DENSIFIED REFUSE DERIVED FUEL CO-FIRING EXPERIENCE 
IN U.S. AIR FORCE SPREADER STOKER BOILERS

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There was a significant difference between the written paper and the presentation by Dr. Joensen. Apparently these tests were conducted for the U.S. Air Force by its contractors and Dr. Joensen was requested to sort out the results. Dr. Joensen's difficulty in sorting out the results indicates that there is no substitute for good planning and there is little to be gained by compromise when compromise results in running equipment at 30% boiler load. There are numerous questions one could ask about the test protocol, data acquisition and evaluation. However, it is not really fair to pose these to Dr. Joensen since he was not part of the testing team.

Discussion by

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The written paper raised many questions, some of which will be posed herein, but first Dr. Joensen must be commended for his detailed, verbal presentation (amplifying greatly on what appeared in the paper) and his apparent resiliency and ingenuity in trying to interpret data which was virtually uncorrelatable from a test program he was not involved in.

The paper made reference to the two previous extensive coal/dRDF test burns sponsored by EPA-MERL-Cinn, i.e., Maryland Correctional Institution (a modest size spreader stoker fired boiler) and at General Electric Company, Erie, Pennsylvania (a large size unit). These tests were conducted under quite rigorous conditions at considerable taxpayer expense with the program and data reviewed by a peer group of professionals. Why wasn't the information generated by this program applicable to the Wright Patterson circumstance? In what way were the circumstances so different as to warrant this new trial burn effort in Dayton? In what way was this final burn different than the one conducted a few years ago at another Wright-Patterson AFB boiler plant?

In the paper mention was made of two types of spreader stoker boilers. In what way were the furnaces different, and in what manner did the investigators expect their differences to impact on the burning or combustion characteristics of the coal/RDF combinations?

Conducting burning trials at 25-35% of design capacity is usually of no material consequence since spreader stoker operation at these fractional loads approaches instability and, therefore, performance predictions can rarely be made other than in regard to opacity. If this was the only load available at the time, the test should have been aborted, since the probability of subsequently replicating the data would be remote.

It is highly unlikely that the selected ratio of coal/dRDF was attained consistently during test burns of several hours using the visual volumetric method described.

The quality of the coal and the dRDF used for these test burns was startling. Coal having 5-6% ash, 5-7% moisture and +2700°F AFT can be considered to be “black diamonds.” Similarly, a refuse derived fuel with only
11-12% moisture, 8-9% ash, and 7000-8000 Btu/lb can be considered to be of “Jewel” quality. Certainly it could not have been expected that fuels of such superior quality would be available routinely, even to the U.S. Air Force . . . perhaps so, if the price is high enough! What were the prices for these fuels . . . f.o.b. source and freight to site? Is coal of this quality normally purchased for these boilers? The tests conducted at General Electric, Erie, PA were with run-of-mine coal and pellets of significantly lower quality . . . the data obtained was correlatable and very promising for the coal/d RDF concept.

It is inconceivable that the boiler efficiency with coal alone would be lower than with 100% RDF pellets or any combination of these fuels. The excess air data and exit gas temperature should have been an indication that something is wrong. It is not surprising that useful correlations were not obtainable at the low boiler loads which are marginal for spreader stoker firing.

It was startling to learn of the d RDF or coal/d RDF feeding capacity limitation of the spreaders. . . . which prompted boiler derating to 64.5% of design steam rating. I do not recall the need for derating at GE-Erie.

Did the U.S.A.F. attain all of their test objectives? What were the subsequent program steps undertaken by Wright-Patterson A.F.B. as a result of these burning trials?