U.S. Army Aberdeen Test Center Support of Heavy Duty Diesel Engine Emissions Testing

Mr. Jason A. Jack

Military Environmental Technology Demonstration Center

U.S. Army Aberdeen Test Center

Background

- Program developed in 1998 in response to consent decree settlement
- EPA has utilized ATC as independent test agency since 2001
- Program tests heavy duty diesel engines with EPA Real time On road Vehicle Emissions Reporter (ROVER)

ROVER System

- Comprised of various off the shelf items including two emissions analyzers, a GPS system, and an engine control module scanner
- Also includes a calibrated flow pipe

ROVER System

In-Use Testing

- ROVER developed to test engines while performing their intended duty cycle
- Currently program participants volunteer engine for testing purposes
- ROVER program participants include state and local governments throughout the United States, private industry, and newer model engines from rental companies

In-use Testing

Various Types of Testing

- Variables
- Marathon
- Non-road
- New technology comparison

Variables Testing

- Engine families are tested under various conditions with the widest range of operational parameters
- Variables include hot and cold temperatures, driver variation, and altitude
- When possible, the same engines in the same vehicles are tested under different conditions

Variables Testing

Variables Testing

Non-road Testing

- Early tests were conducted on various types of non-road equipment including forklifts, dozers, loaders, tractors, etc
- Currently, a method is used to test tractors only

Non-road Testing

Marathon Testing

- Effort to test an engine under the most varied conditions possible during a short period of time
- Involve renting a test item and operating the vehicle from Maryland to points west into higher altitudes
- Normal marathon test will be conducted from ATC to Colorado via Interstate – 70

Marathon Testing

Comparison Testing

- Includes testing engines with ROVER and various available in-use emissions testing technologies
- Analyze applicability of available technologies in the emissions compliance program and real-time emissions capabilities of each system

Comparison Testing

- Performed testing in support of EPA SmartWay to study emissions and fuel economy results with applications of various technologies on tractors and trailers
- Conducted testing in support of the American Bus Association (ABA) to study bus engine idle emissions

Procurement of Test Items

- Procure test items from a variety of sources
- Includes federal, state, and local governments, private industry, and rental companies
- ATC and EPA determine the specific engines to be tested in above referenced scenarios
- Each year ATC attempts to locate the newest model year engine families for testing

Typical ROVER Test

- Most testing of rented vehicles is conducted locally on public roads around ATC
- ATC ROVER test team travels to various program participants to perform testing daily

Data Analysis

- ATC also performs preliminary data analysis
- ATC personnel analyze the data with respect to NTE NO_x in grams per brake horsepower hour over various periods within each test
- A quick pass/fail analysis is usually done before data is submitted to EPA assuring its quality and validity
- ATC provides a fleet report with various types of analysis of NTE NO_x, fuel economy, and engine data for each engine tested for various participants requesting data

ATC Reporting

- Transfer analyzed data to EPA at the completion of each test
- Report progress on procurement, scheduling, testing, and data analysis monthly to EPA
- Interact daily with EPA personnel to further support data analysis and ensure program achieves its goals with respect to variety and number of engine families, number of tests, and cost

Other ATC Reporting

- EPA SmartWay testing
- ABA idle testing

Other ATC ROVER Testing

- EPA allows ATC to use ROVER in DoD programs for emissions measurements
- ESTCP NFESC biodiesel emissions program
- ESTCP NFESC diesel engine emissions reduction technologies program

ATC Testing and Capabilities

- Tracks that simulate various road conditions used primarily for DoD vehicle testing
- The world's largest Roadway Simulator capable of testing up to 80,000 lb tractor trailers while simulating various driving scenarios
- In the process of constructing a high speed test track that will allow vehicles to maintain speeds of 70 mph over a 4.5 mile tri oval track with paved and gravel traffic lanes

THANK YOU!

Jason A. Jack
U.S. Army Aberdeen Test Center
(410) 278 4045
jason.jack@atc.army.mil