

## **NTRD Program Disclaimers**

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

Contract Number: \_\_\_\_\_582-5-70807-0007\_\_\_\_\_

Grantee: \_\_\_\_\_Lamar University\_\_\_\_\_

Date Submitted: \_\_\_\_\_February 15, 2006\_\_\_\_\_

Report for the **Monthly** period:

Starting Date \_\_\_January 15, 2006\_\_\_      Ending Date \_\_\_February 14, 2006\_\_\_

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

- **DPF Off-Line Microwave Regeneration Characterized** – The regeneration of the soot-plugged DPF (Diesel Particulate Filter) has been successfully demonstrated and characterized. In the test, the engine exhaust was passed through the DPF filter to build up soot by measuring pressure drop across the filter. The pressure drop was generally found to increase from 7 to 30” H<sub>2</sub>O for an hour-long test at an engine exhaust flow rate of 12 m<sup>3</sup>/hour, which is about 25% of the total exhaust rate. The partially-plugged DPF was then regenerated by the microwave energy off-line by switching to a fresh air stream. The tests indicate that the soot starts to burn off at about 400°C. The pressure drop across the DPF is effectively reduced back to 7” H<sub>2</sub>O within about 15 minutes. The time required is a function of microwave energy and air flow rate.
- **Microwave Oven Modified** – To enhance the energy efficiency, a 900-watt microwave oven has been modified to concentrate microwave to the SiC DPF by adding a wave guide. This modification helps increase the filter temperature significantly.
- **Diesel Exhaust Sampling Line Installed** – A 50-foot diesel exhaust sampling line (3/8” OD, stainless steel tubing) has been installed from the diesel engine to the Testo 350 exhaust gas analyzer. The flow of exhaust gas in the line has been checked for leaks and several samples have been analyzed by the Testo 350 analyzer for NO<sub>x</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub> and O<sub>2</sub>. The installation is for the NO<sub>x</sub> tests scheduled for the next month.

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

The above accomplishments are related to Tasks 1, 2 and 3 described in the Scope of Work of the project.

## Section II: Problems/Solutions

<p><b>Problem(s) Identified</b></p> <p><i>(Please report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project)</i></p>	<p>On February 6, 2006, while the system was testing the efficiency of microwave soot destruction and filter regeneration, one problem was encountered that the diesel generator was running but no electric power was generated for variable loads testing.</p>
<p><b>Proposed Solution(s)</b></p> <p><i>(Please report any possible solution(s) to the problem(s) that were considered/encountered)</i></p>	<p>We immediately contacted the technical service department of the manufacturer of the diesel generator, GENPRO. After going through a thorough troubleshoot procedure guided by a GENPRO technician, a bad capacitor was identified.</p>
<p><b>Action(s) Conducted and Results</b></p> <p><i>(Please describe the action(s) taken to resolve the problem(s) and its effect)</i></p>	<p>A replacement capacitor was subsequently shipped to Lamar on February 9, 2006 and the problem was fixed on February 10, 2006. No significant effect is expected from this problem on the on-time completion of this project according to the proposed schedule.</p>

**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)*

The goals for the next month are to:

1. Insulate the pipe, flow meters and valves to maintain high engine exhaust temperatures for effective on-line DPF microwave regeneration;
2. Perform on-line microwave DPF regeneration employing the modified microwave oven;
3. Characterize the effects of exhaust flow and microwave power on the efficiency of DPF regeneration; and
4. Start to perform NO<sub>x</sub> reduction catalysts tests.

The next Monthly Progress Report will be submitted to TCEQ on March 15, 2006.



Date: 2/15/06

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*Authorized Project Representative's Signature*

**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.*