

STATEMENT OF WORK

RTI (Research Triangle Institute CF)
Contract No. EP-C-08-008

12/21/2011
Work Assignment 4-01

Title: "Peer Review: LDV/ LDT OBD and High Evaporative Emission Draft Report"

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Appendix A:

Elements of the Charge Letter to the Reviewers

The focus of this report is on the analysis of evaporative emissions and related data collected on light-duty vehicles equipped with OBDII systems, which are present on 1996 and newer model year vehicles. In each of the three high-evap studies (Lipan, Caryl, and Denver 2010), many vehicles received measurements relevant to this report. In these three studies, a small fraction of these vehicles were successfully recruited as participants, and the remaining vehicles were non-participants - the combination of study/participant status producing the three separate datasets. The analysis looks to identify any relationships which may link the several different measures of evaporative emissions and the variables that influence evaporative emissions. If they exist, the report summarizes the evidence for using them in a modeling context which may be useful to the development of EPA's MOVES model.

Correlating tailpipe emission measurements using IM240 tailpipe measurements and the OBD

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system has always been challenging and has been well documented. In this report, the relationships which are explored are between the results of high evaporative vehicle emission field studies and:

- Onboard diagnostic trouble codes (OBD DTCs); indicate vehicle parameters/conditions, including whether vehicle has seen high exhaust or high evaporative emission levels. During routine IM station inspections, OBD inspections are performed on 1996+ vehicles. OBD codes are discrete variables, with values of ‘set’ or ‘not set’.

- portable or laboratory-based SHED results; an assessment of evaporative emissions by testing each high-evap vehicle in a SHED (evap emission results are continuous variables with units of grams HC/15minutes).

- Modified California Method (MCM) inspection; an under-hood and under-body olfactory, visual, and electronic HC-sniffer check, for each high-evap vehicle. MCM variables are generally discrete and the inspections provide ‘smell/no-smell’ (noted by the inspector), apparent condition of various fuel system and evap control system components and ‘detect/no-detect’ by the electronic HC sniffer.

Participant vehicles and non-participant vehicles received different sets of emission tests in each of the three studies covered in this report. Non-participants (I/M-compliant vehicles only) received RSD measurements and OBD inspections, which reported back diagnostic trouble codes (DTCs) for 1996 and newer model year vehicles. Participants (I/M volunteers for high evap emission vehicle testing) received, in addition to RSD and OBD measurements, a measurement of evaporative emissions by placing the vehicle in a SHED. In the Lipan and Ken Caryl studies, a portable PSBED was used. In the Denver 2010 study, a portable SHED was used for the vehicles tested at CDPHE’s West Tech Center and a laboratory SHED was used for vehicles tested at CDPHE’s Aurora test facility. Participants also received MCM inspections.

The analysis described below is broken out by:

- Model Year;
- OBD Evap readiness monitor status; and
- presence of enhanced evap system for 1996-1998 vehicles.

(break-outs were made to the finest level of detail possible; however, this was dependent on the sample size for each category)

The three different datasets were used in this study to determine if high evaporative emitters, defined by the portable SHED, were appropriately identified by the OBD system on the vehicle. The results for this analysis seem to indicate that many vehicles with high portable SHED values probably do not have evaporative DTCs set. For vehicles with high values from portable SHED testing, ERG attempted to make an assessment of the source of the vapor leak. These assessments suggest that about half or more of the high emitters identified should have been identified via the OBD system but were not. The preliminary analysis suggests that OBD systems were unable to identify 50-70% of the potentially high evaporative emitters in these study groups. The lower end of the range, 50%, is based on the known occurrences of when the OBD system should have detected the leak from a known source as shown in “technician” comments. The higher end of the

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range, 70%, includes the unknown leak sources which are likely to be located in the vapor space of the fuel system, which is too tightly packed for the HC sniffer to reach, as opposed to the fuel line connection points or the fuel rail, which are liquid leaks and not detectable by the OBD system.

Additionally, the OBD results indicated that vehicles with high portable SHED values were likely to have evap DTCs set. However, it was seen that high portable SHED values also indicated the likelihood of having an exhaust HC DTC set. Vehicle age was found to be insignificant statistically for identifying vehicles with evap codes set, but was significant for identifying vehicles with exhaust codes set.

In their comments, reviewers should distinguish between recommendations for clearly defined improvements that can be readily made based on data or literature reasonably available to EPA and those improvements which are more exploratory or dependent on information not readily available to EPA. Any comment should be sufficiently clear and detailed to allow a thorough understanding by EPA or other parties familiar with the report. EPA requests that the reviewers not release the peer review materials or their comments to anyone else until the Agency makes its report and any supporting documentation public.

If a reviewer has questions about what is required in order to complete this review or needs additional background material, please direct the reviewer to contact the contractor's project manager for this effort. If a reviewer has a question about the EPA peer review process itself, please have the reviewer contact Ms. Ruth Schenk in EPA's Quality Office, National Vehicle and Fuel Emissions Laboratory by phone (734-214-4017) or through e-mail at schenk.ruth@epa.gov.