

NTRD Program Disclaimers

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

Contract Number: 582-5-65591-0001

Grantee: Catalytica Energy Systems

Date Submitted: 12/10/04

Report for the **Monthly** period: November, 2004

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 1 Accomplishments:

- Completed the schematic drawing of the projected installation for the Denton vehicle. The installation schematic is shown in Figures 1 through 4 in the attachments. The schematic model is used to determine the mounting locations for the various XononD components. (This is a Task 1 deliverable)
- Completed the data analysis of the duty cycle temperatures that were measured on each vehicle in October. The temperature data was used to analyze the duty cycle applicability for the XononD product and to design the dynamometer test cycles for the prototype system evaluation. The results of the temperature survey and data analysis are shown in Figures 5 through 9 in the attachment. (This is a Task 1 deliverable).
- All the work elements and deliverables of Task 1 as described in the Grant Activities are complete.

Task 2 Accomplishments

- Completed the design and fabrication of the XononD Denton configuration test rig. Photographs of the test rig are shown in Figures 10 and 11 in the attachment. The test rig will be used to run the steady-state and transient test cycles on hardware that approximates the Denton field demonstration hardware configuration.

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 Tasks 1 through 2 in the Grant Agreement.

Section II: Problems/Solutions

<p>Problem(s) Identified</p> <p><i>(Please report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project)</i></p>	<p>(1) <i>The installation space on the dump truck is much more restrictive than on the refuse truck. It is unlikely that the XononD, as currently configured, will fit in the available space.</i></p> <p>(2) <i>The final assessment of the dump truck temperature data indicates that exhaust temperature is cooler than desired for a large part of the duty cycle. This will limit the NOx reduction potential of the XononD system.</i></p>
<p>Proposed Solution(s)</p> <p><i>(Please report any possible solution(s) to the problem(s) that were considered/encountered)</i></p>	<p>(1) & (2) – <i>CESI requests that the dump truck be removed as a target installation vehicle. CESI recommends that a refuse truck of the same configuration as VIN#: 1HTSHAARXWH497687 be the replacement target vehicle.</i></p>
<p>Action(s) Conducted and Results</p> <p><i>(Please describe the action(s) taken to resolve the problem(s) and its effect)</i></p>	<p>(1) <i>Have contacted the fleet manager at Denton (Mike Ellis) regarding the availability of an additional vehicle similar to the refuse truck for use in this program. This status report is intended to act as an official request to the TCEQ-NTRD program coordinator for a project vehicle substitution.</i></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)*

- (1) *Begin Task 2 (Dynamometer testing) activities*
 - a. *Develop testing protocol aligned with Denton vehicle data*
 - b. *Initiate system performance testing using steady-state test cycles*
- (2) *Begin Task 3 (Fabricate and Procure XononD field prototype hardware) activities*
 - a. *Finalize the design of the on-vehicle Denton field units*



