15-day Comment
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STATE OF CALIFORNIA
AIR RESOURCES BOARD
RECEIVED 4-5-93
BY BOARD SECRETARY

WSPA
Western States Petroleum Association

Gina Grey
Senior Coordinator
Downstream Issues

April 5, 1993

Pat Hutchens, Board Secretary
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

Re. **WESTERN STATES PETROLEUM ASSOCIATION COMMENTS ON 15 DAY PACKAGE AMENDMENTS TO CERTIFICATION REQUIREMENTS & PROCEDURES FOR LEVS MAILOUT #93-05**

Dear Ms Hutchens:

Attached for your agency's action are comments on the above 15 day package. If you have any questions or comments, please contact me at 818-543-5352.

Sincerely,

Gina Grey

505 N. Brand Blvd., Suite 1400 • Glendale, California 91203 • (818) 543-5352

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WSPA Comments on CARB's 15-Day Modifications to the Rulemaking on Amendments to Certification Requirements and Procedures for Low-Emission Passenger Cars Light-Duty Trucks, and Medium-Duty Vehicles

April 5, 1993

These comments are submitted by the Western States Petroleum Association (WSPA), a trade association of approximately 40 companies whose members conduct much of the producing, refining, transporting and marketing of petroleum and petroleum products in the western United States. WSPA appreciates the opportunity to comment on the California Air Resources Board's (CARB) March 22, 1993, Mail-Out #93-05 containing modified text, supporting documentation, and information relating to their January 14, 1993, public hearing considering amendments to certification requirements and procedures for low-emission passenger cars, light-duty trucks, and medium-duty vehicles.

WSPA's concerns regarding the rulemaking on reactivity adjustment factors (RAFs) for TLEV's and LEVs operating on Phase 2 gasoline are documented in testimony and written comments submitted at the CARB hearing on January 14, 1993. Many of these comments still hold and are incorporated herein by reference.

WSPA wishes to thank CARB for responding to some of our concerns by correcting errors and omissions in the data used to calculate the proposed RAFs, which were brought to CARB's attention by WSPA and members of the auto industry. However, we note that we could not have discovered these errors had we not been given additional time, via two postponements, to review data and information relating to this rulemaking, much of which was made available after the rule was first proposed. This experience supports WSPA's contention that the regulated community should be provided all relevant data for a rulemaking well in advance of the hearing and not be given interim or incomplete data that are subject to change up to the time of the hearing.

Although CARB corrected vehicle emission profiles for chromatographic problems and other mistakes and used the corrected data to recalculate the RAFs, they did not use the corrected emission profiles nor the new RAFs in their airshed modeling analysis. Consequently the modeling results should be viewed with skepticism. Proper airshed model validation of the RAFs would require that the same vehicle emission profiles used for RAF determination also be used in modeling.

Attachment I: Board Resolution 93-3

Page 3, paragraph 2, states that "...an action not be adopted where it will have significant adverse environmental impacts..." Since airshed model testing of the RAFs has not been conducted using the corrected emissions profiles and the final RAFs, the environmental impacts of the rulemaking have not been properly evaluated.

Page 3, paragraph 3, implies that CARB has considered the impact of the proposed regulations on the economy of the state. We are not aware of any such assessment.

Page 3, last paragraph, indicates that the baseline reactivity values for 1993 through 1997 LEVs and ULEVs operating on conventional gasoline are based on tests of vehicles equipped with "advanced emission control systems..." For many of the test vehicles, these "advanced emission control systems" consisted of electrically heated catalysts (EHCs) that were installed by CARB. These control systems were "add-ons" or retrofits; they were not included in the original vehicle designs. There is serious doubt that such systems adequately represent what will really be used by vehicle manufacturers in future years.

The "confirmatory modeling" alluded to in page 4, paragraph 2, is not valid for the reasons noted above and further discussed below.

Attachment IV: Additional Modifications

In paragraph 1, CARB explains that, because of a coelution problem, they apportioned a single chromatographic peak into 70% MTBE and 30% 2,3-dimethylbutane. This is a simplification, since the actual breakdown varies considerably from bag-to-bag and from vehicle-to-vehicle. For instance, a recently completed Petroleum Environmental Research Forum (PERF) project measured the same 70/30 split in Bag 1 samples, but found no MTBE at all in Bags 2 and 3. The FTP-composite ratio of MTBE/2,3-dimethylbutane was found to be 63/37. CARB's assumption of a single ratio of 70/30 is not strictly correct, but it probably introduces no significant error.

Airshed Modeling Protocol and Updated Results

Although the March 15, 1993, version of the CARB report, "Establishment of Corrections to Reactivity Adjustment Factors for Transitional Low-Emission Vehicles and Low-Emission Vehicles Operating on Phase 2 Reformulated Gasoline: Airshed Modeling Protocol and Updated Final Results," provides the most complete summary to date of the airshed modeling methodology and results,

there have been no substantive changes to previous versions. A more thorough report is needed to truly evaluate the modeling analysis.

The opening paragraph indicates that "... the maximum incremental reactivity (MIR) approach used to calculate the RAFs... has been supported by the National Research Council [NRC]." This appears to be something of an overstatement. Our reading of the NRC report does not lead us to conclude that the NRC "supports" or endorses the MIR approach.

The opening paragraph also indicates that RAF corrections are necessary because of "differences in spatial and temporal patterns of emissions between motor vehicle fleets." This hypothesis should be tested; WSPA maintains that the need for a correction may be due to problems with the MIR scale.

It is clear from reading this report that the airshed modeling conducted by Carnegie Mellon University (CMU) was done before the errors in the speciation data due to three coeluting pairs of organic gases and the error in transmitting the aldehyde data to Professor Russell were detected. It is also clear that the airshed model runs were not repeated using the corrected data even though this corrected data set was used to revise the RAFs. It also appears that the final corrected data set includes data from vehicles not included in the data used by CMU. The airshed modeling analysis should have used the same data set as that used by CARB in developing the final RAFs.

The report argues heuristically that, since the CMU modeling indicates a RAF correction of 4 to 5 percent and since the corrected RAFs are 4 percent higher than those given to Professor Russell to model, there is no need for a correction to the RAFs for TLEVs and LEVs operating on Phase 2 gasoline. For the reasons noted above, WSPA feels this should be tested by repeating the CMU analysis with the corrected data set. This is especially important since airshed model results are very sensitive to the amount of aldehyde present and since Professor Russell was given incorrect aldehyde data to model.

Table I, footnote c, indicates that the corrected RAFs (current version) includes "all vehicle test results," and Table IV and Appendix D refer to the "complete data set." The earlier CARB documentation regarding this rulemaking and subsequent informal WSPA meetings with CARB discussed various sets of vehicle test data; which set of vehicle test data did CARB use to establish the final RAFs for TLEVs and LEVs operating on Phase 2 gasoline and the final baseline reactivity values for LEVs and ULEVs? WSPA requests that CARB clearly and completely document the data that they used to develop the final RAFs.

