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# PUBLIC HEARING

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I N D E X



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TUESDAY, MAY 17, 1977 10:00 O'CLOCK A.M.

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CHAIRMAN JACKSON: Are you ready, gentlemen?

MR. AUSTIN: Shall we proceed?

CHAIRMAN JACKSON: Yes.

MR. AUSTIN: For the record, I am Tom Austin, Deputy Executive Officer for the California Air Resources Board. With me today are Mr. Macomber, our Chief Counsel; Mr. Drachand and Gary Rubenstein from the Vehicle Emission Control Division.

My comments this morning are on the subject of the evaporative emission standards and test procedures for 1980 and subsequent model year light-duty and heavy-duty vehicles for which we have requested waiver.

The two gram evaporative emission standard which the board adopted for 1980 and subsequent model year light-duty and heavy-duty vehicles uses test procedures similar to EPA's own procedures for 1978, and is identical to the procedure previously waived by the Administrator in his decision on California's six gram per test standard.

The ARB procedure incorporates a one gram background allowance that applies only to emission data vehicles, and is based on data submitted by vehicle manufacturers which indicated that the background emissions of typical 4,000 mile data vehicles were approximately one gram higher than sabilized background emission levels.

Since background emissions remain relatively constant after 90 days, the test procedure requires

durability data vehicles to be aged the equivalent of at least 90 days before starting mileage accumulation so that the deterioration factor will be independent of background emissions.

The ARB's background allowance will decrease the lead time required to meet a two gram standard by eliminating the necessity for manufacturers to bake or artificially stabilize background emissions on hundreds of test cars and will increase the standards feasibility, while still providing the desired degree of control.

The allowance for background evaporative emissions is consistent with EPA regulations in that it does not require any additional testing by either the manufacturers or EPA. Although this allowance might be interpreted as providing less stringency than a two gram standard without an allowance, it is clearly more stringent than EPA's six gram standard, and consequently satisfies the stringency requirement for a waiver.

On October 7th and 8th, 1976, ARB scheduled a workshop with vehicle manufacturers to discuss the feasibility of the two gram standard and the lead time required to meet it.

Daimler-Benz stated that its fuel injection vehicles could probably meet a two gram standard by 1980. In addition, manufacturers such as Chrysler, who plan to install electric fuel metering systems on their 1980 vehicles, should achieve similar evaporative emission characteristics, since electronic fuel metering systems do not use a carburetor float bowl.

Other manufacturers such as Ford and American Motors argued that a background allowance was needed to make the two gram standard feasible.

I would like to add a point of clarification here. I believe Ford did specifically state that with a one gram background allowance they believe they could comply with the two gram standard. AMC, however, I do not believe made that same claim.

At a subsequent public hearing on November 23rd, 1976, Ford indicated that it could achieve a three gram evaporative emission standard with no background allowance on their carbureted vehicles.

In a study conducted for EPA, Exxon Research and Engineering Company modified six 1974 and 1975 model year vehicles to demonstrate the feasibility of the two gram standard.

Evaporative emissions due to air cleaner overflow, canister overflow and carburetor leaks were substantially reduced by modifications such as venting the carburetor bowl to the carbon canister, using a fan to lower the hot soak temperature, increasing the canister size, increasing the purge rate, closing the bottom of the canister to preclude seepage, and sealing the carburetor and accelerator pump shafts to prevent leakage.

Average evaporative emissions for six vehicles was 1.5 grams, with no vehicle higher than 1.9 grams.

The cost of these modifications range from a minimum of two dollars to a maximum of twenty-five dollars per car.

Many of the changes made by Exxon are simply

extensions of methods already in use and are not expected to present any durability problems to manufacturers who have more than two years of lead time.

We have compiled a list shown at Table 1 of the prepared statement of six 1978 durability vehicles whose average emission shows that systems currently exist which can meet the two gram standard. Most of these systems use a large carbon canister and incorporate an external carburetor bowl vent and/or have fuel injection.

Ford Motor Company can certify one engine family which meets the two gram standard without the background allowance. Toyota, Volkswagen and General Motors have durability vehicles whose average emissions are comfortably below the two gram per test.

We expect that even more manufacturers will demonstrate these low levels as the 1978 certification program progresses.

Another list shown on Table 2 is of 1978 engine families which could probably comply with the two gram standard with certain modifications. These vehicles, emitting between two and three grams, may be brought into compliance by providing adequate sealing around the carburetor and accelerator pump shafts. This is supported by the Exxon report which concluded that carburetor leakage represents the second most significant source of evaporative emissions after air cleaner overflow.