Date: 11/9/04

Authorized Project Representative's Signature

Attachments

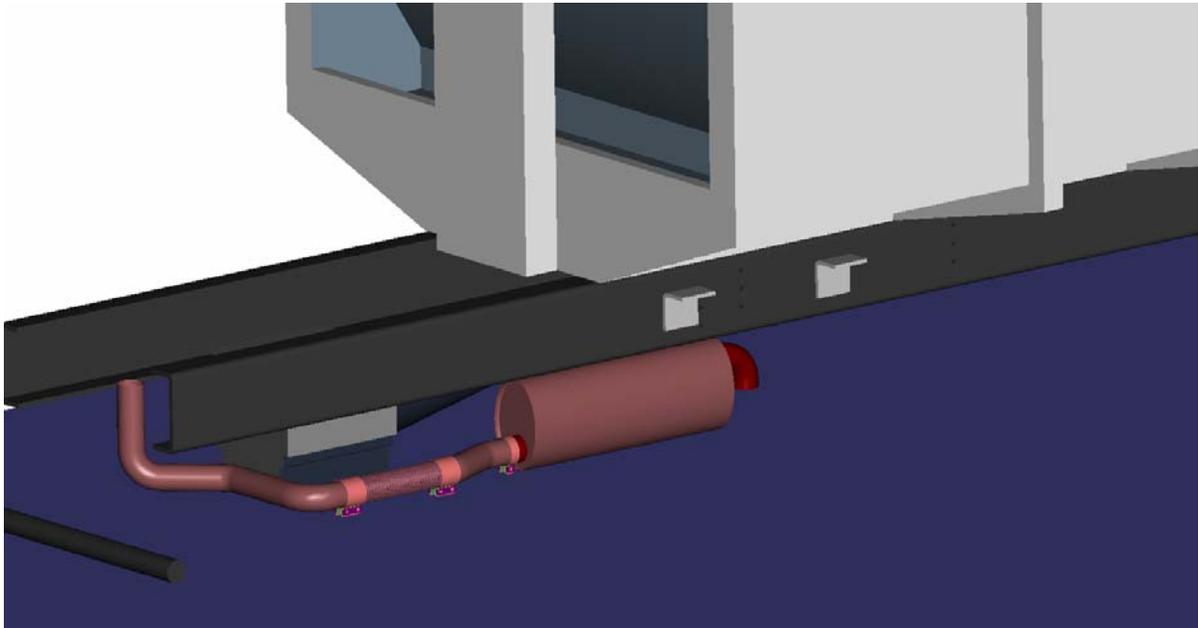


Figure 1: Model of the existing exhaust system and muffler for the refuse truck platform

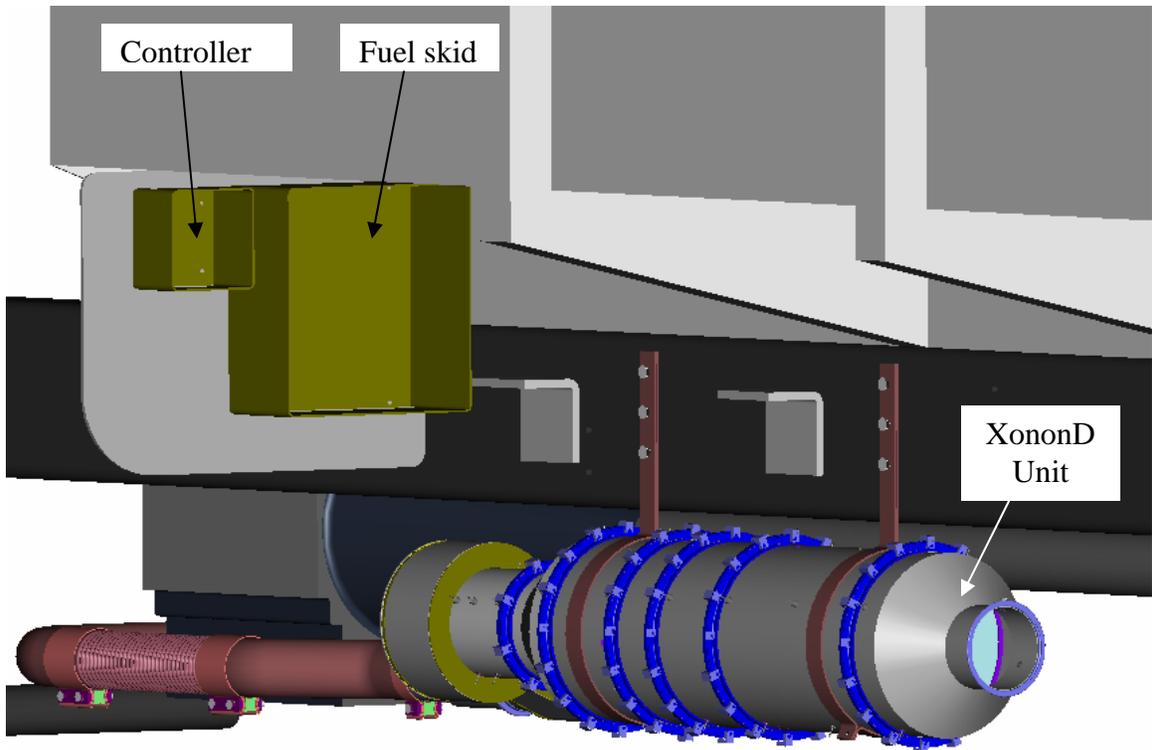


Figure 2: Model of the XononD system for the refuse truck platform (aft looking forward)