Page 4, last paragraph, states that the cold start emissions fraction was lower for TLEVs than for LEVs when both were operating on RF-A. This is counter-intuitive since the LEVs were equipped with electrically-heated catalysts, which are particularly effective in reducing Bag 1 emissions, whereas the TLEVs were not.

Page 5, paragraph 2, states that vehicle exhaust emissions comprise 8% of the total NMOG inventory in 1987 and 22% in 2010. This does not seem possible. In other studies, such as the one conducted by the Auto/Oil Program, the contribution of motor vehicles to the total NMOG inventory is projected to decline greatly between the years 1987 and 2010.

Page 10, Table V, shows all NOx emissions to be the same for a given year; how can this be when the NOx emissions standard for LEVs is only one-half as large as the standard for TLEVs (0.2 vs. 0.4 g/mile)?

Page 10, Table VI, shows that fleet emissions of LCC species ALKA, AROM, and HCHO are all higher from LEVs than from TLEVs. These relationships seem counter-intuitive. CARB indicates that the HCHO case is in error; could the same be true for ALKA and AROM?

In Section V and also in Tables VIII, CARB notes that the computed ozone peaks are usually far downwind and that the values of these peaks are insensitive to NMOG emissions. This is troublesome because it seems to argue against some of the basic premises of MIR-based regulation. It appears to imply that VOC control is not particularly effective in reducing peak ozone, or else that the ozone peak occurs too far downwind to be a useful reference point for defining the MIR values. More explanation on this point would be helpful.

In general, we find that insufficient information has been published about the CMU model and key parameters that affect reactivity simulations, such as predicted aldehyde concentrations and aldehyde photolyis rates.

Futhermore, the CMU model performance has not been compared to standards published by CARB in their photochemical modeling guidelines; the CMU model performance may not qualify for regulatory use. Although recent papers by CARB indicate that HC and CO emissions are underestimated by a factor of two, the CMU simulation of the August SCAQS episode, with doubled HC and CO emissions, produces peak ozone concentrations which are much higher than observed; this may indicate the presence of compensating errors in the model.

The CARB report states that the CIT airshed model, on which the CMU modeling is based, includes night-time reactions that create

HONO concentrations similar to those observed during SCAQS; however, the CMU model simulation significantly overestimates HONO concentrations when compared to those measured during the SCAQS August 1987 episode at the Long Beach site.

In closing, we note that the supporting documents accompanying this rulemaking contain no discussion of the uncertainties associated with the final RAFs and the airshed modeling performed to test their validity. WSPA urges CARB to conduct an in-depth quantitative analysis of the uncertainties in the final RAFs and in the airshed modeling analysis.

15-day Comment

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STATE OF CALIFORNIA
AIR RESOURCES BOARD
RECEIVED
BY BOARD SECRETARY

General Motors
Environmental and Energy Staff
30500 Mound Road, Box 9055
Warren, Michigan 48090-9055

SM-2336
April 5, 1993

P. Hutchens, Board Secretary
California Air Resources Board
P.O. Box 2815
Sacramento, California 95812

Dear Ms. Hutchens:

This letter and the attachment are General Motors (GM) comments to California Air Resources Board (CARB) Mail-Out #93-05, which concerns changes related to CARB's Low Emission Vehicle/Clean Fuels program that were considered at the January 14, 1993 Board Hearing.

GM's comments pertaining to the "California Non-Methane Organic Gas Test Procedures" and the related CARB internal letter dated November 18, 1992 need your immediate attention. CARB is diverting several significant regulatory test procedures issues to the equivalency determination process, rather than incorporating them into the "California Non-Methane Organic Gas Test Procedures." Deferring these test procedure issues to the equivalency determination process deprives manufacturers of an objective and repeatable test procedure specifically defined in the regulations. Absence of such a specific and well-defined test procedure introduces an unnecessary degree of uncertainty to the manufacturing process, which will contribute substantially to added testing expenses. This situation should and can be avoided.

Detailed comments on the NMOG test procedures were submitted prior to the January 14 Board hearing (reference Environmental Research Consortium letter dated January 4, 1993). Many of the issues raised in these comments have not been successfully resolved, as evident from Mail-Out 93-07, which includes modified NMOG test procedures. Therefore, we submit the attached detailed comments on Mail-Out 93-07 as part of this submission of comments on Mail-Out 93-05 because these two mail-outs should be considered together (see Attachment #2).

In addition, CARB has scheduled the test procedure workshop after the close of the 15-day comment period, which precludes the workshop as a forum to further discuss the unresolved issues. This appears to be an illogical sequence of events which precludes a meaningful exchange of information at the workshop. Accordingly, we urge CARB to delay the close of the comment period until 15 days

Let's Get It Together
SAFETY BELTS SAVE LIVES

after the close of the workshop. This would permit the industry to discuss these critical issues with the CARB Staff at the scheduled April 21, 1993 workshop and resolve them, if possible, without unduly delaying the regulatory process.

GM's detailed comments on Mail-Out 93-05 are contained in the attachment (see Attachment #1). If you have any questions regarding these comments please contact me or Mr. W. C. Jones of my staff on (818) 997-5515.

Sincerely,

Samuel A. Leonard, Director
Automotive Emission Control

jse

Attachments

cc: K. D. Drachand

In regard to canister loading requirements for vehicles certified to the new evaporative procedures, GM supports the option to allow manufacturers to establish an adjustment factor for each engine family based on a minimum ten vehicle sample. As more becomes known about evaporative purge characteristics on these vehicles, it may be technically sound to group engine families having similar purge characteristics together for establishing adjustment factors.

GM also supports the option of using Indolene, Phase 1 or Phase 2 gasoline for audit testing through the 1994 model year. This will make it easier to implement Phase 2 gasoline into the audit test facility. Furthermore, testing on Phase 2 gasoline makes sense from a technical standpoint because vehicles being produced now will be operated on Phase 2 gasoline in-use. In this regard, GM believes Phase 2 gasoline should also be used for New Vehicle Compliance Testing (i.e. Title 13 testing) and in-use testing for such vehicles.

Hybrid Electric Vehicle Test Procedures

GM remains very concerned that the test procedures place HEVs at an unfair advantage relative to conventional vehicles. This is primarily because the procedures do not credit HEVs for any net increase in battery state of charge occurring over the test cycle, when such an increase could be used subsequently to drive the vehicle in an all-electric mode. One way around this testing deficiency is for manufacturers to design the control strategy so that the battery returns to its starting state of charge at the end of the test. While this can be done, it may not result in maximum auxiliary power unit (APU) efficiency, minimum emissions or acceptable durability. In our view, favoring a battery "cycle" equal to one urban city schedule represents an arbitrary technology-forcing aspect of the test procedure that is likely to delay and complicate the development of HEVs. GM encourages CARB to continue to work with the SAE committee on establishing hybrid test procedures that will attempt to address these issues.

