PRODUCT STEWARDSHIP SUMMARY

DIESEL FUEL ADDITIVES

Introduction

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

Uses and Advantages

Diesel Fuel Additives are used to help marketers meet changing regulatory requirements and to provide enhanced vehicle performance. The primary types of DFAs include cetane improver, 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. This can yield emissions reductions and potentially improved fuel economy.
- Lubricity Improvers: With removal of sulfur from diesel fuels, the natural lubricating properties of the fuel have been diminished. Lubricity additives not only help fuel marketers meet a mandated lubrication specification, but they are designed to provide protection to fuel pumps and fuel injectors as well.
- 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. To combat this problem, cold flow improvers can be used. These additives alter the way these waxes fall out of the fuel, making it easier for them to pass thru the fuel filters and not affect engine performance.
- Conductivity Additives: Fuels historically have contained materials that naturally can dissipate static electricity build-up. This generally occurs during bulk transfer of fuels. Ultra-low-sulfur diesel fuels no longer contain these naturally occurring sulfur-based conductors. A conductivity additive can be used to restore the fuel’s ability to dissipate static build up, reducing the chance of spark and potential fire.

Health Effects

Diesel Fuel Additives can cause adverse health effects through skin contact with sprays or mist and through inhalation from breathing DFA mist or aerosol. Health effects vary depending on the specific components in the DFA package, but primarily include irritation of the skin, eyes, and respiratory tract. The irritation can be associated with skin and airborne exposures to DFAs. Some of the components in the solvents are toxic or carcinogenic at higher concentrations but these warnings are accurately listed on the SDSs and other hazard communication documents. All employees and downstream users of DFA products have access to all SDSs and receive appropriate training to warn of the health hazards and are provided the appropriate PPE to ensure their safety. As stated previously, the exposure to DFA’s by consumers is so low, given the ppm concentrations, that they are not at risk to the health hazards associated with the components themselves, only the fuel.

Environmental Effects

Most of the Diesel Fuel Additive packages are considered toxic to aquatic organisms and they 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 DFA products may contain components which may also be persistent in the environment; however, it should be noted that neither cetane nor solvent naphtha were assessed to be bioaccumulative and therefore, despite their toxicity, the DFAs are not expected to be PBT (Persistent, Bioaccumulative and Toxic) or vPvB (very Persistent very Bioaccumulative).

Exposure

Industrial Use Exposure:

Workers exposed to the hazards of DFA products are protected both through wearing of appropriate PPE and the careful handling of the materials. Many of the products within the DFA portfolio are either flammable or combustible and may require extra steps when handling (loading, transfer, etc.) to avoid static, sparks, etc. Also, when cetane improver is present at > 25%, the products may be more prone to runaway exotherms when heated which could lead to explosions. As such, Afton warns of this hazard on its hazard communication documents and we provide all of our handlers and customers a Safety & Handling manual which details additional information regarding the safe handling of cetane improver.

Commercial Use Exposure:

Many DFA products are targeted for the commercial sector, including heavy-duty diesel trucks, agriculture & tractors, mining equipment, etc. The workers in this sector can be exposed both to the pre-blend additive packages as well as to the treated diesel fuel. As with industrial use/exposure, Afton recommends workers exposed to the pre-blend additive packages wear similar PPE and use extreme care when handling the packages. Once the DFA packages are blended into fuel, the total concentration of the hazardous components drops significantly to parts-per-million (ppm) levels. At these levels, the risks associated with the hazards from the DFA components are mitigated as direct exposure is so low. Hazards associated with the fuel itself far outweigh any hazards from the DFA components.

Risk Management

Diesel Fuel Additives contain hazardous components which are present at different concentrations across the product portfolio. The primary hazards are associated with two components found in many of the products, solvent naphtha and cetane improver. The hazards are physical, human health and environmental in nature and risks are managed up and down the supply chain to ensure adequate protection for our employees, customers, consumers and the environment. Methods of avoiding direct contact with diesel fuel additives include wearing appropriate personal protective equipment (PPE) which can include chemical resistant gloves, chemical resistant suits, boots, safety goggles with face shield when appropriate, and appropriate respiratory protection. In addition, it is important that there be adequate exhaust ventilation or other engineering controls to keep the airborne concentrations of specific components of the DFAs below their respective threshold exposure limit values.

Conclusion

DFAs provide many benefits to both the fuel marketer and the vehicle operator, including helping to more efficiently burn fuel. This can lead to improved fuel economy and reduced emissions to the environment. Afton is committed to providing its customer with the information they need to responsibly manage any health and environmental risks associated with the intended use of Afton products.

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