F-500 ENCAPSULATOR TECHNOLOGY

CASE HISTORY

Safely and Successfully Extinguishing Transformer Fires

Problem: Traditional Firefighting Tactics Are Ineffective on Transformer Fires

America's Aging Infrastructure

- 132,000 Large Units in Service - Unit Run Life is 40 years, with installations peaking in the 1970's [1]
- Transformer failures are high energy events, often resulting in overpressure damage to the unit and adjacent equipment
- Failures are predicted to increase 500%; 1 in 5 failures will result in a fire [1]
- Transformers represent an energized, pressurized, three-dimensional, Class A, B and C, flowing fuel fire

Transformer Fire Solutions

Traditional firefighting tactics are not designed for industrial hazards or environments. Furthermore, most firefighters are not adequately trained or experienced with the hazards associated with industrial incidents, like a transformer fire. The biggest hazards regarding transformer fires are presumed PCB's, stored energy, impact of overpressure damage, pre-cook time (Point of Failure to De-energization), large oil reservoirs of pressurized fuel and their heat of reaction. Typically, upon arriving on-scene and confirming the units have been de-energized, firefighters will begin applying foam, followed by periodic applications of dry chemical, if available, in an effort to cap off and snuff out the fire. This approach sounds sensible, but fire departments across the country will continue to struggle through these incidents until they gain a better understanding of the hazards and gain additional on-scene experience to combat them. After a 5 minute pre-cook time, transformer fires will generate so much heat that foam becomes ineffective, burning up before it even hits the unit. This complicates the already problematic task of creating and maintaining a foam blanket on a three-dimensional block with flowing fuel. A dry chemical attack can be effective in cloud form, but as soon as the cloud drops, the fire reignites in the presence of fuel and sustained ignition temperatures.

Assume the fixed suppression system is still operational, having survived the overpressure damage from the high energy failure. In only 10 minutes, the unit's containment dikes will begin overflowing, spreading burning oil to other areas of the plant, jeopardizing adjacent equipment. Anthony Natale with Con Edison Emergency Response Group is a leading expert on transformer fires. He has organized the response on countless successful operations with Con Edison and continues to lead the way in research and development improving transformer fire procedures. He has struggled with the hazards of transformer fires and ultimately succeeded in implementing a safer, more effective means of extinguishment. Anthony Natale said, "People don't change until they suffer. You don't improve things on a good day and foam for every fire is not the solution." Supporting Natale's claim is NFPA 11 (Annex A.1.1) which states that "Foam is not suitable for three-dimensional, flowing liquid fuel fires," because of its inability to create a blanket on a three-dimensional surface. The following Incident Report from a Colorado-based utility is yet another example of having the right tool for the job with F-500 Encapsulator Agent.

1. Sources: FERC, IMIA, US Commerce Dept., DOE (April, 2014)

Colorado Utility Transformer Fire

In May, 2011, a Fire Rescue responded to a transformer fire. After the electrical flash, the flames were about 1-2 feet high. Three ABC fire extinguishers were applied from a lift truck, but the fire kept reigniting. Finally, a 1 3/4" attack line was used with 3% F-500 Encapsulator Agent. The fire was out in about 20 seconds.

Utility Substation

Transformer Fire After Flash

Applying Three ABC Extinguishers

F-500 EA - Extinguished in 20 Seconds

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