Also, CARB defines the battery state-of-charge for testing HEVs as follows:

> "Hybrid electric vehicles shall be tested with the battery state-of-charge set such that one of the following two conditions is satisfied: (1) the state-of-charge is at the lowest level allowed by the control unit of the auxiliary power unit; or (2) the state-of-charge is set such that auxiliary power unit operation will be at its maximum level at the beginning and throughout the emission test."

GM believes the term "maximum level" of the APU operation should be clarified to mean the maximum power level the APU could experience during the driving schedule of the exhaust emissions test.

Attachment #1
GM Comments on Mail-Out 93-05

Reactivity Adjustment Factors (RAFs)

GM anticipates working with CARB Staff to develop a procedure and improved test protocol for the determination of the 1998 and later model year RAFs. We believe it is essential that CARB and industry agree on the test protocol before resources are committed to data generation. Also, GM recommends that the Reactivity Advisory Panel be involved in this effort.

GM supports the adoption of the interim RAFs for 1993 through 1997 model year TLEVs and LEVs operating on Phase 2 gasoline of 0.98 and 0.94 respectively. The regulatory language is clearly applicable to all 1993 through 1997 passenger cars and light-duty trucks that select a generic RAF rather than an engine family specific RAF. Therefore, conditional generic RAFs established prior to these modifications would no longer apply.

Regarding the "Airshed Modeling Protocol and Updated Final Results," GM agrees with the following statement:

> "In general, the null test results for the ozone dosage and exposure metrics are within plus or minus 5 percent of the equal ozone impacts required by the regulation, with much closer agreement in many cases"

Also, based on the modeling results and the errors and corrections noted in the text, GM agrees that "the airshed modeling results indicate that there is no need for a correction to the RAFs for TLEVs and LEVs operating on Phase 2 gasoline."

GM noticed what we believe are some errors in the regulatory documents. On page 13-1 of "California Exhaust Emission Standards and Test Procedures...", there is a statement that "1993-1997 model year TLEVs" have a 0.94 RAF. This should be "1993-1997 model year LEVs." On page 13-2 of "California Exhaust Emission Standards and Test Procedures...", the "g ozone potential per g NMOG" baseline for conventional gasoline of 3.13 on page 13-2 is incorrectly attributed to "All LEVs" rather than all 1993 through 1997 model-year LEVs and ULEVs.

Changes to Assembly-Line Test Procedures

Due to the high volume nature of assembly-line testing, changes in these test procedures can have a substantial impact on the testing burden. CARB has been sensitive to manufacturers concerns about increased test burden by providing options which allow manufacturers to test a sample of vehicles to establish adjustment factors which can then be applied to all test results.

Miscellaneous

Title 13, Section 1960.1, (g)(1) note (6) a. requires application of the RAF in determining compliance with intermediate in-use compliance standards for NMOG. The RAF should also be applied to determine compliance with final in-use standards (i.e. certification standards). GM suggests the regulatory language be modified to reflect this. Also, the wording in (h) (2) note (9) a. should be consistent with (g)(1) note (6) a.

Any regulations based on production volumes or projected sales volumes should make it clear that the volumes used do not include vehicles certified to California requirements but sold outside California (e.g. in Section 177 states). For example, page 3-10 of "California Exhaust Emission Standards and Test Procedures..." addresses Tier 1 alternative in-use compliance percentages in terms of "California-certified passenger cars and light-duty trucks." Because California has no authority to regulate new vehicles titled registered or used in other states, this language should be changed to make it clear that any such vehicles are not included.

Throughout the regulatory text, GM suggests the wording "PCs and LDTs from 0-3750 lbs. LVW" be changed to "PCs and 0-3750 lbs. LVW LDTs" to clarify that the 0-3750 lbs. LVW only applies to LDTs.

In Title 13, Section 1960.1, (g)(1) note (6) c. the words "PCs and LDTs from 3751-5750 lbs. LVW" should be changed to "LDTs from 3751-5750 lbs. LVW."

Attachment #2

SUMMARY OF COMMENTS ON NMOG PROCEDURES

1. Equivalency Since the CARB and the GM chemistry laboratory methods and instrumentation are not the same, the issue of equivalency between the two procedures may be difficult to prove. Also of concern is what is accepted as equivalent today may be declared not equivalent tomorrow. A procedure should be established where dissimilar methods can be demonstrated as to be equivalent by some type of cross check program.

   The CARB test procedures are written into law. Deviations from these procedures put the automotive industry at great jeopardy. Since these techniques are in their infancy, continuous improvements and changes may be forthcoming. CARB should allow latitude for these improvements.

2. Calibration Gases The use of benzene as a calibration gas is improper. All previous regulations have been based on propane as a calibration standard. The results between the two calibrations are not identical, although perhaps close.

   The concentration of the calibration gases used for the low and midrange GCs are too low. The proposed calibration gas levels would result in calibrating the GCs at 5 to 10% of typical measured levels. This is a poor practice. GM recommends that the propane calibration gas be at least 1.0 ppmC.

3. Crossover Check CARB has eliminated the crossover check. GM recommends that this check be required. CARB should use hexane or pentane as a crossover check gas and allow GM to use butane as the crossover gas.

4. Quality Control Blank runs for the hydrocarbon speciation GCs are not needed. GM continuously purge these systems when the GCs are not in use. This procedure prevents hydrocarbon hang-up within the GC. Of greater concern is hydrocarbon hang-up in the sample bags. Measurement quality control is protected by CARB's vehicle test 95% consistency rule.

   Quality control charts on each quality control standard are not necessary. GM recommends that two compounds be selected for daily charting.

   Duplicate tests are a poor technique to insure good emission measurements. A far better technique would be to compare the chemistry laboratory results with an independent measurement from the test site FID. These results should agree within ±15%. Also, measurement quality control is protected by CARB's vehicle test 95% consistency rule.

   The LOD requirements for the low range GC should be the same as the LOD requirements for the midrange GC. GM recommends that the LOD for method 1002 be 20 ppbC which is the same as method 1003.

5. Cryotrapping The RPD requirements for duplicate tests for the low and midrange GCs are too tight. The use of the proposed techniques may force the automotive industry into scrapping their current laboratory equipment and installing the CARB cryotrapping instrumentation. These low productivity techniques would force the GM members to greatly expand their laboratories.

GENERAL MOTORS
DETAILED COMMENTS TO
CARB'S NMOG TEST PROCEDURES
MAIL OUT #93-07

ATTACHMENT 1 - PROCESS FOR DETERMINATION OF EQUIVALENCY:

(B)(2)(a) The detection limit for method 1001 should be stated in µg/mL.

