

NTRD Program Disclaimers

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Texas Commission on Environmental Quality
New Technology Research & Development (NTRD) Program
Monthly Project Status Report

Title: FEEDLOT BIOMASS: A REBURN FUEL FOR "MAXIMUM NO_x" REDUCTION IN COAL-FIRED POWER PLANTS

Contract Number: TCEQ Grant # 582-5-65591 0015

Grantee: Texas Engineering Experiment Station, Texas A&M University

Date Submitted: Sep 15, 2006

Report for the Monthly period:

Starting Date: Aug 1, 2006 **Ending Date:** Aug 31, 2006

Section I. Accomplishments (Please provide a bulleted list of project accomplishments as well as a description of their importance to the project.)

The overall objectives of the project are i) to develop a retrofit technology of using processed low-ash feedlot biomass (FB) as reburn fuel for potential reduction of the NO_x in coal-fired power plants by 80-90% and ii) determine the possible capture of Hg for low rank coals, reduction of CO₂ and other benefits of using animal wastes (alternately known as feedlot biomass, FB) as fuels.

In this report, the task lists are summarized and the progress/accomplishments for each task are reported for the last month. Tasks are indicated in bold letters

Task 1: Fuel Characteristics of lignite, sub-bituminous coal, raw manure (RM), and partially composted manure (PC)

2.1. Task Statement: The PERFORMING PARTY will analyze the fuel characteristics of raw manure (RM), and partially composted manure (PC).
Progress to date

Task 1 is 100% complete and a report has been submitted to TCEQ on Aug 1, 2006

Task 2: Small Scale Reburn Experiments for NO_x reduction

2.2. Task Statement: The PERFORMING PARTY will perform small scale reburn studies with fuels listed in Task 1 as reburn fuels except DB, RM and their blends. The conventional TAMU co-fired boiler burner facility will be used for the studies

Task 2 is 100% complete and a report has been submitted to TCEQ on Aug 1, 2006

Task 3: Pilot scale test at the 500,000 BTU/hr DOE-NETL facilities to verify the small-scale test data on NO_x reduction and Hg capture and obtain optimum conditions.

2.3. Task Statement: The pilot plant at the Combustion and Environmental Research Facility (CERF) will be used for testing LA-RM and LA-PC fuels and measuring the NO_x emissions. The PERFORMING PARTY will also obtain the optimum operating conditions and appropriate injector configuration.

Progress to date

As informed earlier the Vendor for pilot scale has been changed from DOE to other facilities. John and Kalyan visited with Vendor # 2 (Southern Research Institute) in July 19 and 20, 2006 and discussed the pilot scale tests. At Vendor # 2, we had a real good technical visit with Dr. Gale Thomas, a Director of Environmental Research, Southern Research Institute (SRI), Birmingham, AL. There is no doubt they can conduct the pilot plant tests while TEES specifies test conditions for combustion or reburn protocols. The description of pilot facility is given below: The SRI Energy group has experience with several types of fuels: coal, switch grass etc. The facility is available for fall testing in fall 2006. Facility Description proposed Reburn Combustion conditions, required test results and the issues likely to be faced in reburn were provided in previous report; SRI had recently signed the NDA (Non Disclosure Agreement).

Task 4: Reburn modeling to predict NOx capture by biomass fuels.

2.4. Task Statement: The PERFORMING PARTY will create a model for characterizing reburn performance with coal, FB and coal: FB blends in predicting NOx and as well as Hg control performance. This task will be conducted primarily using zero Dimensional reburn code with characteristic mixing time scale concept. The simplified model will provide directions for improvement of NOx capture and assist in developing the test matrix.

Task 4 is 100% complete and a report has been submitted to TCEQ on Aug 1, 2006

Task 5: Perform the economics of the use of FB as reburn fuel in coal fired power plants and cost of NOx reduction compared to other technologies.

2.5. Task Statement: The PERFORMING PARTY will conduct an economic analysis for all four biomass fuels listed in Task 1.

Task 5 is 100% complete and a report has been submitted to TCEQ on Aug 1, 2006

Task 6: Reporting

2.6. Task statement: The PERFORMING PARTY will prepare and submit monthly detailed progress reports on the status of this project and a comprehensive final report while ensuring compliance with all TCEQ program requirements.

2.6.1. The PERFORMING PARTY will coordinate all project resources to ensure compliance with NTRD program requirements while providing deliverables on-schedule and on-budget.

2.6.2. The PERFORMING PARTY will generate monthly progress reports and a final report summarizing all aspects of the project based on data from the task completion reports, including the final emissions testing report.

2.6.3. Schedule: The PERFORMING PARTY shall submit monthly reports to TCEQ by no later than 10 days after the end of each month. The PERFORMING PARTY shall submit the final report to complete this task within 21 months from NTP (or 12/31/06) of the signed Notice to Proceed Date as issued by TCEQ.