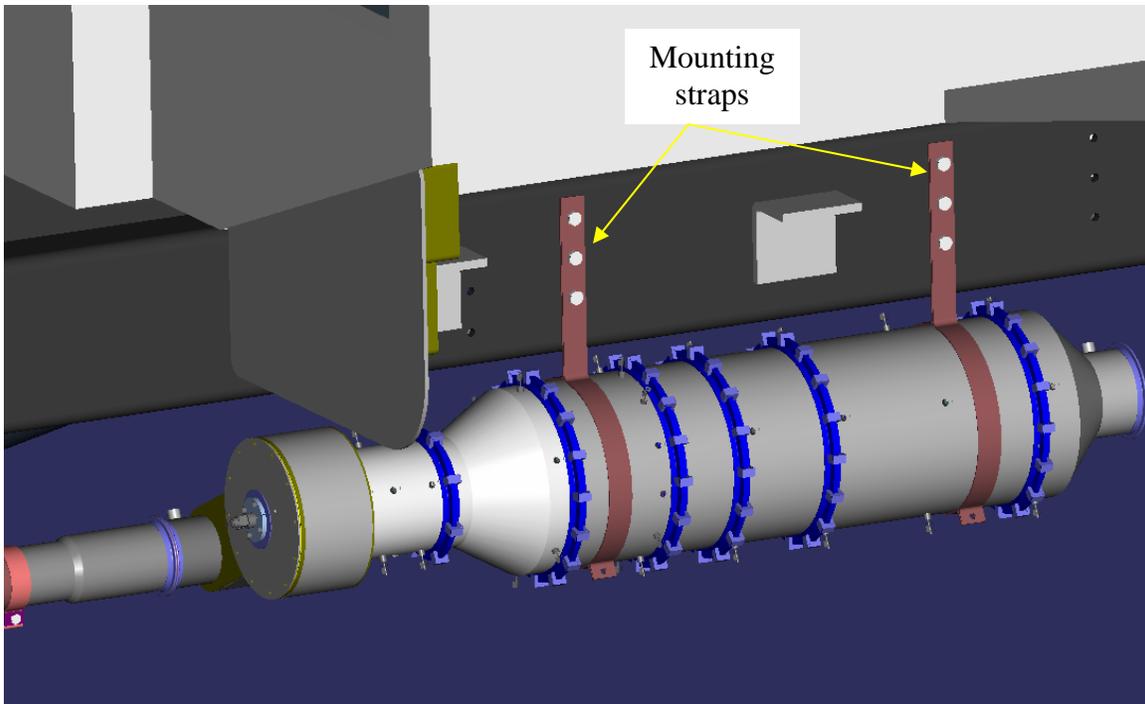


Figure 3: Model of the XononD system for the refuse truck platform (side view)

