

# DENSE MEDIA CYCLONE OPTIMIZATION

Report Type: Quarterly Technical Progress Report

Reporting Period: July 1, 2003 - September 30, 2003

Principal Author: Gerald H. Luttrell

Submission Date: September 9, 2003

DOE Number: DE-FC26-01NT41061

NETL Manager: David M. Hyman

Submitting Organization:

Department of Mining & Minerals Engineering

100 Holden Hall

Virginia Polytechnic Institute & State University

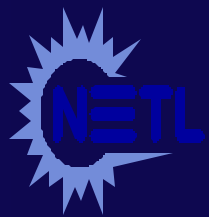
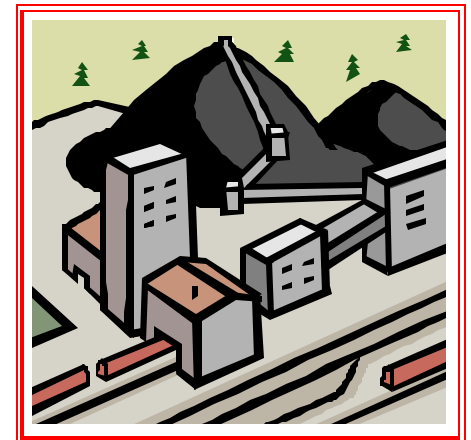
Blacksburg, VA 24061

Other Participants:

Massey Coal Services

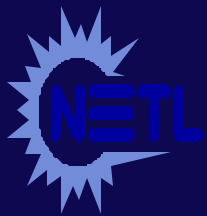
Partition Enterprises

Precision Testing Laboratories



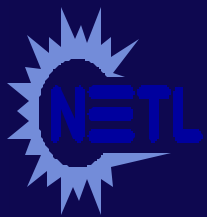
## DISCLAIMER

**This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.**



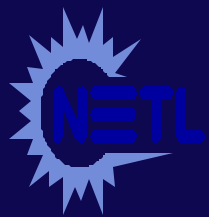
## ABSTRACT

**All technical project activities have been successfully completed. This effort included (i) completion of field testing using density tracers, (ii) development of a spreadsheet based HMC simulation program, and (iii) preparation of a menu-driven expert system for HMC trouble-shooting. The final project report is now being prepared for submission to DOE comment and review. The submission has been delayed due to difficulties in compiling the large base of technical information generated by the project. Technical personnel are now working to complete this report. Effort is being underway to finalize the financial documents necessary to demonstrate that the cost-sharing requirements for the project have been met.**



# Project Objective

- ❑ To develop engineering tools to improve HMC performance.
- ❑ These include:
  - Low cost density tracers to rapidly assess HMC efficiency (used by plant engineers)
  - Process models to predict influence of operating and design variables (used by plant designers)
  - Model-based expert system to provide a user-friendly interface for trouble-shooting HMC problems (used by equipment operators)



# Project Cost Summary

Accrued Costs: \$153,583 (out of \$153,858 available)

Invoiced Costs: \$153,583

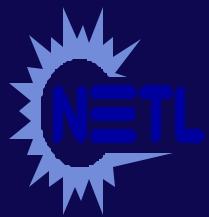
Source	First Year		Second Year		Third Year		Totals	
	Plan*	Actual	Plan*	Actual	Plan*	Actual	Plan	Actual
Participant	\$79K	\$79K	\$87K	\$87K	0	---	\$166K	\$166K
DOE	\$96K	\$96K	\$58K	\$58K	0	---	\$154K	\$154K
Total	\$175K	\$175K	\$145K	\$145K	0	---	\$320K	\$320K

*\*Budget after approved no-cost time extension*

## KEY:

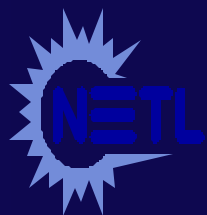
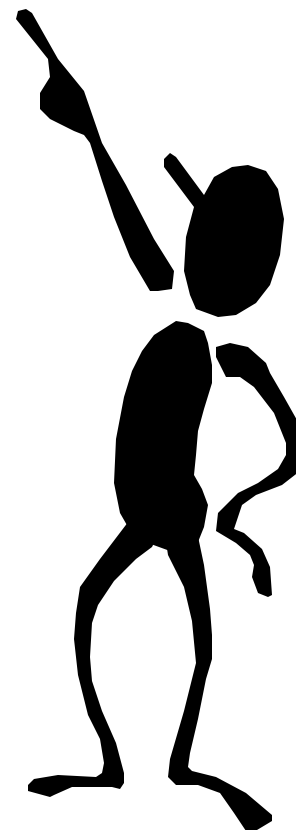
Plan = Planned costs for the full year.