The detection limit for method 1002 should be same as the detection limit for method 1003. The detection limit for both methods should have an equivalent impact on emission results. The extremely low (5 ppbC) detection limit coupled with the duplicate test requirement may preclude the use of current techniques and equipment developed by GM during the Auto/Oil Program. Use of these limits and the duplicate test requirements will force the industry to reinvest in new Chemistry Laboratory equipment such as cryotrapping. GM recommends a detection limit of 20 ppbC for both methods.

(B)(3)(a)(1) Propane and benzene are NIST traceable in each of the manufacturer's laboratories. It has not been the policy of the EPA to require the manufacturers to send their cylinder to NIST to establish NIST traceable concentrations. All laboratories have NIST SRMs to provide NIST traceability.

Carbonyls and alcohols are not NIST traceable at this time.

(2) GM disagrees with need for blank analysis for methods 1002 and 1003.

(4) GM only agrees with the need to perform duplicate runs on methanol tests.

(5) GM does not agree on the proposed method for the Limit of Detection (LOD) determinations. We have stated previously that both the proposed linearity checks and the limit of detection checks are unnecessary for automotive exhaust emission testing, although we have agreed to perform them.

(B)(4) The definition of resolution and sensitivity is ambiguous as required in this section.

General

GM believes that the analysis results obtained in the chemistry laboratory must have relevance to the emission results obtained on the emission test sites. Therefore, GM recommends that a correlation check must be conducted between the chemistry laboratory and the emission test site. A criterion must be established comparing the test results between the two systems and these results must agree within a certain tolerance.

CARB proposes to drop the crossover check between Methods 1002 and 1003. GM objects to dropping this requirement. GM recommends that this check be retained to provide consistent results between the two methods.

GM also proposes that a site aldehyde recovery check be required to insure the proper measurement of aldehydes. While this check may not be appropriate within these methods, it should be added to the test site procedures.

A quality control check should be included by either comparing a propane bag reading between the site FID and the low and mid-range GCs or by conducting a repeatable car test measurement between the test site FID measurement and the chemistry laboratory hydrocarbon measurement.

A. GENERAL APPLICABILITY AND REQUIREMENTS

(5) Technology is currently not available at the manufacturers for diesel speciation as proposed by CARB. This proposed technique leaves many unanswered questions concerning the Carter MIR values to be used and how they are to be used. This technique may be a viable research tool but is not acceptable for a production laboratory environment. The diesel speciation technique should be dropped until CARB fully develops and defines proper procedures.

DETERMINATION OF NON-METHANE HYDROCARBON MASS EMISSIONS BY FLAME IONIZATION DETECTION

No comment for this section.

DETERMINATION OF ALCOHOLS IN AUTOMOTIVE SOURCE SAMPLES BY GAS CHROMATOGRAPHY METHOD NO. 1001

1.1 The proposed lower test range of 4 µg/mL is one half of the proposed limit of detection.

6.4.2 For methanol analysis duplicate tests are needed until better repeatability can be achieved with methanol gas chromatograph.

8.4 A blank check is important to insure that the water used to capture methanol is free of contamination. A blank check to insure that the methanol GC is free of contamination has not proven to be important. A daily blank check should be required before a water source is used to fill impingers.

8.6 The proposed allowable RPD levels are too loose. GM recommends the following criteria:

Average Measurement for Duplicate Runs	Allowable RPD (%)
< .1 µg/mL	no criteria
0.1 to 0.5 µg/mL	50%
0.5 to 1.0 µg/mL	25%
> 1.0 µg/mL	08%

DETERMINATION OF C2 - C5 HYDROCARBONS IN AUTOMOTIVE SOURCE SAMPLES BY GAS CHROMATOGRAPHY METHOD NO. 1002

4.2 This step requires the use of a 10 mL sample loop. GM uses a 5 mL sample loop. Although a larger sample loop should result in a lower level of detection, the required LOD of 5.0 ppbv is about the achievable level of GM. The required duplicate test requirement may be very difficult to achieve with this LOD. These requirements may require GM to reequip their test laboratories with new instrumentation. Does this required level of detection (5 ppbC) really matter to RAF values? GM does not believe that this level is significant to the RAF numbers.

5.1 Six 9's helium purity is not required. Five 9's helium has been found to be acceptable with our methods.

5.4 The use of a 40 ppbv calibration gas is a poor practice when this concentration is below most measurements. The calibration gas should be near the upper range of expected measurements. In all EPA Federal Register procedures it is a requirement that the calibration gas be near the full scale value. GM recommends that the calibration gas have as a minimum a 1.0 ppmC concentration.

Emission laboratory operations have relied on NIST SRMs to provide traceability to NIST. The CARB requirement to send our cylinders to NIST for analysis is unacceptable. GM recommends that propane and benzene continue to be NIST traceable by individual laboratory analysis to NIST SRMs.

5.5 The quality control standard concentration of 30 - 50 ppbv is too low. GM recommends a quality control check standard of at least 1 ppmC.

8.1 The blank run before the daily calibration in not needed. GM continuously purges the GC sample system with air. We believe that this would be the fix if contamination were found in the GC. Of far more importance is contamination in the sample bags which CARB does not address at all.

8.4 Maintaining control charts on each of the eleven compounds in the control standard is not necessary to insure that the measurement process is in control. GM recommends that two compounds be selected to be charted daily to insure that the measurement process remains in control. These additional control charts creates a burden and reduces productivity without improving quality control.

8.5 Duplicate tests are a poor technique to insure good emission measurements in the chemistry laboratory. A far better technique would be to compare chemistry laboratory results with the test site hydrocarbon results. GM recommends that a comparison with the test site FID be conducted and that these measurements agree within ±15%. This check and the crossover check should be performed for every vehicle test.

The RPD requirements are far too tight. These limits with the proposed LOD limit of 5 ppbC may be unachievable by GM laboratories. This requirement may force GM into scrapping their current laboratories and force the use of cryotrapping techniques and equipment. GM recommends the following RPD limits:

Average Measurement for the Duplicate Runs	Allowable RPD
< 0.1 ppmC	No criteria
0.1 to 1.0 ppmC	± 50%
1.0 to 5.0 ppmC	± 25%
> 5.0 ppmC	± 15%

8.7 GM is uncertain of the procedural details required to perform the limit of detection study. CARB uses four "low" concentration levels above the LOD with the stipulation that the lowest concentration standard be at 1 - 5 times the detection limit. This requires a 25 ppbC gas cylinder (or lower concentration) consisting of 11 components. GM is unaware of commercially available cylinder mixtures that span this low concentration range. We request the CARB source of the cylinders and the test data used to generate the typical LODs cited. We believe the LOD of low and midrange GCs should be equal at 20 ppbC.

8.8 CARB has eliminated the crossover check. GM recommends that this check be required. CARB should use hexane or pentane as the compound for comparison GM should be allowed to use butane. This check requires no additional time or analysis time. The results are available from the normal bag measurements. GM has found this test to be useful to find incorrect bag analyses.