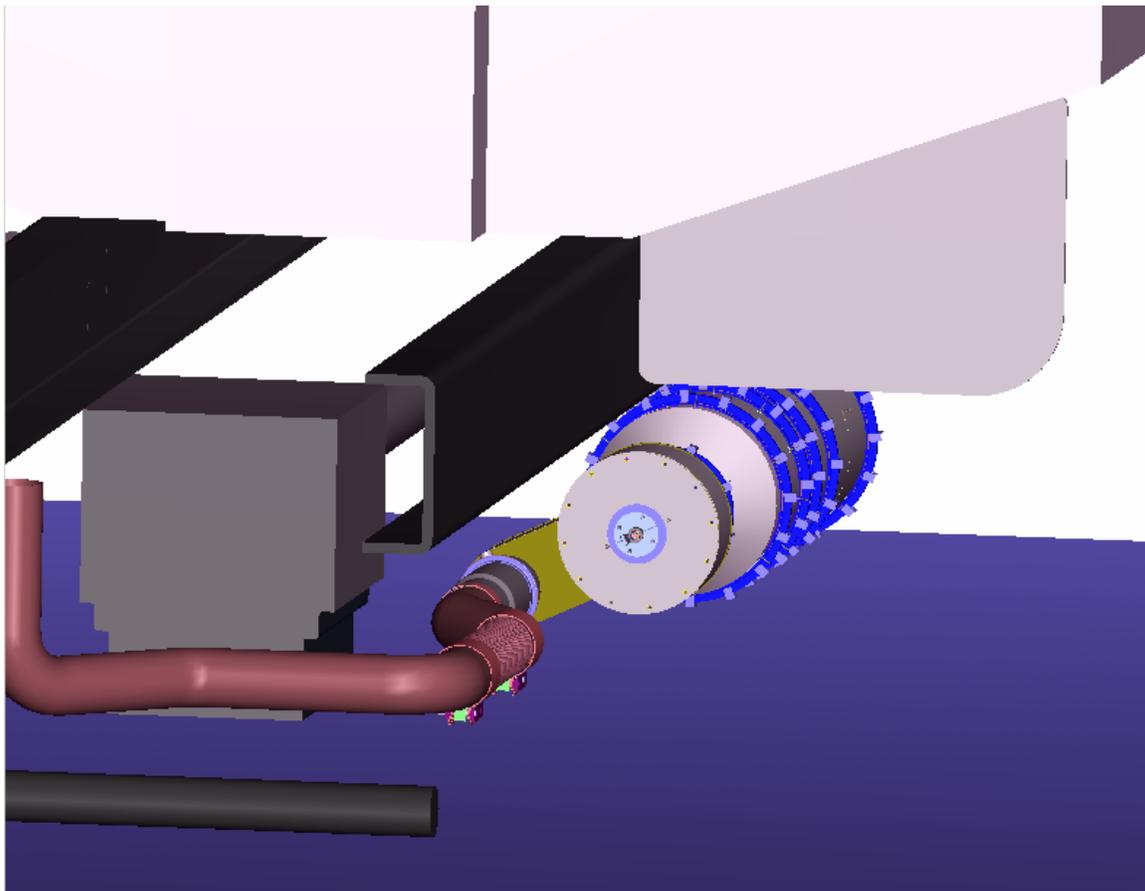


Figure 4: Model of the XononD system for the refuse truck platform (forward looking aft)

Task 1 Deliverable: Temperature measurements of target vehicle report

A team from CESI traveled to Denton to measure the duty cycle temperatures for the two target vehicles during the last week of October. Three type-K fast response thermocouples were installed on each vehicle as shown in Figure 5 below. The two exhaust thermocouples measure engine out (TC1) and approximate XononD inlet temperature (TC2). The ambient air temperature in close proximity of the XononD inlet was also measured. The temperature data was recorded on a pair of DaqPro 5300 eight channel data loggers recording at 1 Hz intervals.

The temperature data is shown in Figures 6 through 9. Figures 6 and 7 show the results for the DT466 powered dump truck. Both figures clearly show that a large part of the overall duty cycle is spent at low exhaust temperatures (<150C). The combination of low exhaust temperatures and long idle periods exhibited in this duty cycle profile may limit NOx reducing effectiveness of the XononD system.

Figures 8 and 9 show the temperature plots for the DT466 powered refuse truck. These figures clearly show a “warmer” temperature profile than the dump truck cycle. The combination of high exhaust temperatures and relatively short idle periods are well suited for the XononD system.

