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

Contract Number: 582-5-65591-0001

Grantee: Catalytica Energy Systems

Date Submitted: 7/12/05

Report for the **Monthly** period: June, 2005

Starting Date 10/18/04 Ending Date 10/31/05

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

Task 5 Accomplishments:

(1) Task 2.5.4 activities

a. Completed initial emissions testing of both refuse vehicles

b. See report in the appendix

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

The accomplishments listed above are all part of Task 5 in the Grant Agreement.

Section II: Problems/Solutions

Problem(s) Identified *(Please report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project)*	*(1) Unable to achieve comparable AVL8 points for emissions testing on the chassis dynamometer due truck/dynamometer limitations.* *(2) Experienced system faults due to fuel delivery system issues*
Proposed Solution(s) *(Please report any possible solution(s) to the problem(s) that were considered/encountered)*	*(1) Eliminate the dynamometer testing and perform on-road emissions testing and develop an alternative steady-state measurement technique using ECOM system* *(2) Perform root cause analysis to determine the cause of the system faults and initiate corrective actions*
Action(s) Conducted and Results *(Please describe the action(s) taken to resolve the problem(s) and its effect)*	*(1) CESI has developed a strategy to measure both on road emissions and stationary steady-state points. A proposal is in process to get TCEQ approval for this change in methodology.* *(2) The root cause activity resulted in several immediate changes being made to the fuel systems in Denton. These changes have dramatically reduced the number of fuel system related faults. A full redesign of the fuel delivery system is underway and new fuel systems will be fabricated and installed on the Denton vehicles when available.*

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)*

(1) Task 2.5.4: Complete second month emissions tests for NOx, CO and HC

Troy W Kinney

_____ Date: *7/12/05*

Authorized Project Representative's Signature

Attachment 1

Task 2.5.4: Denton vehicle emissions testing

Task 2.5.4 Perform Simulated UDDS or AVL 8 mode test every twenty working days

Stationary and mobile emissions testing was performed in the month of June on both project vehicles. This report summarizes the mobile test results obtained with an on-vehicle emissions analyzer. The stationary results are still under review at the time of this report was submitted. A detailed report of the stationary results will be published for the July progress report.

A description of the test protocols for both test types is included in a supplemental report provided to the TCEQ. The revised test protocol represents a change in test strategy based on chassis dynamometer test limitations discovered during the early phases of the testing but is anticipated to be acceptable for characterizing the performance of the systems. If approved, this new protocol will be used for all subsequent emissions testing.

Emissions testing for both vehicles (truck 9858 and 9735) was completed on June 29 and consisted of stationary testing at a single, fixed operating condition as well as mobile vehicle testing covering a range of "on road" engine conditions representative of highway and city driving. The stationary condition corresponded to an engine speed setting between 1600 & 1900 rpm with sufficient load applied to elevate the exhaust gas temperature above that required for catalyst light-off. The mobile testing was accomplished by mounting a portable Testo model 350XL emissions analyzer to the frame of both project vehicles and measuring the exhaust emissions from discrete ports on the XononD unit. This status update contains the emissions test results overview and a mechanical summary for testing during the month of June.

Results

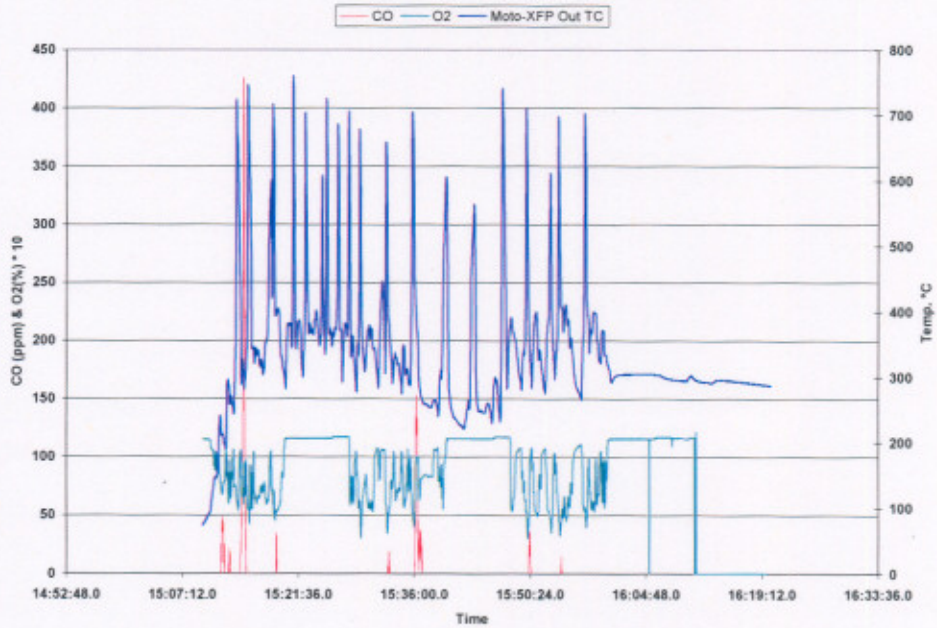
A summary of the key overall performance parameters for both project vehicles is shown below as table 1. Performance differences between the two units are evident and are likely due to differences in the degree of fuel sulfur contamination on the individual lean NOx trap catalysts. Unit AD001 on truck 9858 has accumulated approximately 125 more operational hours (primarily due to durability testing on the CESI dynamometer) than unit AD002. It is the accumulation of these additional operating hours that accounts for the higher sulfur loading on AD001and results in reduced overall NOx conversion. It is anticipated that the NOx conversion performance can be restored once the units have been desulfated. Desulfation is scheduled to take place during the month of July on both vehicles in Denton.

