Operation of a Pressurized Gasifier, Hot Gas Cleanup System and Turbine Simulator

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Abstract

GE Environmental Systems, supported by the GE Corporate Research and Development (GE-CRD) center is developing a high temperature (1000 *F) moving bed desulphurization system for use in advanced IGCC systems. The hot gas cleanup system is based on the use of palletized mixed metal oxide sulfur sorbents to remove H_2S and COS from coal gas, followed by controlled regeneration of the sorbent to produce an SO_2 rich tail gas for final conversion to sulfuric acid or elemental sulfur. Testing of a pilot scale system at the CE-CRD has been underway since 1990, Previous system testing has resulted in numerous process improvements and hardware modifications to improve the performance of the system. Initial testing utilized Zinc Ferrite as the sorbent material, with subsequent testing of Zinc Titanate and other proprietary sorbents, as previously reported. The hot gas cleanup system also contains a circulating fluidized bed chloride removal system to remove Chlorine from the coal gas using sodium bicarbonate as a sorbent.

Efforts during 1995/96 have focused on identifying and testing sorbents for use in the DOE sponsored Clean-Coal IGCC/hot gas cleanup demonstration project under construction by Tampa Electric in Polk County Florida. Two long duration, 200 hour tests were completed since the last Contractor's Report. Test 8 based on a modified Zinc Titanate sorbent was conducted in September 1995. Test 9 based on METC-10 sorbent was performed in March 1996. In addition, during Test 8 the turbine simulator was operated using an improved low-BTU combustor. Test 9 included the first operation of an advanced Rich-Quench-Lean (RQL) combustor designed to minimize the conversion of ammonia (present in the coal gas) to NO_x during the combustion process, The RQL testing was very successful resulting in ammonia to NO_x conversion of So/O.

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