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Quarterly Report

on

Performance of a Diesel Engine;
Operating on Raw Coal-Diesel Engine;
Solvent Refined Coal-Diesel Fuel Slurries

(Contract No. ET-78-S-01-3288)

to

U.S. Department of Energy
Technical Information Center,
Office of Procurement Operations, and
Office of University Affairs

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by

H. P. Marshall, Principal Investigator
Associate Professor of Mechanical Engineering
Virginia Polytechnic Institute and State University 950 0184
Blacksburg, Virginia 24061

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During the past quarter work has dealt mainly with the preparation of a 40 percent by weight raw coal-fuel oil No. 2 slurry and the operation of the engine using this fuel.

Slurry Preparation - Acquisition

In the report for the preceeding quarter the difficulty being experienced with slurry acquisition was indicated. The partially filled drum of 40 percent by weight raw coal slurry supplied by DOE was reconstituted. This was involved and time consuming since it had been in storage a long time and the coal had agglomerated. At about the same time efforts were being made to locate this slurry; a 40 percent by weight slurry containing micronized solvent refined coal (SRC) was requested. The Pittsburg Energy Technology Center, which had supplied the slurries earlier, reported that they were no longer able to supply any kind of micronized coal slurry. At this point a request was made by telephone call to Mr. John Fairbanks project technical advisor, that DOE ship VPI&SU a small quantity of a coal derived liquid fuel to be used as a substitute. This has yet to arrive. Later a quantity of solid SRC was located at the Fuels Laboratory in Germantown, Maryland, by Mr. Ralph Scott of the Pittsburg Energy Technology Center. Mr. Bob Hamilton at Germantown was to have shipped the SRC to Dr. Andrew Szegvavic at Union Process Company in Akron, Ohio. Dr. Szegvavic had agreed to produce the 40 percent by weight SRC-fuel oil slurry upon delivery of the SRC. This slurry has not been delivered. Every effort was made to obtain and test these 40 percent by weight slurries (40 percent by raw and 40 percent by weight solvent refined coal) because of the great interest in discovering performance differences using these two alternative fuels. The expectation was that wear of the

engine and SO_x production in the exhaust would both be reduced using SRC rather than raw coal.

Engine Operation on Forty Percent Coal Slurry

Attempts to burn the 40 percent by weight raw coal-fuel oil slurry were hampered from the outset. First the transfer pump would not deliver the slurry to the injection pump. This problem was overcome by raising the slurry storage tank to increase the positive head on the pump inlet. With the engine running on the slurry, blow-by of gases into the crank case increased considerably, the engine ran erratically, and when operating under its own power produced approximately 20 percent of what was expected. Thus, the test was ended after one hour of operation instead of ten hours as was the case with the 20 and 32 percent slurries.

The immediate loss of power is thought to be a result of poor penetration, dispersion, and atomization of the injected fuel. A request to revise the scope of the work so that an investigation of this power loss can replace the work required to operate on the 40 percent slurries has been submitted.

General

Inspection of this test engine indicates wear occurs at an excessive rate although thermodynamic changes are not drastic with 20 and 32 percent by weight coal in the slurries.

A final and complete report will be submitted in March 1980.

Respectfully submitted,

H. P. Marshall

H. P. Marshall
Principal Investigator