TECHNICAL PROGRESS REPORT
for the Thirteenth Quarter
(October 1, 1998 to December 31, 1998)

POC-SCALE TESTING OF A DRY TRIBOELECTROSTATIC SEPARATOR FOR FINE COAL CLEANING

By

R.-H. Yoon, G.H. Luttrell, G.T. Adel and A.D. Walters

Center for Coal and Minerals Processing
Virginia Polytechnic Institute & State University
Blacksburg, Virginia 24061-0258

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Contracting Officer's Representative
Carl Maronde
U.S. Department of Energy
Federal Energy Technology Center
P.O. Box 10940
Pittsburgh, Pennsylvania 15236

DISCLAIMER

PROJECT OBJECTIVES

It is the objective of the current project to further refine the TES process developed at FETC through bench-scale and proof-of-concept (POC) test programs. The bench-scale test program is aimed at studying the charging mechanisms associated with coal and mineral matter and improving the triboelectrification process, while the POC test program is aimed at obtaining scale-up information. The POC tests will be conducted at a throughput of 200-250 kg/hr. It is also the objective of the project to conduct a cost analysis based on the scale-up information obtained in the present work.

Specific objectives of the work conducted during the current reporting period can be summarized as follows:

- to complete the engineering design of the TES tribocharging system and electrostatic separator, and
- to continue work related to the procurement and fabrication of the key components required to construct and install the proposed POC test circuit.

The following section provides a brief description of the activities currently underway to achieve these objectives.

WORK DESCRIPTION

Introduction

The project has reached the point where the Proof-of-Concept (POC) electrostatic separator is in the design stage. During the quarter, the design concepts have been finalized at Virginia Tech and have been discussed with Carpco. Most of the personnel assigned to

this project have been performing work elements associated with process/engineering design (Task 3) of the TES process.

Sample Acquisition

No activity was required in this area during the quarter.

Process Design

The basic design flowsheets (metric and English units) are attached. In the currently proposed design, pulverized coal will be fed to a rotary turbocharger mounted atop the electrostatic separation chamber by means of a screw feeder. The recirculated middlings product will join the new feed at this point. Details related to the design and operation of the turbocharger has been provided in a previous technical progress report. The charged particles that exit through the bottom of the turbocharger will pass into the top of the separation chamber and through the electrostatic field. Depending on the particular mode of operation selected, the particles will either "free-fall" through the electrostatic field or will be "entrained" in a carefully controlled laminar flow of gas. In either case, the separator will be equipped with baffles near the entrance of the separation chamber to minimize the turbulence created by the feed stream. Carpco will design the separator to provide laminar flow conditions through the separation chamber.

The charged particles will pass through the electrostatic separation chamber where positively charged particles of carbonaceous matter will be attracted to the negative electrode and the negatively charged particles of mineral matter will be attracted to the positive electrode. The electrodes will be interchangeable so that different electrode configurations may be tested (i.e., screen and plate). The electrode support frame will be

designed so that the angle of electrode inclination may also be changed. The separator will be designed to allow easy access to the electrodes in order to facilitate removal and replacement of the various electrode configurations. Virginia Tech will design the Turbo-charges. The unit will be configured so that the electrode voltage can be varied over a range of 0-120,000 volts. After being deflected by the electrodes, the products (clean coal, middlings and reject) will be discharged from the bottom of the separator through discharge ports into collection bins.

Procurement and Fabrication

Specifications have been drawn up for ancillary equipment such as screw conveyors, dust collectors, etc. and will be issued shortly to equipment suppliers. Several renovation activities have been completed at Virginia Tech to accommodate the new test circuit.