2.6.4. Deliverables: The PERFORMING PARTY shall submit monthly progress reports with associated billing statements and a final project summary report.

Progress: Report is on schedule.

Indicate which part of the Grant Activities as defined in the grant agreement, the above accomplishments are related to:

Current status and progress on all tasks are reported

Others:

A disclosure of invention called TAMUS 2300: Hg Reduction In Coal Fired Plants Using Trace Amounts Of Animal Waste Derived Biomass Fuels (AEDBF) has been filed with Texas A&M system on Aug 3, 2005.

Section II: Problems/Solutions

<p>Problem(s) Identified</p> <p>(Please report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project)</p>	<p>Task 1: None</p> <p>Task 2: None</p> <p>Task 3: One of the vendors (Vendor 2) has signed the NDA in Aug 2006; however the NDA may cause problems with vendor 1; further the cost of pilot scale tests with vendor 2 is double that of vendor 1 due to larger size of facility.</p> <p>Task 4: None</p> <p>Task 5: None</p>
<p>Proposed Solution(s)</p> <p>(Please report any possible solution(s) to the problem(s) that were considered/encountered)</p>	<p>Task 2</p> <p>Task 3: Further negotiations are planned. There is task on pilot scale testing with DOE-Golden; the pilot scale tasks from TCEQ and DOE-Golden project may be combined to provide the necessary funds for testing.</p> <p>Task 4:</p> <p>Task 5:</p>

<p>Action(s) Conducted and Results</p> <p>(Please describe the action(s) taken to resolve the problem(s) and its effect)</p>	<p>Tasks 2</p> <p>Task 3: Further negotiations are planned; a request for proposal will be prepared and submitted to both vendors for their response.</p> <p>Task 4:</p> <p>Task 5:</p>
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Section III. **Goals and Issues for Succeeding Period:** (Please provide a brief description of the goal(s) you hope to realize in the coming period and identify any notable challenges that can be foreseen)

Next Month's Goals

Task 3: Further negotiations with pilot facilities to set up a time when experiments can be conducted and present plan of experiments



 Authorized Project Representative's Signature

Date: 9/15/06

NOTE: Please attach any additional information that you feel should be a part of your report or that may be required to meet the deliverable requirements for tasks completed during this reporting period.

LIST OF ACRONYMS

AB: Agricultural Biomass	mmBTU: million BTU
AC: Activated Carbon	MMF: Mineral Matter Free
ACI: activated carbon injection	NETL: National Energy Technology Lab.
APCD: Air Pollution Control Devices	N ₂ : Nitrogen
APH: Air Pre-heater	NO _x : Oxides of Nitrogen
AW: Agricultural Wastes	O ₂ : Oxygen
ARS: Agricultural Research Station	PAC: powdered activated carbon
ATP: Texas Advanced Technology Program	PCD: particulate control devices
AWDF: Animal Waste Derived Biomass Fuels	PM: particulate matter
CAFO: Concentrated Animal Feeding Operations	RM; Raw Manure
CAIR: Clean air Interstate Rule	S: Sulfur
CAMR: Clean Air Mercury Rule	SCR: Selective catalytic reduction
CB: Cattle biomass	SR: Stoichiometric ratio, AF/ AF _{stoich}
CO ₂ : Carbon Dioxide	TAMU: Texas A&M University
DAF: Dry Ash Free	TAES: Texas Agricultural Extension Service
DB: Dairy Biomass	TGA: Thermo-Gravimetric Analysis
DOE: Department of Energy	TMPA: Texas Municipal Power Agency
DSC: Differential Scanning Calorimeter	TXU: Texas Utilities
EER: Energy and Environmental research Corp.	USDA: US Dept of Agriculture
EGR: Exhaust Gas Recirculation	VM: Volatile matter
EPA: Environmental Protection Agency	
ESP: electrostatic Precipitator	
FB: Feedlot biomass (Cattle manure or Cattle Biomass CB)	
FC: Fixed Carbon	
FGD: flue gas Desulfurizer	
FR: Feed Ration	
GRA: Graduate Research Assistant	
HA-FB-Raw: High Ash Feedlot Biomass Raw form	
HA-FB-PC: High Ash Feedlot Biomass Partially Composted	
HAHP: high ash/High Phosphorus feedlot biomass	
HP: High Phosphorus	
HHV: Higher Heating Value	
HV: Heating value	
LA-FB-Raw: Low Ash Feedlot Biomass	
LA-FB-PC: Low Ash Feedlot Biomass Partially Composted	
LALP: Low ash/Low Phosphorus feedlot biomass	
LAHP: Low ash/High Phosphorus feedlot biomass	
LOI: Loss on ignition or % carbon in bottom and fly ash	
LP: Low Phosphorus	
MAF: Moisture Ash Free, Dry Ash Free	