Attachment 1 The low end compounds as recommended by CARB do not match the GM low end compound list. However, all of those compounds not found in the GM low end list can be found in the GM midrange list.

DETERMINATION OF C6 -C12 HYDROCARBONS IN AUTOMOTIVE SOURCE SAMPLES BY GAS CHROMATOGRAPHY METHOD NO. 1003

3.2 There should be an absolute limit of 24 hours for reading the bags. This section should be consistent with method 1002.

5.1 Six 9's helium purity is not required. Five 9's helium has been found to be acceptable with our methods.

5.5 The use of benzene as a calibration gas is improper. All previous emission regulations have been based on propane as the calibration standard. It is improper to calibrate part of the hydrocarbons on propane (method 1002) and part of the hydrocarbons on benzene (method 1003). The results are not identical. GM recommends that propane be used as the calibration gas.

The use of 80 ppbv calibration gas is a poor practice when the concentration is below most measurements. The calibration gas should be near the upper range of the expected measurements. In all EPA Federal Register procedures it is a requirement that the calibration gas be near the full scale value. GM recommends that the calibration gas have as a minimum a 1.0 ppmC concentration.

Emission laboratory operations have relied on NIST SRMs to provide traceability to NIST. The CARB requirement to send our cylinders to NIST for analysis is unacceptable. GM recommends that propane and benzene continue to be NIST traceable by individual laboratory analysis to NIST SRMs.

5.6 The quality control standard concentration of 20 - 100 ppbv is too low. GM recommends a check standard of at least 1 ppmC.

8.1 CARB did not change the text as promised in K. D. Drachand's letter to Marcel Halberstadt (Reference No. AF-92-017) to have only one blank per day.

The blank run before the daily calibration in not needed. GM continuously purges the GC sample system with air. We believe that this would be the fix, if contamination were found in the GC. Of far more importance is contamination in the sample bags which CARB does not address at all.

8.4 Maintaining control charts on each of the six compounds in the control standard is not necessary to insure that the measurement process is in control. GM recommends that two compounds be selected to be charted daily to insure that the measurement process remains in control. These additional control charts create a burden and reduce productivity without improving quality control.

8.5 Duplicate tests are a poor technique to insure good emission measurements in the chemistry laboratory. A far better technique would be to compare chemistry laboratory results with the test site hydrocarbon results. GM recommends that a comparison with the test site FID be conducted and that these measurements agree within ±15%. This check and the crossover check should be performed for every vehicle test.

The RPD requirements are far too tight. This requirement may force GM into scrapping their current laboratories and force the use of cryotrapping techniques and equipment. GM recommends the following RPD limits.

Average Measurement for the Duplicate Runs	Allowable RPD
< 0.1 ppmC	No criteria
0.1 to 1.0 ppmC	± 50%
1.0 to 5.0 ppmC	± 25%
> 5.0 ppmC	± 15%

8.7 GM is uncertain of the procedural details required to perform the limit of detection study. CARB uses four "low" concentration levels above the LOD with the stipulation that the lowest concentration standard be at 1 - 5 times the detection limit. This requires a 100 ppbC gas cylinder (or lower concentration) consisting of six components. GM is unaware of available cylinder mixtures that span this low concentration range. We request the CARB source of the gas and the test data used to generate the typical LODs cited. We request clarification on which components are used to calculate the LOD. GM believes the LOD of low and midrange GCs should be equal at 20 ppbC.

8.8 CARB has eliminated the crossover check. GM recommends that this check be required. CARB should use hexane or pentane as the compound for comparison and GM should be allowed to use butane. This check requires no additional time or analysis time. The results are available from the normal bag measurements. GM has found this test to be useful to find incorrect bag analysis.

Attachment 1

CAS Number 00591-35-2 should be 00590-35-2

GM disagrees with the removal of the following compounds from the CARB midrange GC list:

cyclohexene
n-nonane
2,5-dimethylhexane
2-methyloctane

Of particularly great importance is CARB's removal of n-nonane. In lieu of having a single calibration gas with all hundred-odd compounds in it, GM uses a calibration gas with all of the normal alkanes in it as retention index markers. This ensures that the retention times for all of the compounds not in the calibration mix will be properly adjusted on a daily basis. CARB's elimination of n-nonane from the hydrocarbon list will require the use of a definitive alternative method (i.e., GC/MS, not PID) for proper calibration and/or for correct compound identification for each vehicle sample. GM recommends the restoration of n-nonane to the midrange hydrocarbon list and the inclusion of n-heptane, n-nonane, n-undecane, and n-dodecane to the required list of compounds in the CARB midrange GC calibration mixture.

DETERMINATION OF ALDEHYDE AND KETONE COMPOUNDS IN AUTOMOTIVE SOURCE SAMPLES BY HIGH PRESSURE LIQUID CHROMATOGRAPHY METHOD NO. 1004

3.2 GM recommends that the test samples be stored no more than 6 days. This will be consistent with method 1001.

5.5 A reference control standard has now been developed by Radian Corporation. GM recommends that this control standard be included in the test procedures.

5.7 GM does not believe that a working solution must be prepared every two weeks. A working solution should be prepared when needed.

8.1 A blank run to check solvent impurity is required daily, but when cartridges are used the batch needs to be checked only when received.

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8.8 Duplicate tests are not required to insure good emission measurements in the chemistry laboratory. Round robin correlation will insure measurement accuracy. Repeatability is not a problem with aldehyde and ketone measurements.

If duplicate tests were required, the RPD requirements are far too loose. GM recommends the following RPD limits.

Average Measurement for the Duplicate Runs	Allowable RPD
< 0.06 μg/mL	No criteria
0.06 to 0.2 μg/mL	± 50%
0.2 to 1.0 μg/mL	± 25%
> 1.0 μg/mL	± 08%

DETERMINATION OF NMOG MASS

2.1 This section is confusing. Words should be added stating that NMHC mass for gasoline, LPG, alcohol and diesel vehicles should be obtained by FID analysis and that NMHC mass for CNG vehicles should be obtained by GC analysis. All masses used for the RAF determination should be by GC.

15-day Comment

STATE OF CALIFORNIA
AIR RESOURCES BOARD
RECEIVED 4-5-93
BY BOARD SECRETARY

American Automobile Manufacturers Association
7430 Second Avenue, Suite 300 • Detroit, Michigan 48202
Tel. No. 313-872-4311 • Fax No. 313-872-5400

XC: TAC
MSD
Legal

April 5, 1993

Via Fax: (818) 575-6818

Mr. K. D. Drachand, Director
Mobile Source Division
California Air Resources Board
9528 Telstar Avenue
El Monte, CA 91731

Dear Mr. Drachand:

Re: CARB NMOG Test Procedures

The American Automobile Manufacturers Association (AAMA) has several concerns on the California Air Resources Board's (CARB's) Non-Methane Organic Gas (NMOG) test procedures, Reactivity Adjustments Factors (RAFs), changes to assembly-line test procedures and other related provisions. These procedures are discussed in CARB Mail-Out #93-05 "Notice of Public Availability of Modified Text and Supporting Documents and Information: Public Hearing to Consider Amendments to Certification Requirements and Procedures for Low-Emission Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," which is dated March 22, 1993 and CARB Mail-Out #93-07 "Public Consultation Meeting to Discuss the Anticipated Approach to Evaluating Requests From Manufacturers for Determinations of Equivalency Under the California Non-Methane Organic Gas (NMOG) Test Procedures," dated March 10, 1993.

