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New Technology Research & Development Program
Grant Contract 582-5-70807-0011

Task 1 Deliverable Report

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Texas Commission on Environmental Quality.

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

Contract Number: __582-5-70807-0011 _____

Grantee: __Rolling Frito Lay Sales, LP_____

Date Submitted: _March 1, 2007_____

Truck Description Report

Section I. Vehicle Overview

The intent of this report is to provide an overview of the vehicles to be tested in the Frito-Lay hybrid delivery truck study. The information below describes the vehicles to be used in the testing. Additional baseline vehicles may be added later in the testing to provide additional points of comparison for new-vehicle purchase options in 2007 and beyond.

Vehicle Outline

Baseline 1 is a representative fleet candidate for replacement with HEV

Baseline 2 is a recent purchase with relatively low miles.

Azure Dynamics Gas Hybrid is the series-type gasoline hybrid that was substituted for purposes of this study versus the original parallel-type gasoline-electric hybrid (contract amendment approved).

International/Eaton Diesel Hybrid is the parallel-type diesel electric hybrid truck outlined in the original project scope and proposal.

Potential Baseline 3 - Gasoline Baseline: There is potential at this point to test a baseline gasoline vehicle that represents a new-purchase option in gasoline at this point. When the original project proposal was assembled, Frito-Lay was purchasing diesel vehicles almost exclusively; however, due to a number of factors, including new manufacturer entries into this weight class, Frito-Lay is now purchasing almost exclusively gasoline delivery vehicles.

Time and resources will be available to complete some road testing of the gasoline baseline truck once the other four vehicles complete road testing in the DFW area and Houston. TCEQ has been approached as to the potential for a third baseline truck; a response is pending.

Chart Overview of Trucks In Hybrid Study

Hybrid Project Test Trucks	**Baseline 1 Older Diesel**	**Baseline 2 Newer Diesel**	**Azure Dynamics Gas Hybrid**	**International/ Eaton Diesel Hybrid**
FL Unit #	R70226	R08796	RH2006	R13673
Year Model	1998	2003	2005	2005
Chassis Manufacturer	General Motors	Workhorse Custom Chassis	Workhorse Custom Chassis	Workhorse Custom Chassis
Engine Manufacturer	General Motors	Cummins	General Motors	International
Body Manufacturer	Union City Body Co.	Utilimaster Corp.	Utilimaster Corp.	Utilimaster Corp.
Body (Cargo) Length	18 ft	18 ft	16 ft	18 ft.
VIN	1GBHP32Y8W3304305	5B4HP42P553404763	5B4KBD2V063416051	5B4HPD25363412537
Engine Model	6.5L	ISB4	4.8L	VT275
Engine Type	V8	I4, turbo	V8	V6 turbo
Engine Hp	160@3400	170@2600	270@5200	200@2700
Engine Torque	292@1700	420@1600	285@4000	440@1800
Transmission	GM 4L80E	Allison 1000	n/a	Eaton Hybrid
Data Link Type	none	J1708	OBDII	J1708/1939
Mileage at Test Initiation	235,800	81,100	209	1,200
Vehicle Test Weights - Dry Wt +50% cargo for Dyno and Road Testing (all weights are lb)				
GVWR as built/tested	10,000	10,000	14,500	10,000
GVWR for Test Weight Calculation*	10,000	10,000	11,500	11,500
Dry Weight	8010	7930	9600	9212
Driver	200	200	200	200
Fuel (as delivered for testing)	148.5	111.4	154.7	297.0
TOTAL Weight	8,359	8,241	9,955	9,709
Cargo Capacity, predicted*	1,642	1,759	1,545	1,791
50% of normal cargo	820.75	879.3	772.65	895.5
TOTAL TEST WEIGHT	**9,179**	**9,121**	**10,727**	**10,605**

* intended to reflect future hybrid commercial vehicle purchase specification
Incremental weight of hybrid system will drive GVWR higher than current 10,000 lb.
It is likley that 11,500 GVWR will be sufficient for comparable cargo capacity

Test Weight Assumptions/Approach:

1) Future Hybrid delivery trucks will not be rated at 10,000 lb due to incremental weight of hybrid components - 11,500 GVWR should be spec'ed for the added mass.

