Operating Guideline # 313

Exhaust Regeneration

September 30, 2019

PURPOSE:
The purpose of this Operating Guideline (OG) is to establish policy and procedures for the proper means of performing exhaust regeneration that is required on diesel engines manufactured beginning in 2007.

GUIDELINE:
General
1. Beginning with 2007 model year diesel engines, the traditional muffler has been replaced by a special canister containing a Diesel Oxidation Catalyst and a Diesel Particulate Filter (DPF). This DPF traps particulate matter and keeps it from being released to the environment. Over time and running conditions soot and ash will build up in the filter and must be removed.

Procedure
2. The removal process involves heating the filter up until the particulate is oxidized and converts to carbon dioxide gas. Engine sensors monitor the condition of the DPF and will illuminate lamps on the dash to indicate its condition. Once the sensors have determined that the DPF needs to be regenerated, the After treatment DPF Lamp will come on solid. In this state the DPF needs to regenerate within the next 2-6 hours. If the condition persists, the lamp will begin to flash indicating that regeneration must take place within the next 1-2 hours. If regeneration is not performed the DPF will continue to flash and the Check Engine lamp will also light to indicate that regeneration must take place immediately. In regular driving conditions the normal operating temperature of the engine and exhaust system will clean the DPF through a passive process Should Passive Regeneration not be enough to keep the DPF clean, an Active Regeneration must be performed.
3. Active regeneration can take place in two manners; automatic or parked modes.

Automatic Mode – occurs when the engine load, exhaust temperature and engine speed are within an acceptable range. When these conditions are met, the engine begins dosing fuel into the exhaust stream to cause the temperature buildup to clean the DPF. The automatic regeneration cycle does not require an EVO to initiate; it happens automatically. This may occur during normal driving or during pumping operations.

Parked Mode – occurs once the DPF lamp is lit and must be initiated by the EVO. Parked Regeneration must take place in a safe location due to the extreme heat that is generated. The apparatus must be moved outside and away from other vehicles and objects. Do no perform regeneration on asphalt as the heat will damage to the road surface. It is best to perform this operation on a gravel surface away from any objects and combustibles. In addition the EVO must stay with the apparatus during the operation (expected to take 20-40 minutes). People must be kept away from the apparatus, particularly the exhaust pipe as the temperatures can cause burns.

4. The steps for performing parked mode regeneration are:
   a) Start apparatus
   b) Disengage parking brake and then re-apply brake.

c) Ensure engine is operating at idle speed.
d) Move transmission to Drive and then back to Neutral.
e) Hold the REGEN Switch on the dash near the driver for five seconds then release.
f) The DPF lamp will light for one second and then go off
g) The engine speed will increase to 1,000 rpm.
h) Once the exhaust temperature exceeds the temperature threshold, the HEST (High Exhaust System Temperature) light on the dash will illuminate as a warning to keep people away from the exhaust system as temperatures will reach 1,200 degrees Fahrenheit.
i) Once the regeneration is complete the DPF lamp and other lamps will turn off. The HEST will remain lit until the temperature drops below and the engine will return to idle.

5. If during a Parked Mode Regeneration operation any adjustment to the engine is made; throttle is changed, the parking brake released, transmission switches touched, REGEN Switch held again for five seconds, the regeneration operation will stop and the engine will return to idle. The DPF lamps that were lit prior to the operation starting will again light indicating the need for further regeneration.
6. As a fire apparatus, unlike commercial diesel vehicles, the engines will not derate power if regeneration is not performed on time and the automatic engine shutdown will not occur. However, avoiding regeneration by ignoring the warning lamps and/or using the regeneration inhibit switch on the dash should only be done as a last resort.
7. Regeneration cycles do not have to be continuous. If a Parked Mode regeneration cycle is interrupted by a fire call or other event, the process can be restarted again at a later time. For Automatic Mode regeneration the process will continue the next time conditions are met, either by driving or by pumping.
8. Some newer diesel driven engines are equipped with Diesel Exhaust Fluid (DEF). DEF is a non-hazardous solution (urea &de-ionized water which is sprayed into the exhaust stream of diesel vehicles to break down NOx emissions into harmless nitrogen and water. It is not a fuel additive and never comes into contact with diesel fuel. It is stored in a separate tank. DEF level should be checked after every use and filled, if necessary. DEF can freeze but tends to not freeze when it is full.

RESPONSIBILITY:
It is the responsibility of all Emergency Operations Division staff to comply with the provisions of this Operating Guideline.