NMOG Test Procedures

The timing and content of Mail-Outs #93-05 and #93-07 results in a diversion of several significant regulatory test procedure issues to the equivalency determination process, instead of incorporating them into the "California Non-Methane Organic Gas Test Procedures." Deferring these test procedure issues to the equivalency determination process will cause vehicle manufacturers an unnecessary degree of uncertainty and testing expense, which can and should be avoided.

In addition, CARB has scheduled the test procedure workshop after the close of the 15-day comment period, which precludes the workshop from acting as a forum to further discuss the unresolved issues. Therefore, AAMA requests that CARB delay the close of the comment period with respect to this issue for a suitable period after the workshop. This will allow the industry to discuss these critical issues with the CARB staff at the April 21, 1993 workshop and hopefully resolve them without unduly delaying the rulemaking process.

06899

The industry has prepared a detailed response to the suggested NMOG test procedure modifications, which is attached. AAMA requests that CARB consider these both as comments on the "notice availability of modified text" (Mail-Out #93-05) and as "written comments...for...the workshop" as encouraged in Mail-Out #93-07.

Reactivity Adjustment Factors

AAMA expects to work with CARB staff to develop a procedure and improved test protocol for the determination of the 1998 model year and later RAFs. It is critical that CARB and industry come to an agreement on the test protocol before resources are committed to the data collection effort.

Changes to Assembly-Line Test Procedures

AAMA supports allowing manufacturers the option of establishing an adjustment factor for each engine family based on a minimum sample of ten vehicles to account for canister loading of vehicles certified using the new evaporative emission test procedures. As more becomes known about evaporative purge characteristics of these vehicles, AAMA suspects that it may be appropriate to group engine families having similar purge characteristics and establish one adjustment factor for the group. AAMA recommends that CARB will remain open to this possibility in the future.

Other Provisions

Any regulation based on production volumes or projected sales volumes should clearly identify that the volume used does not include vehicles certified to California requirements but sold outside California (i.e., in Section 177 states). For example, page 3-10 of the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" addresses 1995 and 1996 model year alternative in-use compliance percentages in terms of "California-certified passenger cars and light-duty trucks." Because California has no authority or basis to regulate new vehicles titled, registered or used in other states, this language should be modified to make it clear that any such vehicles are not included.

Conclusion

Based on the previous discussion, AAMA requests that: 1) CARB allow the comment period on the "notice of availability of modified text" and related issues to remain open until after the workshop on NMOG test procedure equivalency; 2) CARB staff continue to work with industry to quickly resolve the remaining issues related to RAF determination procedures; 3) CARB remain open to the future use of "engine family groups" for the assembly-line test adjustment factor to account for canister loading; and 4) CARB ensure that all references to production or sales volumes be clearly identified as vehicles destined for California and not "California-certified vehicles." Additionally, AAMA requests that this letter be entered into the record of the "notice of availability of modified text" and that the attachment be entered into

the record for the April 21, 1993, workshop. AAMA staff and/or member company representatives will attend the workshop to discuss this matter more fully.

If you have any questions, please call me or Mr. Gerald A. Esper at (313) 872-4311.

Sincerely,

Marcel L Halberstadt/ELE

Marcel L. Halberstadt
Director
Environmental Department

Attachment

THE AMERICAN AUTOMOBILE MANUFACTURERS ASSOCIATION (AAMA)
COMMENTS ON
CARB'S NMOG TEST PROCEDURES
MAIL OUT #93-07
April 5, 1993

SUMMARY COMMENTS ON NMOG TEST PROCEDURES

1. Equivalency The CARB and the industry chemistry laboratories employ different methods and instrumentation to determine the species of hydrocarbons in the exhaust emissions. Consequently, the issue of equivalency between these techniques may be difficult to prove. A methodology should be established where dissimilar methods can be demonstrated to be equivalent by means of a cross check program with predetermined criteria for acceptance.

   Since these techniques are in their infancy, continuous improvements and changes may be forthcoming. CARB should allow latitude for these improvements through technical amendment of the regulation.

2. Calibration Gases The use of benzene as a calibration gas for the determination of C6 to C12 hydrocarbons is inconsistent with the current practice of using propane as the calibration gas. AAMA recommends that propane continue to be used as the calibration gas for all hydrocarbon exhaust measurements so that equivalency between the techniques can be established.

   The concentration of the calibration gases used for the low and midrange GCs are too low. The proposed calibration gas levels would result in calibrating the GCs at 5 to 10% of typical measured levels. This is a poor practice. AAMA recommends that the propane calibration gas be at least 1.0 ppmC.

3. Crossover Check AAMA recommends that a cross check between methods be required to validate each test. Due to the current differences in techniques, the actual crossover compound used by CARB and the industry may not be the same. AAMA members would continue to use butane as the crossover gas.

4. Quality Control In the techniques utilized by the industry, blank runs for the hydrocarbon speciation GCs are not required. AAMA members continuously purge these systems when the GCs are not in use. This procedure prevents hydrocarbon hang-up within the GC. Of greater concern is hydrocarbon hang-up in the sample bags. Measurement quality control is protected by CARB's vehicle test 95% consistency rule.

Quality control charts on each quality control standard are not necessary. AAMA recommends that the two compounds be selected for daily charting.

The methodology of employing duplicate tests does not ensure that the emission measurements are accurate. A more appropriate technique would be to compare the chemistry laboratory results with an independent measurement from the test site FID. These results should agree within ±15 percent. Also, measurement quality control is protected by CARB's vehicle test 95 percent consistency rule.

The Limit of Detection (LOD) requirements for the low range GC should be the same as the LOD requirements for the midrange GC. AAMA recommends that the LOD for Method 1002 be 20 ppbC which is the same as Method 1003.

5. Cryotrapping The RPD requirements for duplicate tests for the low and midrange GCs are too tight. The use of the proposed techniques may force the automotive industry into scrapping their current laboratory equipment and installing the CARB cryotrapping instrumentation. These low productivity techniques would force AAMA members to greatly expand their laboratories.

DETAILED COMMENTS ON NMOG TEST PROCEDURES

ATTACHMENT 1 - PROCESS FOR DETERMINATION OF EQUIVALENCY:

(B)(2)(a) The detection limit for Method 1001 should be stated in $\mu g/mL$.

