Environmental Systems Products

11 Kripes Road, East Granby, CT 06026-9720 P 860-392-2100 F 860-392-2105 www.esp-global.com

December 5, 2006

Mr. Andrew Panson
Staff Air Pollution Specialist
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: *Carl Moyer Guidelines, Proposed 2006 Revision to Project Criteria for Light-Duty Vehicles,* Release date: *October 20 2006, Board date: December 7, 2006.*

Dear Mr. Panson:

ESP would like to thank ARB for the opportunity to submit further comments on the proposed revisions to Carl Moyer Guidelines. These comments are supplemental to our previous comments submitted on the guidelines, some of which have been incorporated in the October 20th revisions.

At this time we are submitting two supplemental comments regarding VRV credit life and VAVR second and third year credits. We believe it is important that the benefits of VRV and VAVR programs not be underestimated, that the random roadside ASM tests provide evidence of greater benefits than those proposed and that these greater benefits are real and incremental to the SMOG Check program.

ESP thanks ARB for their consideration of these comments.

Sincerely,

Carl H. Nord
Vice President

Comment and Proposed Changes to the *Carl Moyer Guidelines, Proposed 2006 Revision to Project Criteria for Light-Duty Vehicles,* Release date: *October 20 2006, Board date: December 7, 2006.*

On page V, the section headed 'Calculating Emission Reductions' states that
ARB staff is proposing that emission reductions be based on the difference in emissions between pre-repair and post-repair Smog Check tests. Staff is also proposing a one-year credit life for repairs to avoid double counting the emission benefits of the Smog Check program. On average, vehicles are one year away from their next biennial Smog Check test. High emitting vehicles identified between Smog Checks and repaired in these voluntary programs would have needed to be repaired after failing their next biennial Smog Check test.

The proposed one-year credit life for repairs understates the true incremental benefit of high emitter VRV programs.

A high emitter VRV program provides incremental benefits over Smog Check in three ways:

1) Earlier identification and repair of high emitters;
2) Identification and repair of high emitters not identified or repaired by Smog Check;
3) Greater repair effectiveness than average Smog Check repairs through application of higher quality repairs in compliance with the 'Repair Requirement' stated on page V:
   "Ensuring that emission control system failures are correctly diagnosed and repaired so real emission reductions are achieved is critical to the success of repair projects. Staff is proposing project criteria requiring systematic diagnosis and repair in accordance with standard industry protocols to ensure that vehicles are correctly and efficiently repaired. To make sure repairs are durable, they must bring emissions below the Smog Check pass/fail emission standards in order to be creditable. This requirement aims to prevent partial repairs that may be short lived."

The proposed credit only accounts for the first of the three incremental benefits listed above, namely early identification and repair of high emitter. In our view the identification and repair of high emitters not identified or correctly repaired by Smog Check and more effective repairs provide greater benefits.

For reasons discussed below, a preliminary estimate of the fraction of high emitters measured between Smog Check tests is that at least 50% are present because they were not identified or repaired by Smog Check. This does not mean that Smog Check is only 50% effective since a majority of vehicles successfully repaired in Smog Check will not appear on-road as high emitters within the two years until their next Smog Check. It is the fraction of high emitters remaining on-road that is at issue.

A proper repair should typically last at least three years. Therefore, at a minimum, the VRV repair credit life should be two years (50% x 1 year and 50% x three years).

Discussion

For a variety of reasons, significant fraction of high emitters remain on –road despite the best efforts of the current SMOG Check program. Three points of reference indicate that many vehicles still have high on-road emissions immediately after or soon after completing Smog Check.

- Tom Wenzel, et al, "Evaluation of the Enhanced Smog Check Program", Report to IMRC, 2000, page III-13: "Although the data indicate that 20% of the fail-pass fleet would fail if retested immediately after their passing test, Figure 3 suggests that this failure rate stays steady and does not begin to increase until about nine months after the initial test."

- ARB 2004 Evaluation of Smog Check, page 41: "based on roadside data collected in 2001, 40.4 percent of the repaired vehicles tested failed the subsequent roadside test."

