PRODUCT STEWARDSHIP SUMMARY

DIESEL PERFORMANCE ADDITIVES

Introduction

Fuel additives have long been used to improve vehicle performance. Diesel performance additives (DPA), which are added to diesel fuel after the refining process, are no exception. As regulatory requirements and fuel properties change and engine hardware technology becomes more complex, additives will continue to provide value to fuel marketers and vehicle operators.

Uses and Advantages

Diesel Performance Additives are used to help marketers meet changing regulatory requirements and to provide enhanced vehicle performance. The primary types of DPAs include cetane improvers, lubricity improvers, detergents, cold flow improvers, and conductivity additives. Specifically, these additives can provide the following benefits:

- Cetane Improver: Improves combustion of the fuel by shortening the ignition delay, resulting in more complete burning of the fuel that can yield emissions reductions and potentially improve fuel economy.
- Lubricity Improvers: With the removal of sulfur from diesel fuels, the natural lubricating properties of the fuel have been diminished. Lubricity additives help fuel marketers meet a mandated lubrication specification and are designed to provide protection to fuel pumps and fuel injectors.
- Detergents: Over time, incomplete fuel combustion, and the presence of certain impurities in the fuel, can lead to deposit build-up on fuel injectors. These deposits can result in lost power and reduced fuel economy. Detergents work to both clean up these deposits and, with continued use, keep them from coming back, restoring lost power and fuel economy.
- Cold Flow Improvers: During cold weather periods, natural waxes in diesel fuels can “freeze” out of the fuel, becoming solid particles that can plug fuel filters and lead to starvation of fuel to the engine. Cold flow improvers can be used to combat this problem. These additives alter how these waxes fall out of the fuel, making it easier for them to pass through the fuel filters and not affect engine performance.
- Conductivity Additives: Fuels have historically contained materials that naturally dissipate static electricity build-up that can occur during bulk transfer of the fuel. Ultra-low-sulfur diesel fuels no longer contain these naturally occurring sulfur-based conductors. A conductivity additive can restore the fuel’s ability to dissipate static build-up, reducing the chance of spark and potential fire.

Health Effects

DPAs can cause adverse health effects through skin contact or inhalation from breathing sprays or mist. Health effects vary depending on the specific components in the DPA package. These effects primarily include skin, eyes, and respiratory tract irritation as well as narcotic effects, and skin sensitization. A few DPAs are corrosive to the skin and eyes. Some DPAs are classified as harmful if swallowed, in contact with skin, or inhaled, but none of these additive packages are classified as causing organ effects after chronic exposure. Many DPAs are classified as aspiration hazards if swallowed. A small number of packages may also contain components that cause reproductive or developmental effects following exposure to high doses or for extended periods of time. Additionally, some of the constituents within the solvents are carcinogenic.

Environmental Effects

Most Diesel performance additive packages are considered toxic or very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment. The aquatic toxicity is primarily due to the solvent naphtha and cetane improver. Some of Afton's DPA products can contain components that may also be persistent in the environment; however, it should be noted that neither cetane nor solvent naphtha was assessed to be bioaccumulative and therefore, despite their toxicity, the DPAs are not expected to be PBT (Persistent, Bioaccumulative and Toxic) or vPvB (very Persistent very Bioaccumulative).

Exposure

For industrial workers, the most common route of exposure is via skin contact during manufacturing and processing. The extent of exposure can depend on the type of manufacturing system (open or enclosed), adequacy of engineering controls, material handling practices, and use of personal protective equipment. Handling at elevated temperatures or generating vapors or mists can increase the significance of inhalation exposure.

Consumers are most commonly exposed to diesel performance additives when they purchase treated diesel fuel. As such, consumers are only potentially exposed to very low (ppm) levels of the hazardous components in the DPA through skin contact with the treated diesel fuel. Many DPA products target the commercial sector, including heavy-duty diesel trucks, agriculture tractors, and mining equipment. The workers in this sector can be exposed to the additive packages and the treated diesel fuel.

Risk Management

Diesel performance additives contain hazardous components at different concentrations across the product portfolio. The primary hazards are mainly associated with two components found in many products: solvent naphtha and cetane improver. Many of the solvents used in DPA are flammable or combustible. Products containing cetane improver, commonly 2-ethylhexyl nitrate (2-EHN), have specific physical hazards associated with them. Additional information related to 2-EHN can be found in the product safety summary for that substance.

The health and environmental risks of these products can vary depending on the product as well as the conditions encountered during their use. Information on the safe handling of these products is provided to users through the data sheets. Appropriate engineering, administrative controls (work practices), and personal protective equipment are recommended to control exposures during manufacture and use, as well as to manage the risk associated with the flammability of these products.

Conclusion

DPAs provide many benefits to the fuel marketer and the vehicle operator, including helping burn fuel more efficiently, which improves fuel economy and reduces emissions. Afton is committed to providing its customers with the information they need to responsibly manage any safety, health, and environmental risks associated with the intended use of Afton products.

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