As we have mentioned before, we do not believe that the cost/effectiveness of the ARB control programs is a proper

subject for consideration at waiver hearings. Since the question is so often raised, however, we will address it at this time.

Our estimates indicate that the emission reductions due to the two gram evaporative emission standard would cost about 41 cents per pound. Calculations and assumptions behind this figure can be found in the ARB November 23rd, 1976 staff report.

Just for the record, that 41 cents per pound figure is substantially lower than many other both stationary and mobile source control programs -- in other words, that we see the two gram evaporative standard as being one of our more cost/effective hydrocarbon control programs.

Besides being cost/effective, the new standards will result in a hydrocarbon reduction of 153 tons per day within the South Coast Air Basin. This represents a 38 percent reduction in hydrocarbon emissions from motor vehicles and a nine percent reduction in hydrocarbon emissions from all sources.

In conclusion, we believe the two gram evaporative standard is technologically feasible within the lead time remaining; that the Administrator must therefore grant California a waiver to implement this standard.

Thank you. I would be happy to answer any questions on this issue.

Mr. Jackson, perhaps before we get some questions on one particular area, I should offer a point of clarification. There has been some concern expressed to us recently regarding

the way we intend to interpret our two gram evap standard as it applies to heavy-duty vehicles.

Ford Motor Company has submitted to us a proposed method for determining the compliance with our standard on heavy-duty vehicles. It consists of running a SHED test of the evaporative control system itself, removed from the vehicle, while it is going through a typical cycling as it would during actual vehicle operation.

Ford is concerned as are other manufacturers that if the entire vehicle must be tested, that background emissions from such a large vehicle may make it impossible to meet the two gram standard, even with a one gram background allowance.

We have decided that Ford's recommended approach for certifying heavy-duty evaporative control systems is acceptable to the Air Resources Board. We will be sending an advisory circular to that effect before the close of the hearing record.

We are also planning to amend our procedures in the future to write that advisory circular into law, in effect, to make it clear that we are attempting to achieve control over heavy-duty vehicles that gives us essentially the same degree of control that the two gram standard would achieve on a passenger vehicle. This will clarify our intent and make it clear that we will not be requiring full SHED tests of completed heavy-duty vehicles equipped with evaporative control systems.

Basically what we are looking for is to see systems

installed in heavy-duty vehicles that provide essentially the same degree of control as two gram systems installed on passenger cars, and we have already accepted Ford's approach to demonstrating that compliance. We will be issuing the advisory circular and will submit that for the record.

MR. GRAY: You made the statement that the ARB's background allowance will decrease the lead time required to meet a two gram standard by eliminating the necessity for manufacturers to bake or artificially stabilize background emissions, will not increase the standards feasibility, and yet still provide the desired degree of control.

Do you expect the background emissions to be such that the fuel emissions will be below two grams per test?

MR. AUSTIN: I do not understand the question.

MR. GRAY: Do you expect the manufacturers to not take advantage of that situation and still stabilize the background emissions on their data cars, their test cars?

MR. AUSTIN: They may be able to get away with doing that. However, we will be requiring the durability vehicle to run about 50,000 miles without any background allowance. That should give us some pretty good indication of the capabilities of the evap control system. We will not allow the durability vehicle to start until it has been aged either 90 days or the equivalent of 90 days. Given that fact, we should be reasonably confident in the capabilities of the system based on the durability of vehicle test. It is conceivable, if I understand the thrust of your question -- it is conceivable that manufacturers may go to great lengths to

lower the background emissions from emission data vehicle, still take credit for the one gram background allowance, in order to minimize his risk when he is going through the data vehicle certification process. That is a possibility. It is something I guess we are prepared to live with.

MR. LIEFERMAN: You state some costs here for implementing this regulation. You are stating a cost of about 41 cents per pound of hydrocarbons reduced. Do you know what the cost per vehicle that is calculated from -- you mentioned the cost on the Exxon vehicles was from two to twenty-five dollars per vehicle --

MR. RUBENSTEIN: The 41 cents a pound is assuming the maximum of $25 per vehicle.

MR. LIEFERMAN: So anything that would cost less than $25 per vehicle would reduce that 41-cent figure?

MR. RUBENSTEIN: Proportionately, correct.

MR. LIEFERMAN: Thank you.

MR. GRAY: I have one last question. You also made the statement that Ford recently indicated they could achieve a three gram hydrocarbon evaporative emission standard with no background allowance. Could you expand upon that a bit? How did they actually present information that would indicate that that level could be achieved without any background allowance? Did they separate the background and the test program?

