

## **NTRD Program Disclaimers**

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

Contract Number: 582-5-70807-0008

Grantee: Clean Air Worldwide GP, Inc.

Date Submitted: November 7, 2005

Report for the **Monthly** period:

Starting Date June 1, 2005

Ending Date: October 31, 2005

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

Article 1. Objectives: To obtain verification from the California Air Resources Board for the Dragon Fire 2010 Fuel System, a computer-controlled diesel fuel injection system.

Company representatives have held conversations with California Environmental Engineering and The California Air Resources Board regarding emission testing protocol for verification. They have met with TCEQ representatives to clarify verification testing for the CARB. Information has been provided which is necessary for Brookside Machine Inc. and B&A Auto Electric to provide equipment and services to the company.

Article 2. Scope of Work

Task 1, Task Statement 2.1: Initiate CARB Verification Application Process

Mr. Henry Harness spent several hours the week of September 12 in joint meetings with representatives from California Environmental Engineering and representatives from the CARB. At these meetings Mr. Harness laid out the defense for the Verification of the DF2010 Fuel System. CARB encouraged Mr. Harness to prepare and submit a proposed verification testing protocol for their review and agreed to write a letter accepting this protocol and authorizing the submission of an application for Verification. Task 2.1.1, prepare a proposed verification testing protocol is being completed currently and will be submitted to CARB for their review.

Task 2, Task Statement 2.2: Map engine for the DF2010 Fuel System

Mr. Henry Harness conducted the initial mapping on the OEM International DT466 mapping. In order to accomplish this, he directed Brookside Machine Inc. to perform the following tasks:

INTAKE: modification of intake manifold (measurement of air flow), modification of induction tube (measurement of discharge temperature), modification of turbo compressor housing discharge (measurement of turbo efficiency), modification of turbo charger inlet (measure ambient conditions of pressure and temperature)

EXHAUST: modification of exhaust turbine (measure exhaust velocity), modification of exhaust manifold (measure exhaust back pressure and exhaust temperature), modification of exhaust pipe for turbocharger discharge (measure temperature and pressure), modification of exhaust pipe for emission test equipment.

Mr. Henry Harness directed B&A Auto Electric to perform the following tasks: Install all sensors to measure initial engine readings, install Data Acquisition System to record all initial engine readings

#### Sub-Task 2.2.1

Mr. Henry Harness conducted initial mapping on the DT466 to determine the proper size of the DF2010 Fuel System. B&A Auto Electric assisted him with the dyno work to baseline the OEM Engine.

#### Sub-Task 2.2.1.1

Mr. Henry Harness used the information from 2.2.1 to calculate the proper size of the DF2010 Fuel System to be applied to the DT466 engine.

Based on this information Mr. Harness directed Brookside Machine to make alterations to the evaporative module portion of the DF2010 Fuel System and modify the induction tube, after cooler, fuel pump, injector and associated hardware including the brackets to mount the fuel system (see task 2.2.1.2). They also manufactured adapters for the new turbo inlet and new turbo outlet.

Based on this information Mr. Harness directed B&A Auto Electric to modify a new power generation unit to match horsepower of the DT466 engine. Additionally the wiring harness which controls the evaporative module required extensive revisions and improvements for operation with the DT466 engine.

#### Sub-Task 2.2.1.2 and Sub-Task 2.3.1.1 regarding Brookside Machine

Mr. Henry Harness completed the design of all mounting brackets (2.2.1.2) and completed the design of The DF2010 retrofit device (2.3.1) and directed Brookside Machine to manufacture the following components:

Turbo inlet adaptor: T4

Sleeve for Turbo compressor inlet housing from 2.75 inches to 3.0 inches

Four inch turbo discharge outlet adaptor

One inch turbo drain fitting

Induction tube for front side of turbo

Auxiliary injector

Fuel pump bracket

Injector bracket

Fuel pressure regulator bracket

Induction tube mounting bracket

New turbo discharge pressure tubes

Brackets for after cooler

Modify after cooler mounting for DT466

Modify power generation unit housing and nickel plate for element protection

Power Generation Brackets with idle pulley provisions

Idler pulley

18 tooth power generation driven sprocket

90 tooth drive sprocket

power generator support bracket

Injector cap for auxiliary injector with cooling fins

Five inch fan spacer

Exhaust manifold studded standoffs

Evaporative module

Modify inlet and outlet fuel pressure regulator

Nickel plate evaporative module

Nickel plate aluminum 18 tooth sprocket to give high Reynolds number

Nickel plate aluminum 90 tooth sprocket to give high Reynolds number

Nickel plate fan spacer for corrosion resistance

Nickel plate after cooler for high temperature corrosion resistance

Powder coat all brackets

Ceramic coat Turbine housing

Powder coat fuel pressure regulator to protect from elements

Powder coat induction tubes

Ceramic coat all exhaust adaptors

**Sub-Task 2.3.1**

Mr. Henry Harness worked with and directed B&A Auto Electric to modify all electronics to be compatible with the DT466 engine and modify the electronics to control the DF2010 retrofit device.

**Sub-Task 2.3.1.2**

In addition to the purchase and assembly of electronic parts B&A Auto Electric, as a quality control measure, performed engineering electronic computer modeling for both air flow and resistance. B&A Auto Electric assembled all electronic components and ran bench test: voltage, amperage, fuel flow under simulated engine driving conditions. Matched fuel flow and amperage to engine speed and load. This is actually a second mapping for the operation of the DF2010 retrofit device operating on the DT466 engine.

**Task 2.4, Sub-Task 2.4.1**

Mr. Henry Harness directed B&A Auto Electric to mount the Engine Control Module and all wiring harnesses on the DT466 engine.

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

**SEE ABOVE**

**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>We anticipated that due to CARB's workload, CARB personnel would not be able, in a timely fashion, to review testing protocol and draft a written notice as required under Task 1: 2.1.</p>
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<p>Proposed Solution(s)</p> <p><i>(Please report any possible solution(s) to the problem(s) that were considered/encountered)</i></p>	<p>To solve the problem we requested that CEE to arrange a meeting with CARB personnel to present the DF2010 Fuel System as a solution to diesel emissions. The meeting was set and Mr. Henry Harness flew to California for the meeting. Mr. Harness presented the theory, practical application, commercial experience, running performance hours on the DF2010 Fuel System and answered hours of questions from CARB engineers.</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>As a result of the favorable response by CARB personnel, the testing protocol is being drafted based on directions received during the discussions. CARB personnel have agreed, verbally to review the testing protocol and if acceptable prepare a written notice as required under Task 1: 2.1</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)*

During November we plan to complete the following:

Task 1: Deliver a written report (2.1.4) including a copy of the proposed verification testing protocol (2.1.1) and a copy of the written notice from CARB (2.1.2) accepting the proposed testing protocol and authorizing the submission of an application for Verification.

Task 2: Deliver a written report (2.2.3) including the results of the initial engine mapping.

Task 3: Deliver a written report (3.3.3) including photos of the fully developed and completely constructed DF2010 Fuel System.

Task 4: Deliver a written report (2.4.3) including a report on initial performance (2.4.1.1), emission testing (2.4.1.2) and a report on the final installation of the DF2010 Fuel System (2.4.1) including photos.

Task 5: Deliver a Monthly Report confirming the completion of tasks, (2.5.1.1), (2.5.1.2) and (2.5.1.3).

*Tom C Bane*

Date: \_\_\_\_\_

*11/7/05*

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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.*