Sample Analysis/Characterization

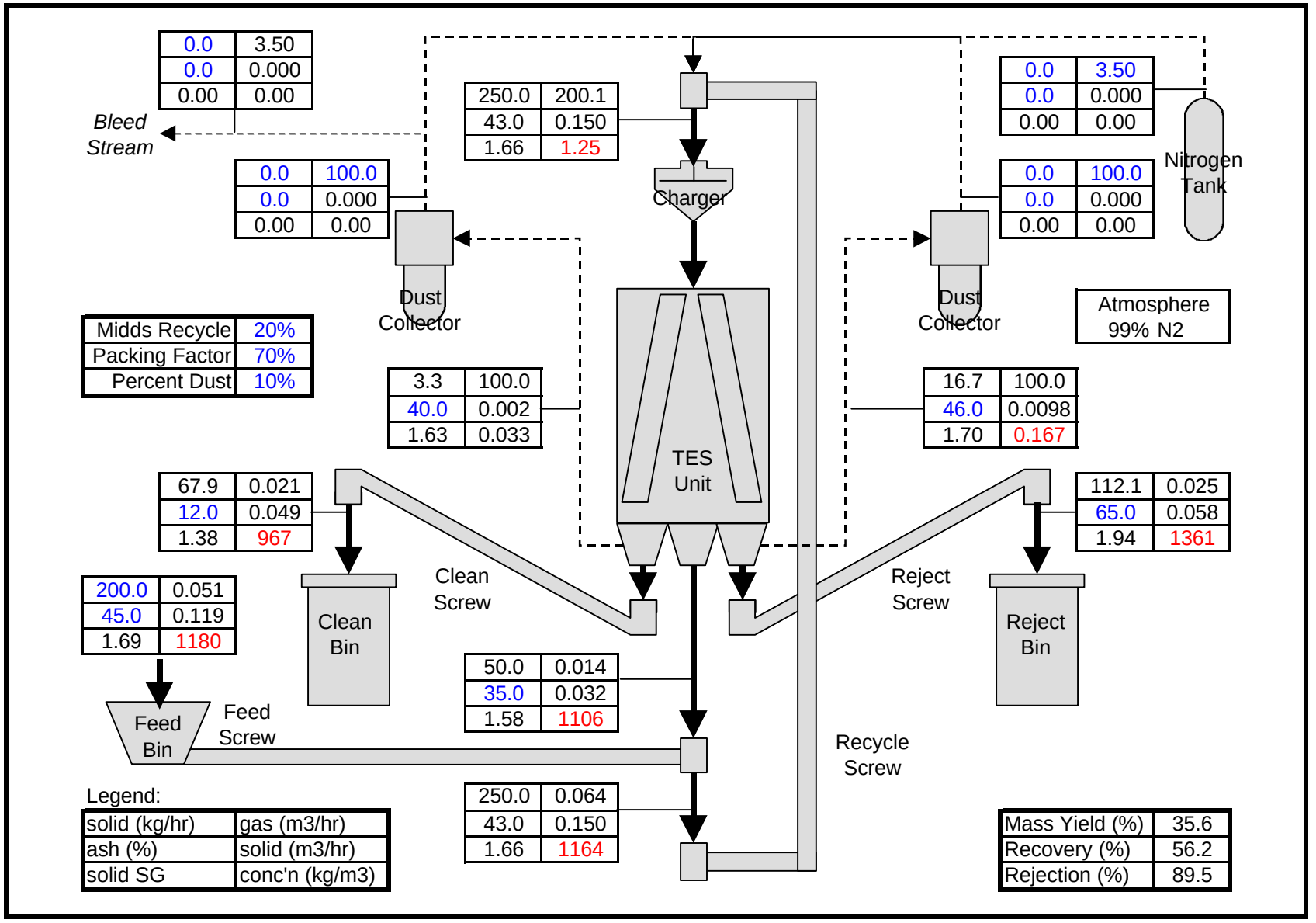
Analysis and characterization of samples continued throughout the quarter as outlined in the project work plan.

SUMMARY AND CONCLUSION

During the past quarter, most of the project work centered on activities related to the design of the POC circuit. These activities included the preparation of process flowsheets, preliminary material balances, fabrication drawings and engineering specifications for the proposed POC circuitry. Activities required to procure and/or fabricate the POC circuit are also currently underway.

Triboelectrostatic Separator Process Flowsheet

Utility Pulverizer Reject Sample



Triboelectrostatic Separator Process Flowsheet

Utility Pulverizer Reject Sample