

Skyland Fire Department – Diesel Oxidation Catalyst Retrofits

Case Study Follow-up visit on 6-20-14

NC DENR, Division of Air Quality

Site Overview

Located in Buncombe County, the Skyland Fire Department (SFD) has been serving the surrounding community since 1954. The current Fire Chief, Chief Dennis Presley, started as a volunteer at SFD in 1978 and has since held the ranks of Engineer, Lieutenant, Captain, Assistant Chief and Deputy Chief. He became the Chief of SFD in 1995 and has since been a major advocate of improving air quality in his department, other North Carolina fire departments, and the state in general.

The Fire Engine Projects

In 1998, SFD purchased its 1996 Freightliner FL80 fire engine. It has a 330 horsepower, 8.3 Liter Cummins diesel engine which, prior to any modification and like many fire engines, would emit black smoke and exhaust when idling. After calculating the FL80 fire engine's usage, its estimated idle time per year was 436 hours, or just over a full 18 days. Knowing how harmful that was to the environment, the community and his firefighters, Chief Presley partnered with Ashley Featherstone, the Permitting Program Manager at Western North Carolina Regional Air Quality Agency (WNCRAQA), to retrofit several fire trucks, including the FL80.



Skyland Fire Department's 1996 Freightliner FL80 Diesel Fire Engine (left). It was lifted about six feet in the air to better view the Diesel Oxidation Catalyst (DOC) retrofit.

Implementation

In 2009 and 2013, the WNCRAQA was awarded Diesel Emissions-Economic Recovery (DEER) and Mobile Source Emission Reduction (MSERG) grants that went toward Cummins Emission Solution diesel oxidation catalyst (DOC) retrofits for various fire trucks at fire stations in Buncombe County. In 2009, 20 fire trucks were retrofitted, including three trucks from SFD. In 2013, Skyland's FL80 fire engine was one of five regional fire trucks to receive a DOC. DOCs remove soot (particulate matter) from exhaust gas, and have led to the following benefits and impacts at SFD:

- When processed by a DOC, carbon monoxide (CO), hydrocarbons (HC), diesel particulates and diesel odor can all be reduced.
- An EPA-verified reduction of fine particulate matter emissions by 20 percent, hydrocarbon emissions by 66 percent and carbon monoxide emissions by 41 percent.
- The FL80 runs cleaner and noticeably produces less black smoke when idling.
- Cleaner start-ups, which is when the greatest volume of diesel exhaust is expelled.
- Saving on cleaning supplies for the fire engine bay because of the DOC coupled with the bay's Straight Rail System, which captures start-up emissions.
- No increase in maintenance costs and no decrease in performance.
- Firefighters that stand near the fire engine while it is idling are exposed to less air pollution.
- Buncombe County TV and Ezine, the Weaverville Tribune, the Clean Vehicles Coalition, online blogs and social media sources, and a press release all reported on the DOC installations.

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Adjustments and Conclusion

The Skyland Fire Department and the WNC Regional Air Quality Agency only encountered minor complications during the second retrofit process because of lessons learned the first time. During the first round of DOC installations, it was learned that each fire truck had to be measured individually in order to get the proper fit. The DOC had to be reinstalled two additional times to replace an incorrect part. A reinstallation would take about half a day to complete, so there were periods of time where the fire engine was temporarily unavailable. On a more positive note, the retrofitting process cost the WNCRAQA less than the original vendor estimate. The initial budget was for the five fire engines was \$12,000, but the total cost of the project was \$7,940.85. Plus, all of the retrofits and their information were compiled into an extensive case study by Ms. Featherstone and presented at the South East Diesel Collaborative (available for viewing at <http://www.southeastdiesel.org>).

Chief Presley continues to be excited about the project's outcome and is willing to have more of his fire engines retrofitted if given the opportunity. Furthermore, he is a major advocate for other fire departments getting DOCs and he continues to promote them at Chief Association meetings.



The DOC (above) can either replace the muffler or be added to the existing exhaust system.



The size of Skyland Fire Department's facility allows it to inspect, service, and house fire engines from other regional departments.

"Mobile source emissions represent 8 percent of the state-wide mobile source particulate matter emissions and 49 percent of the state hydrocarbon. This project has shown a lifetime emission reduction of 1 ton of particulate matter, 7 tons of hydrocarbons and 19 tons of carbon monoxide."

- Ashley Featherstone, Permitting Program Manager, WNCRAQC

Emission Reductions (for the five 2013 fire engines)

| Hydrocarbons (tons/yr) | Fine Particulate Matter (tons/yr) | Carbon Monoxide (tons/yr) |
|---------------------------|--------------------------------------------|---------------------------------|
| 0.0041 | 0.0023 | 0.0168 |

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