**Proof of Principal Test to Feed and Meter
Granular Coal into 450 psig Gas Pressure.**

5th Quarterly Technical Progress Report

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Prepared by : Derek L. Aldred,

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**STAMET INC.,
17244 South Main Street,
Gardena, CA 90248-3130**

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Abstract

The objective of this project is to demonstrate proof of principal to feed and meter granular coal into 450 psig gas pressure for use with pressurized fluidized bed combustors. This report summarizes work undertaken in the first quarter of 2000 in support of that objective.

At the end of the last quarter the pump had been re-designed to incorporate a larger torque hub and provide a substantial increase in drive train strength to prevent recurrence of failures experienced during earlier testing. Additional modifications were incorporated to improve the performance of the disk seals by improved location and adjustability, and the outlet was modified to incorporate a method to allow rapid adjustment of the outlet sealing column length without pump disassembly and rework being required. This quarter has been largely spent in manufacture of the new parts required, and in initial assembly, alignment and pinning of the revised configuration.

The assembly is now complete and the pump is ready for installation into the test rig for the final series of tests.

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Introduction

This is the fifth quarterly report by STAMET INC. describing the progress of their work toward the successful proof of principal test to feed & meter granular coal into 450 psig gas pressure.

The work reported in this document covers the manufacture and initial build of the strengthened and modified solids pump, following the drive train failures experienced in earlier testing. Additional modifications to the disk seals were incorporated and an adjustable auger installed on the outlet to allow rapid changes to the outlet seal length to be made without pump disassembly and modification.

Executive Summary

As previously reported, a failure occurred in the drive train of the pump. Although the failure is believed to have been initiated during earlier use of the components, the testing had indicated higher than anticipated torque values would be encountered in the high pressure tests. This resulted in the decision to strengthen the drive train of the pump to avoid recurrence of such drive train failures.

Additional modifications were incorporated to the disk seals to provide improved location and adjustment. An adjustable auger arrangement was incorporated into the pump outlet to allow rapid adjustment of the outlet sealing column length without pump disassembly or modification.

The re-design was completed in December 1999, and new components were delivered in late February 2000. Fitting and assembly has been completed and the final series of tests will commence in April.

Experimental

No further experimental work has been possible during this quarter since the time has been expended in modifications to the test pump.

Results & Discussion

No further test data has been obtained during this quarter.

The pump has been modified to increase drive train strength, improve disk sealing and provide flexibility of adjustment of the outlet sealing column length.

The disk sealing was modified to provide an adjustable support ring behind the seal to allow seal pre-load to be adjusted. Locating pins were included to attach the seal ring to the support ring at several locations to evenly distribute torque loads around the circumference and so prevent excessive compressive loads on the material leading to distortion and bunching of the seal.

An adjustable auger was fitted to the outlet pipework of the machine to break up the outlet sealing column at any desired point within the outlet pipe. This arrangement will allow the testing of different length sealing columns to be achieved without disassembly of the test rig. This will allow the final series of tests to proceed much more rapidly than would otherwise have been possible.

Conclusion

- 1) No further testing has been possible during this quarter.
- 2) The pump has been extensively modified to improve drive train strength, disk sealing and provide adjustability of the outlet sealing column length.
- 3) The final testing series in this program will commence in April 2000.