials normally occur over a period of several hours of oxidative self heating an early warning fire detection system would be of tremendous value. One suggestion was to consider installing differential carbon monoxide probes across the column. CPE uses CO probes to detect smoldering fires in their Fluid Bed Dryer.

3. Investigate the possibility of using Infrared cameras as a monitoring tool for detecting hot spots in distillation columns that are to be opened.

4. Consider eliminating the use of high efficiency packings in applications where potential is high for plugging due to deposits/sludge/polymers. One specific suggestion was to eliminate high surface area packings in T-10 and T-11.

5. A suggestion was made to eliminate the use of the "head box" high efficiency distributors in T-10 and T-11 and replace these with the "overflow type" distributors.

6. Reemphasize the importance of monitoring the operation of the distillation column air mover. In situations where undetected smoldering fires are occurring, the failure of an air mover could result in downdraft of hot gases or flames onto personnel working in the column.

7. Communicate this incident to Glycol 1 and Ethanolamines Plants. Similar packings are being used in those plants.

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8. All distillation columns containing high efficiency packings should be evaluated to determine the potential for similar problems

Gerald Wagener

Gerald Wagener, Chairman
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