The detection limit for Method 1002 should be same as the detection limit for Method 1003. The detection limit for both methods should have an equivalent impact on emission results. The extremely low (5 ppbC) detection limit coupled with the duplicate test requirement may preclude the use of current techniques and equipment developed by the American vehicle manufacturers during the Auto/Oil Program. Use of these limits and the duplicate test requirements will force the industry to reinvest in new chemistry laboratory equipment such as cryotrapping. AAMA recommends a detection limit of 20 ppbC for both methods.

(B)(3)(a)(1) Propane and benzene are NIST traceable in each of the manufacturer's laboratories. It has not been the policy of the EPA to require the manufacturers to send their cylinder to NIST to establish NIST traceable concentrations. All laboratories have the NIST SRMs to provide NIST traceability.

Carbonyls and alcohols are not NIST traceable at this time.

(2) AAMA disagrees with need for blank analysis for Methods 1002 and 1003.

(4) AAMA only agrees with the need to perform duplicate runs on methanol tests.

(5) AAMA does not agree on the proposed method for the LOD determinations. We have stated previously that both the proposed linearity checks and the limit of detection checks are unnecessary for automotive exhaust emission testing, although we have agreed to perform them.

(B)(4) The definition of resolution and sensitivity is ambiguous as required in this section.

General AAMA believes that the analysis results obtained in the chemistry laboratory must have relevance to the emission results obtained on the emission test sites. Therefore, AAMA recommends that a correlation check must be conducted between the chemistry laboratory and the emission test site. A criterion must be established comparing the test results between the two systems and these results must agree within a certain tolerance.

A. GENERAL APPLICABILITY AND REQUIREMENTS

(5) Technology is currently not available at the manufacturers for diesel speciation as proposed by CARB. This proposed technique leaves many unanswered questions concerning the Carter MIR values to be used and how they are to be used. This technique may be a viable research tool, but is not acceptable for a production laboratory environment. The diesel speciation technique should be dropped until CARB fully develops and defines proper procedures.

DETERMINATION OF NON-METHANE HYDROCARBON MASS EMISSIONS BY FLAME IONIZATION DETECTION

(5) Equations and calculations for CNG, E85, and E80 should be included in this section. The calculated numerator in the DF equations utilize intermediate and inconsistent round-off. Gas = 13.47, LPG = 11.64, M100 = 11.57, M85 = 12.02, and E100 = 12.29.

DETERMINATION OF ALCOHOLS IN AUTOMOTIVE SOURCE SAMPLES BY GAS CHROMATOGRAPHY METHOD NO. 1001

1.1 The proposed lower test range of 4 μg/mL is one half of the proposed limit of detection.

6.4.2 For methanol analysis, duplicate tests are needed until better repeatability can be achieved with methanol gas chromatography.

8.4 A blank check is important to ensure that the water used to capture methanol is free of contamination. A blank check to ensure that the methanol GC is free of contamination has not proven to be important. A daily blank check should be required before a water source is used to fill impingers.

8.6 The proposed allowable RPD levels are too loose. AAMA recommends the following criteria:

Average Measurement for Duplicate Runs	Allowable RPD (%)
< .1 μg/mL	no criteria
0.1 to 0.5 μg/mL	50%
0.5 to 1.0 μg/mL	25%
> 1.0 μg/mL	08%

DETERMINATION OF C2 - C5 HYDROCARBONS IN AUTOMOTIVE SOURCE SAMPLES BY GAS CHROMATOGRAPHY METHOD NO. 1002

4.2 This step requires the use of a 10 mL sample loop. AAMA members use a 5 mL sample loop. Although a larger sample loop should result in a lower level of detection, the required LOD of 5.0 ppbC is about the achievable level of AAMA members. The required duplicate test requirement may be very difficult to achieve with this LOD. These requirements may require the AAMA members to reequip their test laboratories with new instrumentation. AAMA submits that this required level of detection (5 ppbC) does not really matter in calculating RAF values.

5.1 Six 9's helium purity is not required. Five 9's helium has been found to be acceptable with our methods.

5.4 The use of a 40 ppbv calibration gas is not good laboratory practice since this concentration is below most measurements. The calibration gas should be near the upper range of expected measurements. In all EPA Federal Register procedures it is a requirement that the calibration gas be near the full scale value. AAMA recommends that the calibration gas have as a minimum a 1.0 ppmC concentration.

Emission laboratory operations have relied on NIST SRMs to provide traceability to NIST. The CARB requirement to send our cylinders to NIST for analysis is unacceptable. AAMA recommends that propane and benzene continue to be NIST traceable by individual laboratory analysis to NIST SRMs.

5.5 The quality control standard concentration of 30 - 50 ppbv is too low. AAMA recommends a quality control check standard of at least 1 ppmC.

8.1 The blank run before the daily calibration is not needed. All AAMA members continuously purge the GC sample system with air. Of far more importance is contamination in the sample bags which CARB does not address at all.

8.4 Maintaining control charts on each of the eleven compounds in the control standard is not necessary. AAMA recommends that two compounds be selected to be charted daily to ensure that the measurement process remains in control. Additional control charts create a burden and reduces productivity without improving quality control.

8.5 Duplicate tests are an inadequate technique to ensure good emission measurements in the chemistry laboratory. Duplicate tests can produce duplicate wrong values. A far better technique would be to compare chemistry laboratory results with the test site hydrocarbon results. AAMA

recommends that a comparison with the test site FID be conducted and that these measurements agree within ±15 percent. This check and the crossover check should be performed for every bag of the vehicle test.

The RPD requirements are far too tight. These limits with the proposed LOD limit of 5 ppbC may be unachievable by AAMA laboratories. This requirement may force the American vehicle manufacturers into scrapping their current laboratories and force the use of cryotrapping techniques and equipment. AAMA recommends the following RPD limits:

Average Measurement for the Duplicate Runs	Allowable RPD
< 0.1 ppmC	No criteria
0.1 to 1.0 ppmC	± 50%
1.0 to 5.0 ppmC	± 25%
> 5.0 ppmC	± 15%

8.7 AAMA members are uncertain of the procedural details required to perform the limit of detection study. CARB uses four "low" concentration levels above the LOD with the stipulation that the lowest concentration standard be at one to five times the detection limit. This requires a 25 ppbC gas cylinder (or lower concentration) consisting of six components. AAMA is unaware of commercially available cylinder mixtures that span this low concentration range. We request the CARB source of the cylinders and the test data used to generate the typical LODs cited. We request clarification on which components are used to calculate the LOD. AAMA believes the LOD of low and midrange GCs should be equal at 20 ppbC.