Actual = Actual costs through the reporting period.



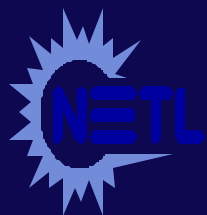
# Milestones and Status

- Task 1: Baseline Assessment **completed** using density tracers and sampling campaigns.
- Task 2: Circuit Modifications **completed**, including plant upgrades and new O&M practices.
- Task 3: Follow-Up Assessments **completed** on a monthly basis to track process improvements.
- Task 4: Sample Analyses **completed** for all samples from monthly and detailed test programs.
- Task 5: Data Analysis/Simulation **completed** for all plant sites using spreadsheet simulator.
- Task 6: HMC Expert System **completed** for plant training and trouble-shooting.
- Task 7: Concept Assessment is **being finalized** (final report and cost-sharing documents).



# Key Accomplishments

- ❑ Project demonstrated that Density Tracers can rapidly assess HMC performance.
- ❑ Project made it possible to develop a spreadsheet-based HMC Simulator.
- ❑ Project data used to construct a CD-ROM Expert System for HMC trouble-shooting.





# Project Recognition

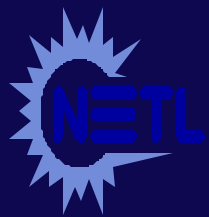


## □ Conference Paper

- “Simulation of Heavy Medium Cyclone Performance,” 2004 Annual Meeting and Exhibit of the Society for Mining, Metallurgy, and Exploration, Inc. (SME), February 23-25, Denver, Colorado. (Abstract Accepted, Manuscript In Preparation).
- Paper to be presented in the “Coal Preparation” technical session at SME.

## □ Coal Age Magazine

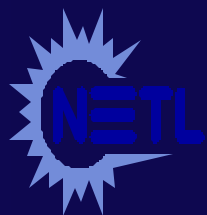
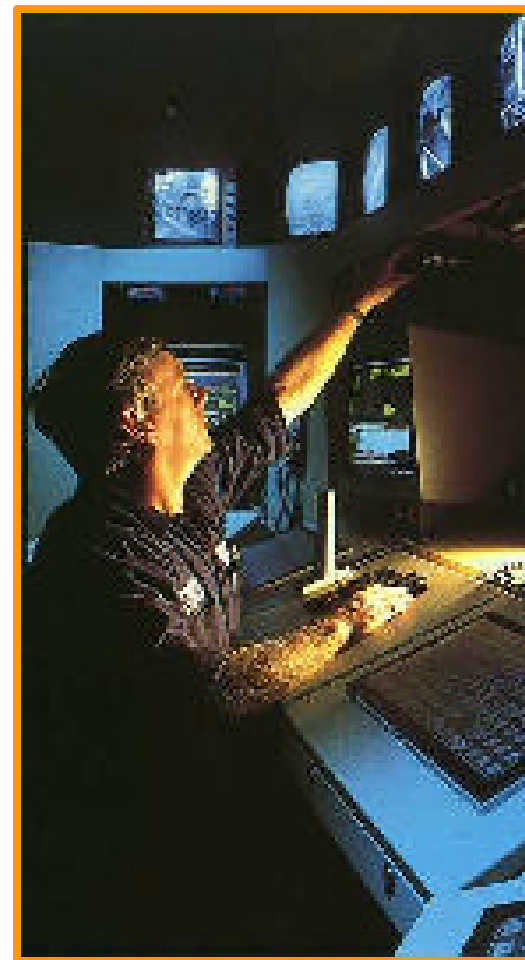
- “Operating Guidelines for Heavy-Media Cyclone Circuits,” Coal Age, April 2003, pp. 30-34.
- Guidelines developed from project featured in the April 2003 issue of “Coal Age” magazine (the leading trade journal for the coal preparation).
- Article recognizes financial support provided by the U.S. Department of Energy (DE-FC26-01NT41061).





# Commercialization Outlook

- ❑ Tracer services now offered by Precision Testing Laboratories (PTL) of Beckley, WV.
- ❑ Tracers recently used by PTL at industrial sites:
  - Turris Coal
  - Sapphire Coal
  - Arch Coal
- ❑ Project data used to obtain spin-off project involving electronic tracers that can be remotely detected.



# Project Status

- ❑ Technical activities successfully completed.
- ❑ Expenditures well within budget allocations.
- ❑ Project closeout underway.
  - Editing/Submission of Final Project Report
  - Securing Required Cost-Sharing Documentation

