Hazards of Gasoline Contamination – Case Study of a Tanker Truck Explosion Resulting from Switch Loading

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Abstract

When a tanker truck is drained of a Class I liquid (e.g., gasoline) and refilled with a similar liquid, there is no flammable mixture on the surface of the rising fluid because Class I fluids create mixtures at their surface that are too fuel rich to burn. Similarly, if a tanker truck is drained of Class II liquid (e.g., diesel) and refilled with a Class II liquid, there is no flammable mixture created because Class II liquids do not produce ignitable mixtures at ordinary temperatures. An extremely hazardous condition occurs, however, if the liquids are switch loaded, which is when a Class II or III liquid is loaded into a tank vehicle that previously contained a Class I liquid. Under these conditions, the atmosphere above the fluid surface can become ignitable. An explosion can occur if a spark occurs from the fluid surface to another object, igniting the flammable mixture in the headspace of the tank.

This paper describes a recent incident involving an explosion during the filling of a tank of a transport truck with diesel fuel. This particular tank was previously filled with gasoline and was not completely emptied of the gasoline prior to the switch loading. After only filling one-quarter of the programmed load, a spark ignited the flammable mixture within the head space and cause significant damage to the truck and neighboring tanks. The study will address issues and lessons learned regarding spark promotion with the tank, reduction of static generation by the fluid being filled into the tank, and elimination of the flammable mixture within the tank prior to switch loading.