DENSE MEDIA CYCLONE OPTIMIZATION

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Partition Enterprises

Precision Testing Laboratories

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ABSTRACT

All project activities are now winding down. Follow-up tracer tests were conducted at several of the industrial test sites and analysis of the experimental data is currently underway. All required field work was completed during this quarter. In addition, the heavy medium cyclone simulation and expert system programs are nearly completed and user manuals are being prepared. Administrative activities (e.g., project documents, cost-sharing accounts, etc.) are being reviewed and prepared for final submission to DOE. All project reporting requirements are up to date. All financial expenditures are within approved limits

DENSE MEDIUM CYCLONE OPTIMIZATION

Principal Investigator:	Gerald Luttrell
NETL Project Manager:	David M. Hyman

Prime Contractor:	Virginia Tech
Partners:	Massey Coal Services Partition Enterprises Precision Testing Laboratory

Total Project Cost:	\$320K
DOE Share:	\$154K
Participant Share:	\$166K

Project Period:	18 months
Project Start Date:	14 Dec. 2000

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: \$121,423 as of 6/24/02

Invoiced Costs: \$104,745 (\$100,810 Paid, \$3,936 Outstanding)

Source	First Year		Second Year		Third Year		Totals	
	Plan*	Actual	Plan*	Actual	Plan*	Actual	Plan	Actual
Participant	\$79K	\$79**	\$87K	---	0	---	\$166K	\$79**
DOE	\$96K	\$96	\$58K	\$1K	0	---	\$154K	\$97K
Total	\$320K	\$180	0	---	0	---	\$320K	\$176K

**Budget after no-cost time extension*

***Does not include costs encumbered for sample analysis*

KEY:

Plan = Planned costs for the full year.

Actual = Actual costs through the reporting period.

Milestones and Status

Major Milestone	Description of Planned Activity
1 - Baseline Assessment	Initial inspection and testing to establish existing performance of DMC circuits at four selected plant sites
2 - Circuit Modification	Modification of plant circuits and/or operating practices based on information from the Baseline Assessment
3 - Follow-Up Assessment	Secondary inspection and testing to establish technical and economic benefits of recommended modifications
4 - Sample Analysis	Detailed float-sink testing of representative samples from the DMC circuits at the four selected plant sites
5 - Data Analysis/Simulation	Detailed analysis of density tracer and float-sink test data (including mass balancing and simulation studies)
6 - Expert System Development	Development of mathematical routines and expert rules that can be used by operators for DMC optimization
7 - Concept Assessment	Technical and economic evaluations of the project work (including preparation of technical reports)

Milestones and Status

Planned Milestone	Scheduled*	Completed	Current Status
1 - Baseline Assessment	July '01	July '01	Completed All Baseline Tests (5 Plant Sites and 7 Circuits)
2 - Circuit Modification	Sept. '01	Oct. '01	Task Site Reports Completed Circuit Modifications Completed
3 - Follow-Up Assessment	May '02	May '02	Follow-Up (Monthly) Sampling Campaigns Completed
4 - Sample Analysis	May '02	May '02	Sample Analyses Completed (Except Microtrac)
5 - Data Analysis/Simulation	May '02	June '02	Excel Simulator Completed (Validation Underway)
6 - Expert System Development	May. '02	---	Software Version of ES Underway (Hardcopy Checklist Completed)
7 - Concept Assessment	June. '02	---	Assessment Underway & Site Reports Prepared/Distributed

**Dates modified to reflect no-cost time extension.*

Key Accomplishments

- ❑ Assessment reports prepared and discussed with superintendents at each site.
- ❑ Microsoft Excel simulation program completed and being refined.
- ❑ Preparation of troubleshooting guide/software currently underway and nearing completion.
- ❑ Tracer studies conducted at an additional industrial site (Marfork) to further evaluate tracer capabilities.
 - HMC Finding - Performance Very Good
 - Bath Finding - Coal Loss Identified / Plant Modifications Underway to Correct Problems

Good News!

- ❑ Simulation program prepared for use by project participants.
- ❑ Website completed to distribute project findings and software.
 - Site to be activated upon project completion.
 - VT will provide free network support for the website.
- ❑ Spin-off project funded by CAST to develop the tracer technology.
 - New tracers utilize electronic transponder identification technology.
 - Allows a single person to conduct an efficiency test in just minutes.

Project Recognition

- ❑ 2002 - International Conferences
 - “Operating Guidelines for Heavy Media Cyclone Circuits,” Proceedings, 19th International Coal Preparation Conference & Exhibition (Coal Prep 2002), April 30-May 2, 2002, Lexington, KY, pp. 115-124.
 - “An Assessment of Industrial Heavy Media Cyclone Circuits,” 19th Annual International Pittsburgh Coal Conference, September 23-27, 2002, Pittsburgh, PA. (Manuscript Submitted).
- ❑ 2002 - Short Courses and Workshops
 - Operating and Maintenance Standards for Heavy Media Cyclones,” Half-Day Workshop, Sponsored by Massey Coal Services, Chapmanville, WV, July 10, 2002, 14 attendees.

Commercialization Outlook

❑ Marketing Agreement

- Tracer services now available to the U.S. coal industry via an agreement with Precision Testing Laboratories.
- Technical support to be provided by VT and Partition Enterprises.
- These parties are also providing cost-sharing funds and personnel to develop the new transponder-based tracers.