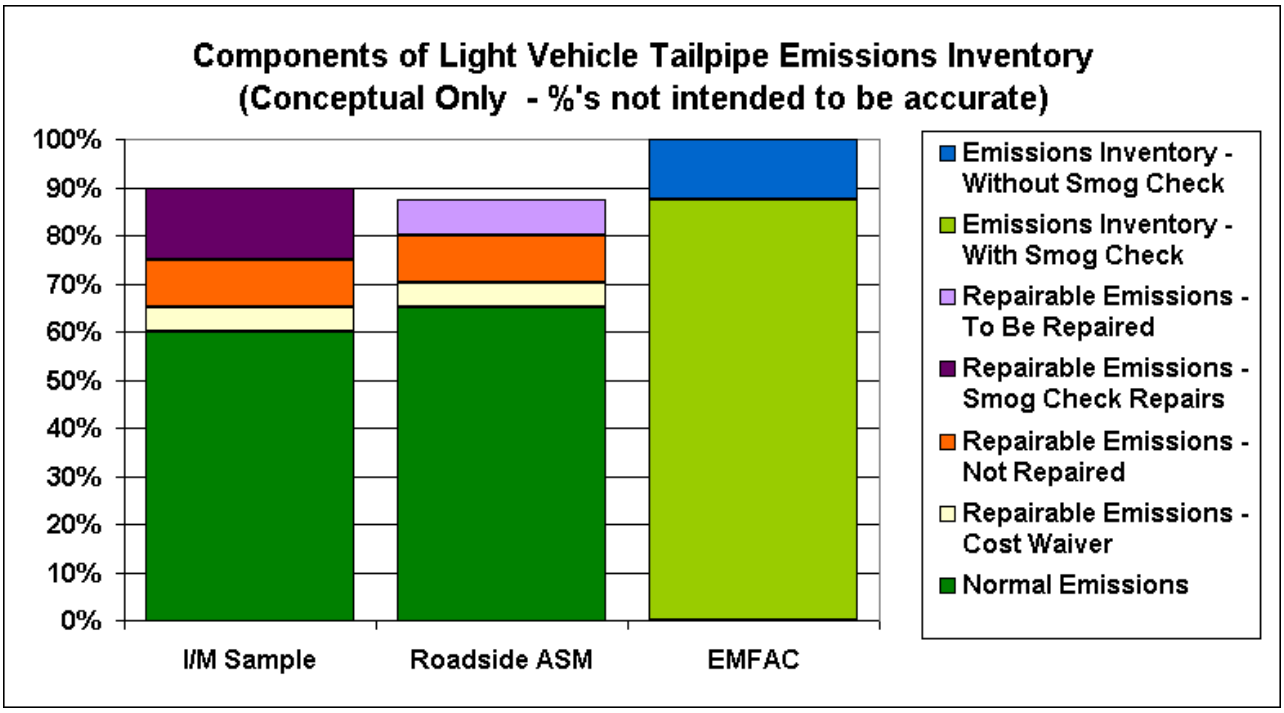
- October 2006 IMRC, Phil Heirigs, Sierra Research presentation based on California random roadside ASM tests. The roadside ASM fail rate vs. time since the last Smog Check shows increasing fail rates with time, as one would expect. But, fail rates were high and the trends were relatively flat. If projected back to time zero, i.e. right after the Smog Check, then the imputed roadside fail rates would be:
  - 40+% for vehicles that initially failed Smog Check;
  - 18% for vehicles that initially passed Smog Check.

The implications are; 1) that Smog Check remains ineffective at identifying and ensuring the proper repair of some faulty vehicles, and 2) there are many high emitters active on-road despite Smog Check. In fact, the fail rate of vehicles measured by roadside ASM soon after Smog Check is similar to or higher than the Smog Check fail rate.

The EMFAC emission model simulation of I/M is based on several studies done in the past where samples of I/M vehicles due for Smog Check were sent out for undercover diagnosis and repair. That is, the vehicles were brought into the ARB laboratory for inspection and baseline testing (including FTP tests), they were then sent out to Smog Check stations. The stations performed their repairs to "pass" the vehicles, which were the brought back to the ARB lab to determine repair effectiveness. Some mechanics had performed proper repairs, some vehicles had been cost-waivered, some mechanics cheated and some made the vehicles worse. But bottom-line ARB measured Smog Check station effectiveness and then did additional repairs with ARB mechanics. This allowed ARB to model the effectiveness of I/M and the additional benefits of options such as increased cost limits, better mechanic training, etc.

We do not believe there is any disagreement that Smog Check is not identifying and fully repairing all vehicles with high emissions. Multiple evaluations of Smog Check have been conducted over the years and concluded the same. It is our understanding that

EMFAC embodies the knowledge accumulated from successive Smog Check evaluations. The Figure below then illustrates the prevailing situation.



The Figure assumes:

- The I/M sample and roadside samples are collected over the same time period and the EMFAC forecast is for the same time period.
- ASM standards determine normal emissions and repairable emissions;
- ASM emissions are converted to FTP equivalents and I/M sample and roadside results are normalized to EMFAC fleet fractions.

The I/M sample emission are composed of:

- Normal Emissions: emissions of vehicles due for Smog Check that pass a properly administered ASM test.
- Repairable Emissions - Cost Waiver: repairable emissions not repaired in Smog Check because of cost waivers.
- Repairable Emissions - Not Repaired: repairable emissions not repaired to ASM standards in Smog Check for other reasons (vehicle/test variability, poor repairs, improper test, etc).
- Repairable Emissions - Smog Check Repairs: repairable emissions repaired by Smog Check mechanics.