MR. AUSTIN: Gary, you can correct me if I am wrong, but I think we are referencing statements that Ford Motor Company, Mr. Jensen, I believe, made at our board meeting when

we decided to go with the one gram background allowance. I believe in his testimony, Mr. Jensen's testimony, he indicated that because of the problems with background, the best Ford could do would be three grams. We then got into a discussion whether it would make a significant difference to Ford whether the standard was three grams or the standard was two grams with one gram background allowance. And Ford's position was that since their primary concern was over the background problem on data vehicles, that they could live with the three gram standard. Is that your understanding?

MR. RUBENSTEIN: Right. I believe that is correct.

MR. GRAY: The way I would interpret the statement -- Ford has said they could meet a four gram standard with an allowance or with background included. If you subtracted out background it could only meet three grams. I am wondering if this is --

MR. AUSTIN: No, that is not the proper interpretation.

MR. DRACHAND: I think what he said is, including background they can meet a standard of three grams per test, which includes fuel evap emissions and background emissions.

MR. GRAY: No background allowance means that the background would be included in the test?

MR. DRACHAN: Correct.

MR. AUSTIN: Correct.

CHAIRMAN JACKSON: Just for a point of clarification. Your regs apparently indicate that the one gram allowance for background will apply to '78 and '79 on its face. Is that

what you intend, or is that an error or what?

MR. RUBENSTEIN: It was an oversight in drafting. We don't expect it will be applied, and that position hasn't been waived by EPA for 1978 or '79, so it could not in fact be applied.

CHAIRMAN JACKSON: But you are not asking for a waiver, and you do not intend to ask for a waiver for that?

MR. AUSTIN: I understand the question now. That is correct. We are not asking for a waiver that would allow us to apply a one gram background allowance to 1978 or '79 vehicles.

CHAIRMAN JACKSON: As I understand it, for these model year vehicles, you have to do both the bench test for durability and the actual durability?

MR. RUBENSTEIN: That is correct.

CHAIRMAN JACKSON: There won't be any kind of application of any kind of factor for the bench test, I assume?

MR. RUBENSTEIN: No. The bench test is part of the durability procedure, and the durability procedure does not have any background correction factor.

CHAIRMAN JACKSON: Thank you, Mr. Austin.

MR. NELSON: Mr. Jackson, I am Ed Nelson, Assistant Director of Automotive Emission Control, General Motors Environmental Activities Staff. With me today again are Mr. Petersen and Mr. Schwochert, and, in addition, we have Mr. Hanson, a staff engineer from the Chevrolet Motor Car Division.

At this time I would like to have Mr. Schwochert read the prepared statement.

MR. SCHWOCHERT: General Motors appreciates the opportunity to comment on the question of California's request for a waiver to impose, in 1980, a two gram test evaporative emission standard using the SHED measurement technique. In a number of communications with EPA since early last year, we have explained our belief that, insofar as automotive emissions are concerned, evaporative control is inexpensive hydrocarbon control -- up to some point. Also, we have stated our belief that control to some level below the 1978 standard of six grams per test appears, with present knowledge, to be feasible. We have noted the desirability of withholding judgment on the precise definition of that level of feasibility until experience with certification, production and at least limited field use of cars certified to the six gram per test SHED standard is in hand.

Consistent with the foregoing and reinforced with our recent experience both with certification to the six gram per test level and developmental attempts to achieve substantially lower levels, it is recommended that EPA establish, approximately one year from now, a national automotive evaporative emission standard and test procedure for 1981 at the level which available technology will allow with consideration given to cost-benefit. We believe it is clear that technological feasibility for the two gram per test standard has not been demonstrated.

We further believe that California must demonstrate

technological feasibility before waiver can be granted.

As 1978 certification now approaches completion, we will be able to devote increasing attention to lower evaporative emission levels. The knowledge gained from the experience of 1978 certification and production should allow EPA to make a better judgment on the level for a more stringent evaporative emission standard for passenger cars.

We would hope and expect that within that period of time the questions of test procedure which we believe still exist, including durability demonstration and high altitute requirements could be resolved.

In its technical support for the establishment of the 1980 two gram per test standard, California stated that feasibility had been established by an Exxon program run for the Environmental Protection Agency. It was stated that the six vehicles modified by Exxon averaged 1.5 grams per test with no vehicle higher than 1.9 grams per test.