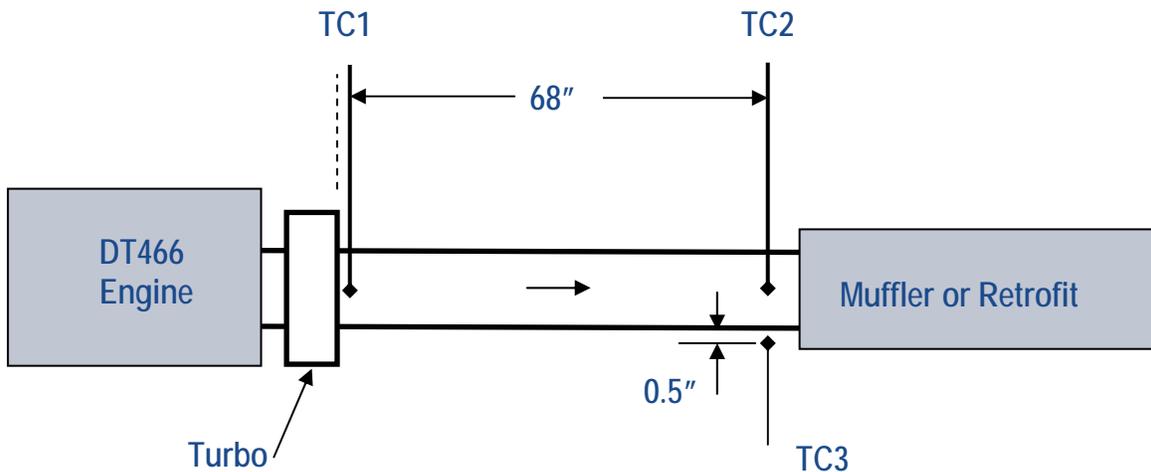


Figure 5: Location of the thermocouples on the test vehicles (thermocouple locations denoted by TC1 – TC3)

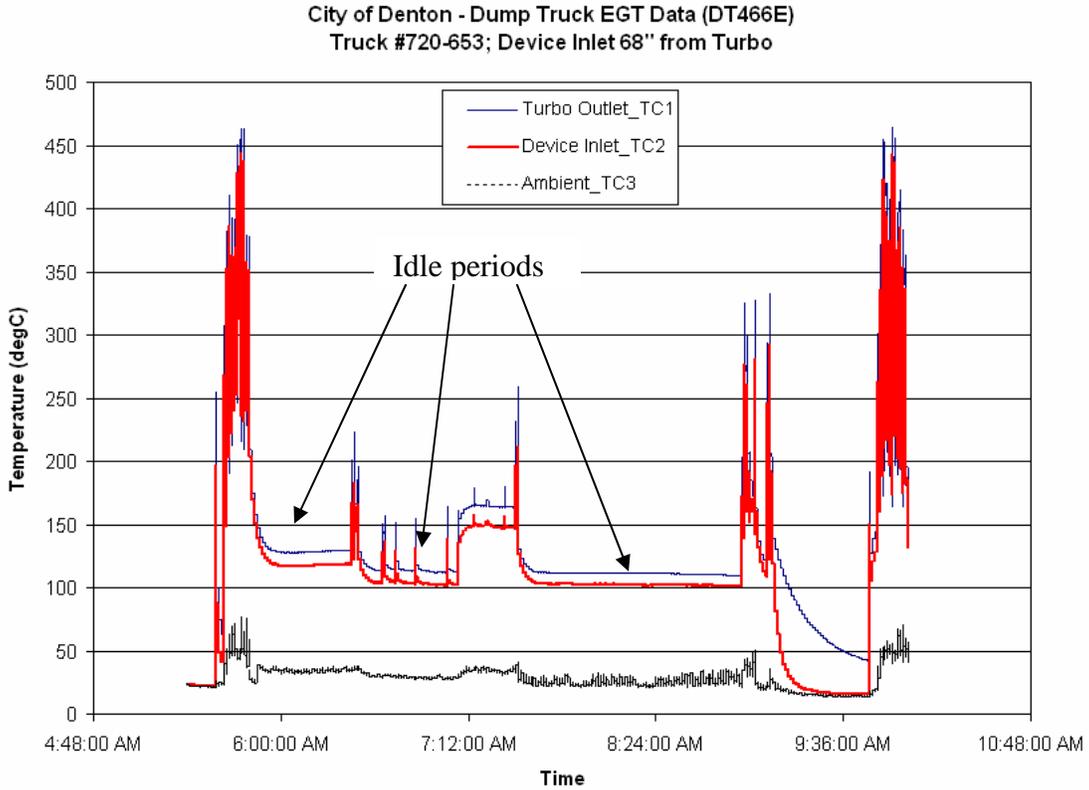


Figure 6: Temperature data for the dump truck. Note extended idling periods.