The Roadside ASM emissions are composed of the same components with these changes:

- There is a greater fraction of normal emissions because on average these vehicles have a year to go before being due for Smog Check;

- Repairable Emissions - Smog Check Repairs**:** are replaced by a smaller component of Repairable Emissions - To Be Repaired at the next Smog Check;
- The overall emissions are lower than the I/M sample because these vehicles, on average, are mid cycle and more will deteriorate before their next Smog Check is due.

The EMFAC emissions inventory with Smog Check approximately matches the sum of the roadside results. Without Smog Check the total EMFAC inventory would have been higher than both the I/M sample and the roadside results.

The remaining emission inventory with the Smog Check program operating, as projected by EMFAC, contains a significant component of vehicles whose emissions exceed roadside ASM standards, i.e. it includes an element of excess emissions that for one reason or another have gone undetected or unrepaired by the Smog Check program. These excess emissions could be further reduced.

VRV programs that recruit and repair high emitting vehicles independent of Smog Check will reduce the emissions of three components of the Roadside ASM emissions shown in Figure 1:

- Emissions that would have been repaired at the next Smog Check;
- Emissions of vehicles that received a Cost Waiver;
- Emissions of vehicle that were not, and will not be, identified and repaired by Smog Check

Therefore, part of the emissions reductions from high emitter VRV programs are incremental to Smog Check and will result in roadside emissions levels that are below those currently assumed in EMFAC and the SIP. For these emissions VRV programs should be given credit for the full life of the repair.

Similarly, mandatory RSD high emitter identification and repair programs would also yield incremental reductions and a large portion of their repairs should also be given credit for the full life of the repair.

Comment and Proposed Changes to the *Carl Moyer Guidelines, Proposed 2006 Revision to Project Criteria for Light-Duty Vehicles,* Release date: *October 20 2006, Board date: December 7, 2006.*

VAVR Credits

On Page XI-6, the document describes how VAVR credits are to be calculated:

For the first year of the three year credit life, a retired vehicle's baseline emissions would be equal to the confirmatory Smog Check ASM reading converted to a federal test procedure (FTP) based gram per mile emission rate using conversion equations developed from the 2004 Evaluation of the California Enhanced Inspection and Maintenance (Smog Check) Program. [ARB/BAR, 2004; ARB/BAR, 2005]

For years two and three of the credit life, its emissions would have been lower because, had it not been retired, it would have presumably failed its Smog Check and been repaired to pass Smog Check. ARB staff proposes that the retired vehicle's baseline emissions for years two and three be equal to the Smog Check pass/fail emission cutpoint pollutant concentrations for the vehicle class and model year, converted to an FTP based gram per mile emission rate. This approach assumes retired vehicles are one year away, on average, from their next biennial Smog Check. Some vehicles may fail the Smog Check test for only one pollutant. If a vehicle's emissions at time of retirement were below the Smog Check pass/fail cutpoint for a pollutant, the emissions for that pollutant would be equal to its measured emissions at the time of retirement because the Smog Check program would not have forced any reduction of the passing pollutant.

The proposal to use Smog Check cutpoint values as the assessment of high emitter VAVR vehicle emissions during the second and third year following retirement will, in many cases, underestimate the value of retiring a high emitter.

The Roadside ASM results show that 40% of vehicles repaired through Smog Check fail roadside ASM in the year following their inspection. The ARB 2004 Evaluation of Smog Check, page 41, states that, "based on roadside data collected in 2001, 40.4 percent of the repaired vehicles tested failed the subsequent roadside test."

At the October 2006 IMRC meeting, Phil Heirigs, Sierra Research presented draft results of a more recent review California random roadside ASM tests. The roadside ASM fail rate vs. time since the last Smog Check showed increasing fail rates with time, as one would expect. But, fail rates were high and the trends were relatively flat. If projected back to time zero, i.e. right after the Smog Check, then the imputed roadside fail rates would be:

- 40+% for vehicles that initially failed Smog Check;
- 18% for vehicles that initially passed Smog Check.

Therefore, the Roadside data show that at best 60% of high emitters are satisfactorily identified and given durable repairs in Smog Check and that, any point in time, at least 40% remain high emitters.

Consequently, we believe a more accurate estimate of the remaining life emissions for high emitters would be to use the average of Roadside ASM emissions for similar age

and model year vehicles that failed their previous Smog Check, whether repaired or not. To overcome ‘thin data’ in the roadside tests, model year average roadside ASM values of the vehicles failing their previous Smog Check could be converted to FTP values for the specific model using the same equations proposed for the first year benefit calculation.

This approach may result in higher credits for some models and lower credits for others than the proposed use of ASM cutpoints. We believe the direct use of Roadside test results will provide a more accurate projection of what would have occurred.

On a related topic, we request ARB verify the stability and reasonableness of the referenced conversion equations, i.e. those developed from the 2004 Evaluation of the California Enhanced Inspection and Maintenance (Smog Check) Program. [ARB/BAR, 2004; ARB/BAR, 2005]. We suggest exercising the equations and plotting results over a wide range of HC values up to 10,000 ppm HC and NOx to verify results remain stable and reasonable over the range for a variety of models.