2007 Engine Exhaust Emission Devices

11/06 Projected 2007 Cummins engine operation specs with new EPA exhaust system:

The first system is a Diesel Oxidation Converter that provides additional heat in the oxidation event and additional oxygen to aid in the regeneration of the soot in the filter. The DOC reacts to hydrocarbon in the exhaust or fuel to create heat by means of a chemical reaction (no flame) to clean the filter.

The DIESEL PARTICULATE FILTER filter requires 1100 degree heat in order to convert soot into CO2 gas. The exhaust is filtered by the DIESEL PARTICULATE FILTER removing the soot or black smoke from the exhaust. It also filters out ash or the additive in engine oil that is burnt in the combustion process. The soot can be changed into CO2 gas when we add the extra oxygen and heat from the DOC.

The outside skin temperature of the DIESEL PARTICULATE FILTER is the same as the current muffler on a truck today, about 400-500 degrees.

The exhaust gas temperature leaving the DIESEL PARTICULATE FILTER during a regeneration event can reach 1000 degrees. The key thing here is that the exhaust gas will cool as it leaves the DIESEL PARTICULATE FILTER going up the exhaust pipe to be discharged. There is a sensor in the exhaust behind the DIESEL PARTICULATE FILTER to alert the driver of high exhaust temp.

The basic way the passive DIESEL PARTICULATE FILTER system works is: During normal operation of the truck when on the highway will generate enough exhaust temperature from the engine to provide the heat we need to clean the DIESEL PARTICULATE FILTER. If the truck is under light load and the exhaust temperature is to low fuel will be added to the exhaust gas to cause a chemical reaction in the DOC before the filter to add the additional heat needed to clean the filter without any driver input. Takes about 20-30 minutes. If the truck slows below 6 MPH, regeneration stops.

If the computer senses that the vehicle is not moving then no regeneration will occur unless the driver requests the event to occur. For the regeneration to occur when standing the DIESEL PARTICULATE FILTER warning light has to be on and a switch located somewhere on the truck must be turned on. Then and only then will the regeneration take place and this event will last about 30 minutes. This event should be done outside of a building and in a location away from any combustible material.

Some of the truck manufactures are providing a diffuser in the exhaust pipe to add cooler air to lower the exhaust temperature as it leaves the exhaust pipe. Exhaust temperature at exhaust exit could reach 600 degrees F.

The amount of regeneration of the DIESEL PARTICULATE FILTER will be directly related to the amount of soot that is in the filter and the amount of time the truck operates on highway at higher exhaust temperatures. The worst case example is a truck that accelerates from idle to full engine RPM and then to idle again with no highway operation to provide heat to clean the DIESEL PARTICULATE FILTER. In this case it is possible that a standing regeneration will be needed daily or every other day.

Warning lights for the DIESEL PARTICULATE FILTER: There will be a new warning light for the DIESEL PARTICULATE FILTER that will come on to alert the driver that the filter is starting to show restriction and a change in operation should be considered. This warning usually occurs about a 100 to 150 mile before the filter will be plugged causing a shut down.

The second warning will be that the yellow check engine light will come on along with the DIESEL PARTICULATE FILTER warning light. This means that regeneration or leaning of the DIESEL PARTICULATE FILTER is required, now. A derate of the engine power will occur when the yellow warning light comes on, slowing the truck below 40 MPH approx.

The last warning is the red engine shut down light that will come on and the engine will shut down in 30 seconds and the filter will need to be removed and replaced. A estimated cost of $700 - $1000 approx.

So a time frame of the DIESEL PARTICULATE FILTER warning light first comes on to the second warning of the flashing of the DIESEL PARTICULATE FILTER warning light is about 100 miles or 4 hours. The time to the yellow warning light coming on after that is 50 miles or about 2 hours. Again the time and mileage will vary due to load and outside temperature that the truck is operating\g in.

- NOTE: New 2007 trucks with 2006 pre-ignition engines have been approved to run on new ultra low sulfur.

- SAFETY ISSUE: Will a tanker truck be able to be driven safely during a regeneration? If an accident occurs and product is spilled and makes contact with the DIESEL PARTICULATE FILTER with the internal temperature at 1100 degrees F (approx.), fire problems may occur.