



117 W.TUPPER ST•BUFFALO, NY 14201•716-856-9607•FX: 716-856-0750

TECH BULLETIN

SUBJECT: DIESEL ENGINE SCR AND DPF REGEN SYSTEMS WHEN USED WITH DIESEL FUEL ADDITIVES

DATE: APRIL 7, 2016

GENERAL

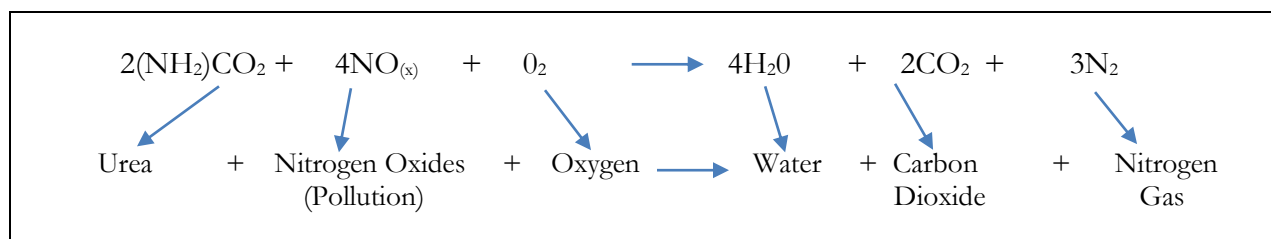
It has been brought to my attention that there are increasing concerns about the operation of Diesel Engines with SCR & DPF systems when used with quality fuel additives. There are some fuel additives that claim to improve the efficiency of both the DPF and the SCR systems on new trucks, let's investigate this further.

First, let me briefly define each of these 2 systems:

- DPF (Diesel Particulate Filter) is the technology that incorporates the high tech filtering/regen processes to remove most solid carbon based emissions from fuel exhaust (the regen process is a costly self-cleaning of the system requiring downtime). There are several different filtering methods, and a variety of filtering media employed, but the intended result is constant: less emissions. The actual results vary from 35% effective to over 99% success.

- SCR (Selective Catalytic Reduction) Systems are the newest addition to diesel engine technology. This system uses DEF (Diesel Exhaust Fluid), a Urea/Water based fluid, to remove Nitrogen Oxides from exhaust gases before exiting the vehicle. The SCR technology enables trucks to meet the new "Tier 4" emission standards that make the exhaust gases from vehicles "almost" as clean as or cleaner than the air entering the vehicles.

The chemistry is quite simple:





Now, the big question is what effect, if any, do fuel additives have on the operation enhancement of these two systems.

All FPPF fuel Additives assist in the proper and efficient operation of both of these pollution abatement systems.

Let's back up a bit. Remember, crude oil is a mixture of primarily decaying plants and, to a lesser degree animal life from millions of years ago. Diesel Fuel is a middle distillate of crude oil, and consists of a variety of over 150 different components, the polluting potential of every batch of fuel varies. The U.S. has the highest Diesel Engine emission standards in the world, but fuel quality issues prevent universal compliance with these standards. The quality of some of the starting crude oil today is actually the worst in history. We are depleting our supply of sweet light crude and are replacing it with Canadian Tar Sand crudes and shale oil crudes. Today's improved refining techniques allow the fuel producers to successfully use these crudes for production of gasolines, diesel, plastics and a variety of other products.

The new fuels are prone to more rapid degradation and instability which causes increased fuel related deposits and poor combustion. This can lead to DPF issues, increased smoke, and higher unwanted emissions if the DPF and SCR's are not working properly.

It's ironic, today's fuels have almost no Sulfur, but can actually be more detrimental to the environment in so many other ways if it weren't for the new engine technologies. Today's diesel fuels tend to hold more moisture, which increases the presence of naturally occurring salts, this can lead to injector deposits and improper injector operation.

Modern engine fuel systems are manufactured with special fuel delivery components that require constant and sophisticated efforts to maintain their good working order. Today's diesel engine fuel pumps create enormously high operating fuel pressures and the exceptionally fine fuel injector holes and tolerances are extremely sensitive to the slightest amount of dirt, debris, moisture and other potential contaminations typically found in diesel fuels. If not kept exceedingly clean, and in proper working order, these systems will exponentially intensify operational issues and dramatically increase the creation of unburned hydrocarbon emissions at all levels of operation.

Additionally, the new DPF regen systems actually use the vehicle's diesel fuel as a cleaning agent during the regen process. This is why it is critical that only fuel additives with **strong detergency** and that are "Tier 4" compliant be used (Tier 4 are the new emission standards for common rail engines). **FPPF's Diesel Fuel Injector Cleaner and**



Super Fuel Stabilizer are designed to be used with common rail injectors and meet all Tier 4 criteria. The same active ingredients in these products are contained in FPPF's other diesel fuel additives at a lower concentration. These active ingredients literally chemically breakdown pollutants microscopically, and assist the functioning of the DPF and SCR systems.

Since diesel fuel is used as the cleaning agent during DPF REGENS, increased DPF regen frequency results in increased fuel consumption without any additional horsepower or work accomplished.

Other diesel fuel physical parameters that impact DPF/ REGENS and exhaust emissions are the fuel Distillation Range (IBP – initial boiling point and other boiling temperatures including the EP – end point temperature), the Engine Cetane Number and the HFRR fuel lubricity value.

FPPF fuel additives can also significantly improve fuel lubricity and cetane numbers. **FPPF's Lubricity plus Fuel Power, 8+ Cetane, Total Power** and others all enhance the operation of the DPF systems and reduce the need for system Regenerations in both warm and cold weather.

Cold Weather

We all know Diesel Fuel thickens as the temperature drops and all fuels react differently. Fuel Gelling is a function of the chemical make-up of the fuel. When wax crystals form in fuel without an effective anti-gel, not only may it prevent the operation of the vehicle, it will also affect the DPF and EGR systems. Wax crystals will agglomerate and foul the fuel delivery system (pumps, filters and injectors) causing poor or incomplete combustion which increase unburned hydrocarbon emissions.

This poor combustion efficiency leads to increased carbon particulates entering the EGR Valve and DPF systems which increases the need for DPF regenerations –and increases diesel fuel consumption with no additional horsepower being sent to the drive train.

Correcting the Problem

All the issues affecting diesel fuel combustion efficiency and unburned diesel fuel hydrocarbon emissions can be eliminated by treating the diesel fuel with **FPPF Additives**.

By using **FPPF's Diesel Fuel Injector Cleaner, 8+ Cetane Improver, Super Fuel Stabilizer** or any of our combination “multi-functional “ additives; **Lubricity plus Fuel**



Power, Total Power, Polar Power, Agri Fuel Treatment and others will greatly enhance the performance of the latest Diesel engine emission reduction technology systems and reduce the need for regeneration within the system.

Summary

FPPF remains on the forefront of additive technology. All FPPF products are formulated to function effectively and actually enhance the operation of all the latest diesel engine technologies, including common rail, ERG, DPF and SCR.

One further point, if your vehicle is older and does not contain the latest emission controls, FPPF additives actually reduce emissions by enabling your engine to burn the fuel more effectively and completely. The end result is better fuel mileage and reduced emissions for all diesel engines, old and new.

Peter M. Guerra
FPPF Chemical Co., Inc.