8.8 CARB has eliminated the crossover check. AAMA recommends that this check be required. CARB should use hexane or pentane as the compound for comparison and AAMA members should be allowed to use the normal hydrocarbons, butane, pentane or hexane. Emphasis should be placed on the value of the procedure and allow CARB and industry to choose the compound that would work best for their instrumentation. Butane for the industry and another hydrocarbon for CARB. This check requires no additional time or analysis time. The results are available from the normal bag measurements. AAMA has found this test to be useful to find incorrect bag analyses.

Attachment 1 The low end compounds as recommended by CARB do not match the AAMA low end compound list. However, all of those compounds not found in the AAMA low end list can be found in the AAMA midrange list.

DETERMINATION OF C6 - C12 HYDROCARBONS IN AUTOMOTIVE SOURCE SAMPLES BY GAS CHROMATOGRAPHY METHOD NO. 1003

3.2 There should be an absolute limit of 24 hours for reading the bags. This section should be consistent with Method 1002.

5.1 Six 9's helium purity is not required. Five 9's helium has been found to be acceptable with our methods.

5.5 The use of benzene as a calibration gas is improper. All previous emission regulations have been based on propane as the calibration standard. It is improper to calibrate part of the hydrocarbons on propane (Method 1002) and part of the hydrocarbons on benzene (Method 1003). The results are not identical. AAMA recommends that propane be used as the calibration gas.

The use of 80 ppbv calibration gas is a poor practice when the concentration is below most measurements. The calibration gas should be near the upper range of the expected measurements. In all EPA Federal Register procedures it is a requirement that the calibration gas be near the full scale value. AAMA recommends that the calibrations gas have as a minimum a 1.0 ppmC concentration.

Emission laboratory operations have relied on NIST SRMs to provide traceability to NIST. The CARB requirement to send our cylinders to NIST for analysis is unacceptable. AAMA recommends that propane and benzene continue to be NIST traceable by individual laboratory analysis to NIST SRMs.

5.6 The quality control standard concentration of 20 - 100 ppbv is too low. AAMA recommends a check standard of at least 1 ppmC.

8.1 CARB did not change the text to have only one blank per day, as indicated in K. D. Drachand's letter to Marcel Halberstadt (Reference No. AF-92-017).

The blank run before the daily calibration is not needed. All AAMA members continuously purge the GC sample system with air. We believe that this would be the fix, if contamination were found in the GC. Of far more importance is contamination in the sample bags which CARB does not address at all.

8.4 Maintaining control charts on each of the six compounds in the control standard is not necessary to ensure that the measurement process is in control. AAMA recommends that two compounds be selected to be charted daily to ensure that the measurement process remains in control.

Additional control charts create a burden and reduce productivity without improving quality control.

8.5 Duplicate tests are a poor technique to ensure good emission measurements in the chemistry laboratory. A far better technique would be to compare chemistry laboratory results with the test site hydrocarbon results. AAMA recommends that a comparison with the test site FID be conducted and that these measurements agree within ±15. This check and the crossover check should be performed for every vehicle test.

The RFD requirements are far too tight. These limits with the proposed LOD limit of 5 ppbC may be unachievable by AAMA laboratories. This requirement may force the American vehicle manufacturers into scrapping their current laboratories and force the use of cryotrapping techniques and equipment. AAMA recommends the following RPD limits:

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Attachment 1

CAS Number 00591-35-2 should be 00590-35-2.

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cyclohexane
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Of particularly great importance is CARB's removal of n-nonane. In lieu of having a single calibration gas with all hundred-odd compounds in it, AAMA members use a calibration gas with all of the normal alkanes in it as retention index markers. This ensures that the retention times for all of the compounds not in the calibration mix will be properly adjusted on a daily basis. CARB's elimination of n-nonane from the hydrocarbon list will require the use of a definitive alternative method (i.e., GC/MS, not PID) for proper calibration and/or for correct compound identification for each vehicle sample. AAMA recommends the restoration of n-nonane to the midrange hydrocarbon list and the inclusion of n-heptane, n-nonane, n-undecane and n-dodecane to the required list of compounds in the CARB midrange GC calibration mixture.

DETERMINATION OF ALDEHYDE AND KETONE COMPOUNDS IN AUTOMOTIVE SOURCE SAMPLES BY HIGH PRESSURE LIQUID CHROMATOGRAPHY METHOD NO. 1004

3.2 AAMA recommends that the test samples be stored no more than 6 days. This will be consistent with Method 1001.

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15-day Comment

TAC
XC: MSD
Legal

STATE OF CALIFORNIA
AIR RESOURCES BOARD
RECEIVED 4-5-93
BY BOARD SECRETARY

TOYOTA
TECHNICAL
CENTER, U.S.A., INC.
SM Automobile Research Development & Engineering Design

1630 W. 186th Street, Gardena, CA 90248 / Phone: (310) 538-2570 / Facsimile: (310) 323-2471, (310) 532-9188

April 1, 1993 TTC-93017

Board Secretary
California Air Resources Board
Post Office Box 2815
Sacramento, California 95812

Please find attached to this letter, Toyota's comments regarding Air Resources Board Mail-out #93-05 which addresses modifications made to Amendments to Certification Requirements and Procedures for Low-Emission Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles at the January 14, 1993 Air Resources Board public hearing. Toyota's comments specifically address the issue of ASSEMBLY-LINE TEST PROCEDURES PERTAINING TO CANISTER LOADING.

Thank you for your thorough consideration of our comments as they represent a significant concern of our company.

Sincerely,

David Hermance
General Manager
L.A. Power Train

DH:JH:mst
Enc.

06912

Evaporative Canister Conditioning For Quality Audit Testing (QAT)

If manufacturers were to use CARB's proposed test procedure for evaporative canister conditioning during quality audit testing (QAT), test frequency would become a heavy burden on manufacturers especially those who have many engine families. For Toyota, we currently (93MY) have certified 21 engine families for sale in California. Thinking ahead to the 98MY (when all vehicles which meet the evaporative emission requirements approved in August 1990 must be subject to QAT), and supposing there would be as many engine families as we currently have, Toyota would have to conduct 21x20 (10 loaded canister tests, 10 unloaded canister tests) = 420 preliminary tests before the first QAT.

Our best engineering judgment reveals that canisters of mass-produced vehicles cannot be detached, therefore, preliminary tests must be conducted before line-off. In order to reduce the burden on all manufacturers, we request the following:

a) When engine families are carried over, the additive factor must also be carried over.

b) We do not believe tests for every engine family are necessary. Manufacturers should be permitted to select a technically sound representative grouping, thereby limiting testing to each grouping.

c) We do not think 20 tests per one engine family are necessary. 6 tests (3 loaded canister tests, 3 unloaded canister tests) will be enough.

d) We do not think a test plan submittal is necessary. All test details can be included in the first quarterly report.

CARB's serious consideration of Toyota's comments regarding this matter are greatly appreciated. We feel strongly that our comments represent a solid improvement to CARB's proposed test procedure.