2) The approach here is to assume maximum load currently required, add that to the actual vehicle weight during the test regardless of starting weight or GVWR.

Section II. Individual Vehicle Descriptions

Azure Dynamics Gasoline Hybrid

- Azure Dynamics – The Azure Dynamics truck has been on-site at the Frito-Lay Fleet Service Center in Ft. Worth, Texas for several weeks, undergoing minor preparations for testing. The truck has received a special decal package in anticipation of engaging in the on-road testing phase. The gasoline hybrid-electric truck utilizes a series type hybrid architecture and is consistent with the type of vehicle Azure is currently producing for other large fleets in North America.

- See photo of the truck ready for Phase I testing below:

Unit RH2006, Azure Dynamics Gas-Electric Hybrid Delivery Truck

Eaton/International Diesel Hybrid

- The International/Eaton diesel-electric hybrid was delivered in January, and has entered on-road testing in Ft Worth and Houston. The Diesel hybrid uses the Eaton Hybrid Drive Unit parallel type hybrid system with an automated manual shift transmission.
- Although there remain a few minor drivability issues with the truck (the main one is idle control and idle speed stability, but does not affect ability to execute the testing), the truck was demmed ready to test given the schedule concerns with the overall project. Further engine controls improvements will be made by Eaton and International during the testing to eliminate the drivability issues.

- Photo of the International/Eaton Hybrid being readied for on-road testing:

Baseline 1 – Older Diesel

- The older diesel truck selected for the study is representative of trucks purchased in the mid 1990's and is now a candidate for replacement due to mileage, age, condition, or a combination of all. This type of truck (with the 6.5L V8 diesel engine) is the single largest constituent of the Frito-Lay delivery fleet, at approximately 6,000 units nationally. This particular unit is reaching the end of it's useful life in the Frito-Lay fleet due to mileage, but remains reliable and was pulled off of daily route delivery for the hybrid study.
- Photo of Baseline 1, older diesel truck:

Baseline 2 – Newer Diesel

- The newer diesel truck selected for the study is representative of trucks purchased from 2002-2005. There are approximately 2000 units of this type in the Frito-Lay delivery fleet. The engines in these vehicles are typically very durable and long-lasting, so are expected to be in the fleet for at least the next 10-15 years.

Photo of Baseline 2, newer diesel truck being readied for on-road testing:

Baseline 2 Truck at Southwest Research Institute, San Antonio, TX.

Potential Baseline 3, Gasoline Engine

Baseline 3 - Gasoline	**Cutaway Chassis Gasoline Route Truck (new purchases in 2007-)**
FL Unit #	TBD
Year Model	2006-2007
Chassis Manufacturer	Ford Motor Co.
Engine Manufacturer	Ford Motor Co.
Body Manufacturer	Utilimaster Corp.
Body (Cargo) Length	18 ft.
VIN	various
Engine Model	5.4L
Engine Type	V8 2V
Engine Hp	255@4500
Engine Torque	350@2500
Transmission	5sp Automatic (Ford)
Data Link Type	OBDII
Mileage at Test Initiation	TBD
GVWR as built/tested	10,000
GVWR for Test Weight Calculation*	11,500
Dry Weight	7680
Driver	200
Fuel (as delivered for testing)	297.0
TOTAL Weight	8,177
Cargo Capacity, predicted*	3,323
50% of normal cargo	1661.5
TOTAL TEST WEIGHT	**9,839**

Proposed Baseline 3, Gasoline Delivery Truck, New Cutaway Design.

The proposed baseline 3 truck is a new truck type developed with Utilimaster Corp. of Wakarusa, Indiana. This truck utilizes the cab structure manufactured by Ford Motor Co. and a body by Utilimaster Corp. Frito-Lay is purchasing approximately 900 of these trucks in 2007 for use in the delivery fleet. The drive train is the same as provided by Ford on the stripped chassis built in 2006. This new design truck is expected to be the standard type design for new truck purchases in the next several years, so is proposed as a new truck purchase baseline comparison point.