Parameter	9858 (unit AD001)	9735 (unit AD002)
XononD operating hours (hrs)	93	96
Truck hours (hrs)	143	131
Reliability (%)	65	77
Mileage rating w/ XononD (mpg)	2.72	2.11
Estimated fuel penalty (%)	10.5	---
Ave NOx conversion (%)	26.4	55.9

Table 1 XononD June performance summary

Overall backpressure was measured during mobile testing as well and is consistent with levels measured in the CESI dynamometer test cell. The peak backpressures during mobile testing were recorded during periods of highway acceleration and were in the range of 3-3.5 psig. Time averaged backpressures are considerably lower.

Secondary emissions of CO at the outlet of the after-treatment units were measured during mobile testing on both vehicles and are within acceptable levels (see figure 1 for truck 9858). The discrete, short duration pulses of CO seen in figure 1 correspond to times when the XFP reforming catalyst is being fueled. From the plot, one can see that the pulses quickly dissipate such that the time averaged exhaust CO levels are quite low. Further testing will be required to more fully assess the exhaust emissions trends and those results will be reported in the reporting periods to follow.



Appendix

The cumulative NOx emissions results for the Denton demonstration program are shown in the figures below.

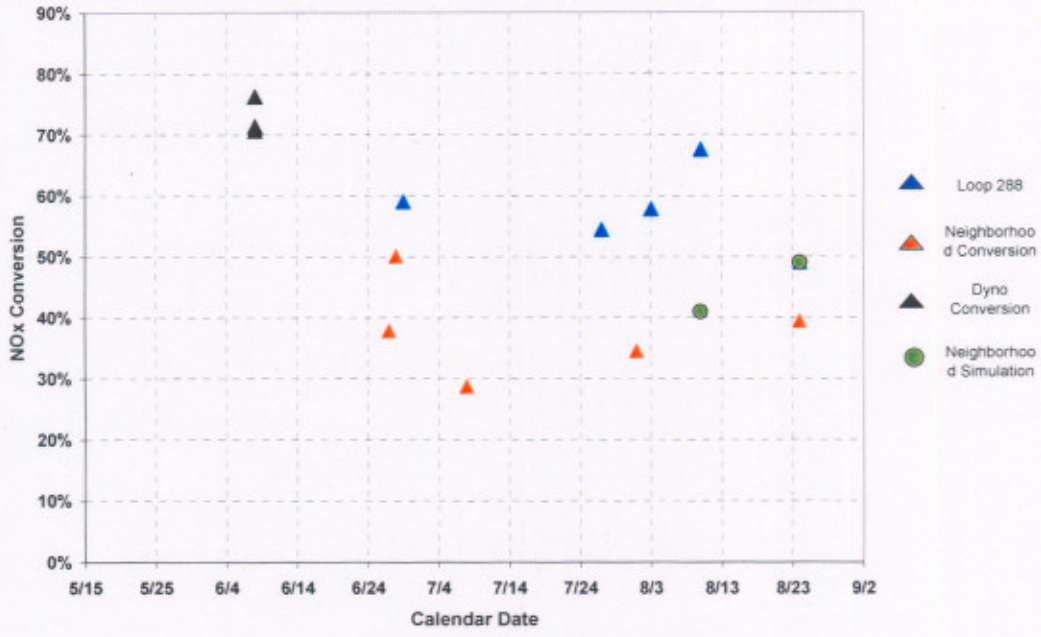


Figure 1: Cumulative NOx reduction data for truck 9735

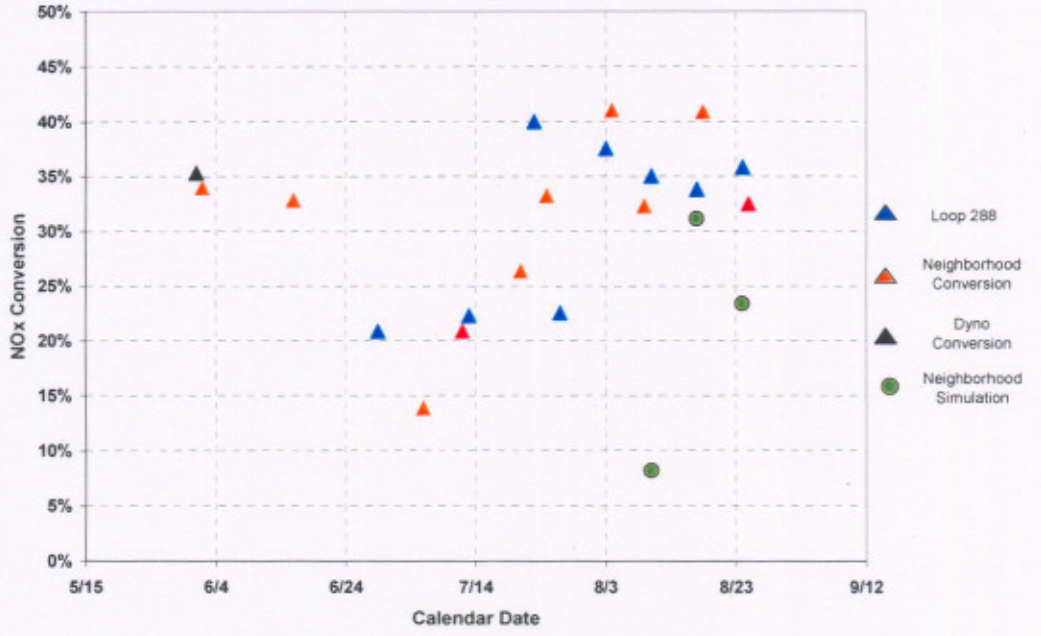


Figure 2: Cumulative NOx reduction data for truck 9858