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Summary of the Test of FPC-1[®] Active Ingredient by Automotive Testing Laboratory, Aurora, Colorado

This paper summarizes the results of tests with the active ingredient for FPC-1[®] conducted by Automotive Testing Laboratory (ATL), Aurora, Colorado. ATL was selected as the testing site for two reasons. First, at the time the test was conducted (1981), ATL was an EPA-Category I laboratory, the highest rating of approval offered by the US-EPA at that time. Second, it was a high altitude location where engine performance and emissions are hampered by low intake air pressures.

The ATL study involved testing of two spark-ignition (gasoline) engines in light duty passenger vehicles using the EPA standardized Federal Test Procedures (FTP) both hot and cold starts, and the Highway Fuel Economy Test (HFET). These are chassis dynamometer procedures that use the indirect or carbon mass balance (CMB) method to determine fuel consumption. The CMB is not only accurate, but at the same time, makes possible the measurement of harmful or regulated emissions. The EPA-FTP and HFET were also selected because these more accurately reproduce actual driving conditions unlike steady-state engine tests (constant load and rpm) typically used by laboratories to measure fuel consumption. Steady-state procedures tend to minimize the improvements possible from the use of FPC-1[®], and are not indicative of results that can be observed under real world conditions. A description of the FTP and HFET follows.

Discussion of Test Procedures

The Federal Test Procedures (FTP) is conducted in two phases: A 505 second cold transient segment covering 3.59 miles of city driving, a 869 second cold stabilized segment covering 3.86 miles (also city driving), and a 505 second hot transient, a repeat of the initial segment, with a hot start. The second phase of the FTP, known as the Hot '74 is a repeat of the FTP without the last hot transient segment.

The Highway Fuel Economy Test (HFET) is a 765 second, 10.24 mile run under highway driving conditions conducted in one segment.

Discussion of Results

A 1981 TC3 and a 1979 Oldsmobile were tested using 3 different EPA approved test procedures (the FTP cold and hot start, and the HFET). After conducting duplicate tests on base fuel, the two vehicles ran 800 miles on FPC[®] treated fuel (part of an engine preconditioning), and the engines re-tested. Then

a second 1,000 mile preconditioning run was conducted, followed by a third and final repeat of the test procedures. The results follow:

- (1) Fuel economy was improved 4.05% based upon a harmonic average of all cycles (both FTP and HFET).
- (2) Fuel economy improvement averaged nearly 5% for the stop-and-go test cycles (the FTP hot and cold start).
- (3) The fuel economy trend of both vehicles showed a positive trend the longer they ran on FPC[®] treated fuel. The maximum improvement may not have been attained in these evaluations.
- (4) Reduction in all regulated exhaust emission was observed. Unburned hydrocarbons were reduced 8.14%, carbon monoxide was reduced 14.81%, and oxides of nitrogen were reduced 2.47%.

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