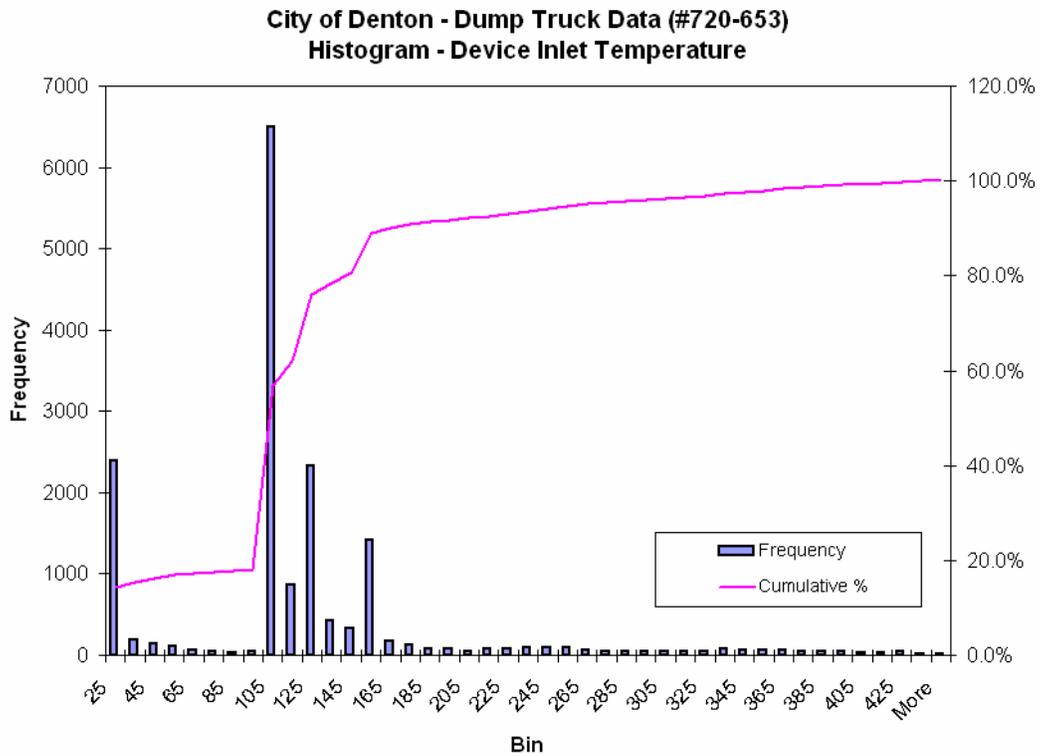


Figure 7: Histogram of temperature data for the dump truck. Note the high frequency of low temperature operation.

