

FUEL FORMULATION EFFECTS ON DIESEL FUEL INJECTION, COMBUSTION, EMISSIONS, AND EMISSION CONTROL

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ABSTRACT

This paper describes work under an Ultra Clean Fuels project entitled "Ultra Clean Fuels from Natural Gas," Cooperative Agreement No. DE-FC26-01NT41098. In this study we have examined the incremental benefits of moving from low-sulfur diesel fuel and ultra-low sulfur diesel fuel to an ultra-clean fuel, Fischer-Tropsch diesel fuel produced from natural gas. Blending with biodiesel, B100, was also considered. The impact of fuel formulation on fuel injection timing, bulk modulus of compressibility, in-cylinder combustion

processes, gaseous and particulate emissions, diesel particulate filter regeneration temperature, and urea selective catalytic reduction NO_x control has been examined. The primary test engine is a 5.9L Cummins ISB, which has been instrumented for in-cylinder combustion analysis and in-cylinder visualization with an engine video-scope. A single-cylinder engine has also been used to examine in detail the impacts of fuel formulation on injection timing in a pump-line-nozzle engine in order to assist in the interpretation of results from the ISB engine.