NEW METHODOLOGIES AND IMPROVED DATA GATHERING DEVELOPED FOR CARB'S HEAVY-DUTY VEHICLE (HDV) SELECTIVE CATALYTIC REDUCTION (SCR) TEST PROGRAM

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Outline

- Introduction of Sampling Methodology
- Overview of CARB's HDV SCR Test program
- Enhanced Support for CARB's HDV SCR Test Program
 - Sampling Methodology
 - Standardize Fleet Information
 - Standardize Vehicle Information
 - Data Gathering
 - Data Analysis



Integrated "Real-World" Testing Design



Nonroad Construction Test Program



Working Together to Gather Data



Partnerships

- Partnerships allow for synergies:
 - Combining different experiences and knowledge between partners
 - Better use of facilities and equipment
 - Potential to expand test programs through cost sharing
 - Increase in understanding across the entire emissions community
 - Gain support from local entities



CARB's HDV SCR Test Program Features

- Objective: to develop activity profiles for different types of heavy-duty vehicles
- CARB contracted with CE-CERT to gather activity data on 100 HD trucks with SCR (MY2010+)
 - Three months of activity data per vehicle
 - Different sizes of vehicles (MDV, HDVs, HHDVs)
 - Different geographic locations within California (North/Central/South)
 - Different truck vocations



Enhanced Support from EPA

- EPA and CE-CERT signed a Cooperative Research And Development Agreement (CRADA) to work together to gather HDV and non-road data
- EPA and CE-CERT partnered to help support CARB's HDV SCR data gathering effort
 - Technical support
 - Equipment support
 - Sampling Methodology support
 - Data Analysis support



Improvements to Sampling Methodology

- Sampling full fleet instead of just the vehicle being tested with PAMS and/or PEMS
- Provides a better understanding of how that tested vehicle fits into the rest of the fleet and to the overall vehicle population
- Developed a new standardized fleet survey form to capture fleet data (details in a later presentation)





Improvements to Sampling Methodology CECTA Statistics of the statistic of

- Developed new standardized vehicle profile documentation forms (details in a later presentation)
 - Saves "field" time by taking pictures of vehicle
 - Data fields can be completed later





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Improvements to Data Gathering

- Standardizing HDV J1939 Data Files for Loggers (details in a later presentation)
 - Known database structure for quick data analysis
 - Gathering <u>"key" vehicle parameter fields</u> for present and future data analysis



Improvements to Data Gathering

- Standardizing Data Loggers (Non-cellular)
 - Quicker installation and setup
 - Problem: Did not know if worked for 3 months

- Cellular Data Loggers (details in a later presentation)
 - Create "Dashboard" to monitor data logger and vehicle
 - "Real-time" notification of issues on data logger and/or vehicle and resolve them (better data)
 - Allow "Real-time" data analysis

Improvements to Data Analysis

- Currently developing and implementing an open database and open data analysis structure with partners
 - Standard database structure: MySQL
 - Standard data analysis and QC/QA techniques: modular designed Scripts in Python and MySQL
 - Standard graphics: R
- Communicate through "Bit-Bucket" to share data analysis methods

Quicker Results!

- Quicker QA/QC of data
- Quicker data analysis



Conclusions

- Partnering together is allowing for:
 - Sharing the experience, knowledge and expertise of staffs;
 - Sharing equipment and costs to gather data; and
 - Better and consistent data to be gathered to address present and <u>future</u> research questions.



Thank You and Questions