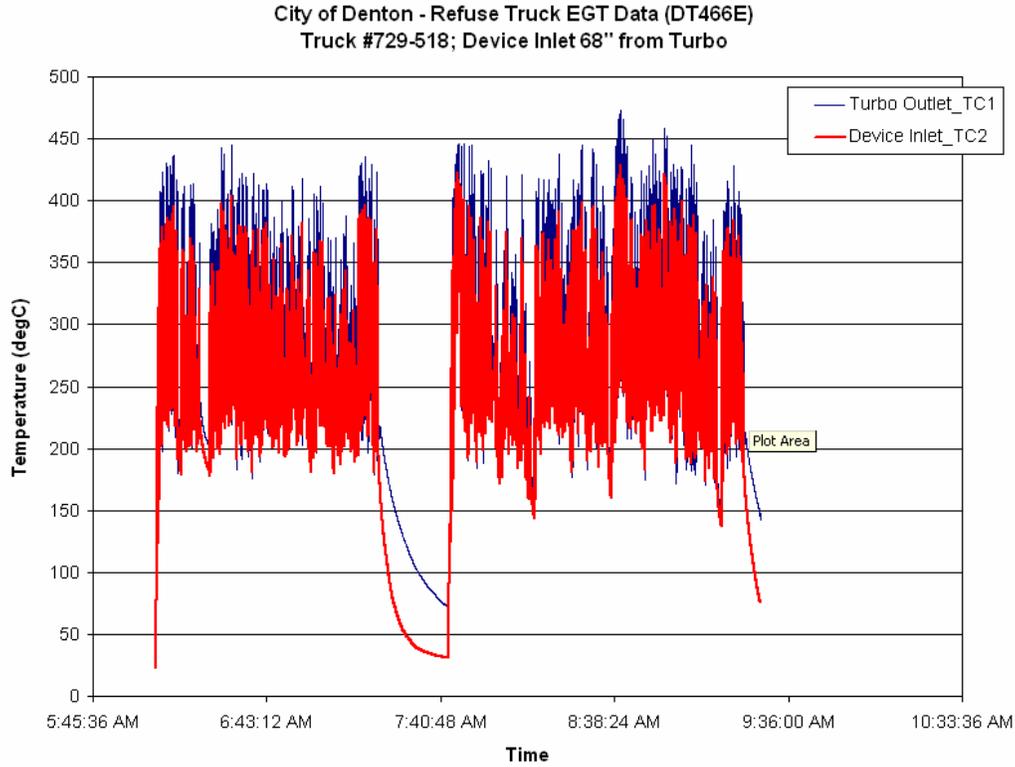


Figure 8: Temperature data for the refuse truck

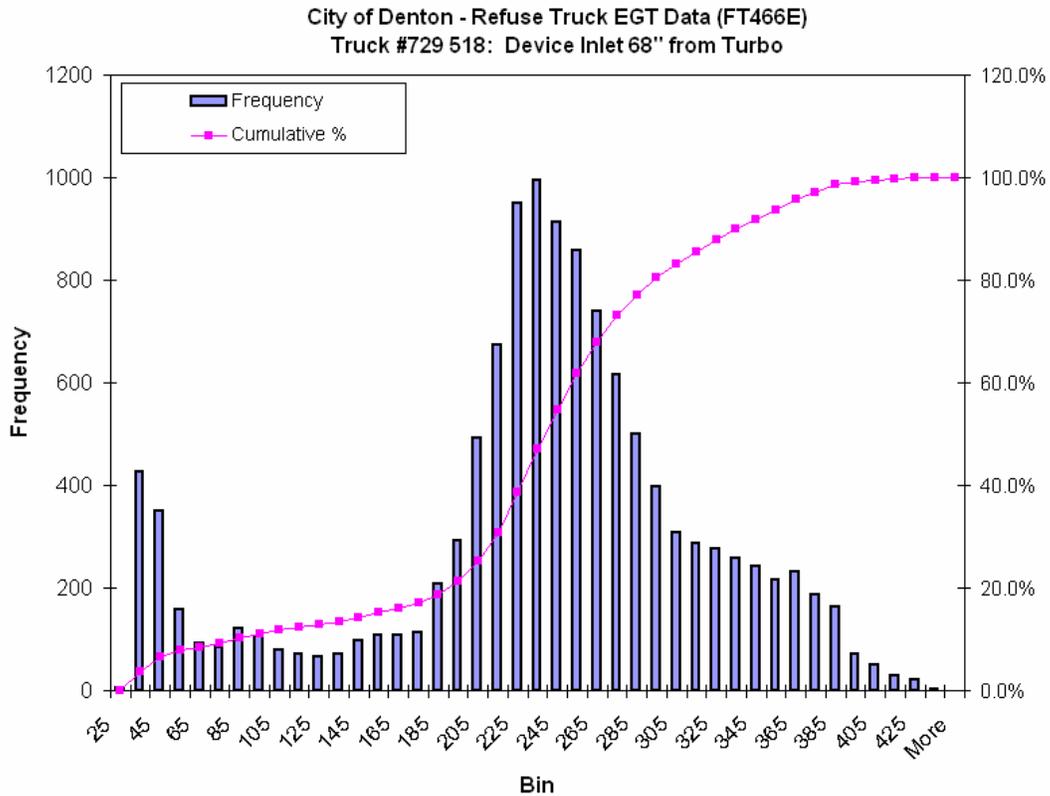


Figure 9: Histogram of temperature data for the refuse truck.



Figure 10: Denton prototype test rig installed in the CESI test facility



Figure 11: Denton prototype test rig installed in the CESI test facility