Our study of the report shows one of the three tests of the Pontiac car at 2.5 grams, one of two tests of the second Chrysler car at two grams, and the initial Chrysler car showed measurements of 2.1 and 2.5 grams per test at the best configuration. While it was implied that the additional modifications made to the second Chrysler car would have achieved the two or 1.9 grams per test level on the first car, there was no demonstration of that assumption described.

We pointed out in our March 18, 1976 response to the Environmental Protection Agency's two gram notice of

proposed rule making that the existing data showed test variability to be very large relative to such a standard -- on the order of .89 grams standard deviation, about 2.11 gram mean on a two barrel Vega test car program. We estimated that, on the basis of test variability alone, a one gram per test design target was necessary to provide reasonable confidence that a system could be certified to a two gram standard. Our experience since that time has not altered that conclusion significantly.

We must respectfully reject the conclusion that average measurements below two grams per test from the six experimentally modified cars demonstrates feasibility.

As an example of the test variability problem, which includes test-to-test, site-to-site, car-to-car and lab-to-lab variability, the comparative data of Tables 1 and 2 show that there is currently an "offset" between two industry laboratories and the EPA-Ann Arbor laboratory of nine to sixty-eight percent. Even at the low end of that offset range, three of the thirteen tests of the six Exxon cars in their final configuration would have failed a two gram standard -- assuming Exxon measurements were comparable to the two industry laboratories.

At the upper end of that offset range, ten of the thirteen tests would have been failures. In other words, if we had applied this offset we would have seen more failures than is indicated by the Exxon data, and probably someplace between three and ten of the thirteen tests could have been considered to be exceeding the two grams.

Another recent example of test variability is provided by the data from a GM practice test which shows large variations in deterioration factors as defined by the 1977 regulations of identical experimental cars, with no apparent reason except test variability.

In addition to the test variability question, it is important to note that the Exxon program involved a number of test procedure differences from currently established regulations by both EPA and California. All of these procedural differences of which we are aware acted to produce lower evaporative emissions in the Exxon program.

Examples include additional preconditioning operation, a cooling fan system which provided lower fuel tank temperatures, preconditioning with "weathered" test fuel and -- for at least one car in its final configuration -- artificial purging of the caninster.

As the Exxon report pointed out, there was no assessment of the durability characteristics of the modifications evaluated. That omission was acknowledged in the California support document, but the belief was nonetheless expressed that "most manufacturers" could still meet the two gram per test standard by 1980. It is our conclusion that "belief" should not constitute a demonstration of technological feasibility.

It is well to point out here that the expected benefit from a two gram standard, if it could be achieved, is less than half that estimated by California. To explain, we concur with the estimate of .7 grams per mile as

"equivalent" to the six gram per test standard. We do not agree with the California estimate of .15 grams per mile as "equivalent" to the two gram per test level in its implied distribution of the emissions between the diurnal and hot soak test phases -- assuming this "equivalent" is based on precise achievement of a two gram standard. A realistic distribution of .5 grams to the diurnal and 1.5 grams to the hot soak yields a 2.2 gram per mile equivalence. In addition, our current certification experience suggest that the 1978 certification level will be much closer to the three grams per test and than the six grams per test standard -- that is, .32 grams per mile equivalent.

While it may not be possible to make a precise estimate of 1978 production car emission levels from such preliminary data, we believe that the actual improvement which would result from a two gram per test standard would be less than half the California estimate of .55 gallons per mile.

Current data from our 1978 certification program support our continued confidence that some evaporative standard level below six grams is feasible -- although two of the "data cars" need improvement to the six gram level. It should be kept in mind, however, that these are demonstration cars whose emission control performance levels should provide a reasonable margin below the standard. Also, the ultimate criteria, for certification purposes, of pass/fail against the established standard is the EPA laboratory, and the previously mentioned offset should be added to these

data when judging the ability to achieve a lower standard. While these data do support confidence that a standard below six grams may be feasible, they clearly indicate that a realistic target for a two gram standard has not yet been achieved except possibly for two or three individual cars. Much has been learned in the development work and the certification effort for the 1978 standard. As indicated in our last annual report to EPA, for example, the application of carburetor bowl-to-canister vent lines in a number of cases severely aggravated fuel tank or diurnal emissions, a source which had previously been believed to be under excellent control. We believe that the possibility of high diurnal emissions has been solved with subsequent development work. More experience will be gained within the next few months as production begins and studies are performed to assess the evaporative control capabilities of the production cars.

As we have previously indicated to both EPA and the California ARB, our efforts in evaporative emission control development have been concentrated on achievement of the 1978 standard. The difficulty of this task was even greater than anticipated as a result of the requirement for achievement at high altitude with the present fuel volatility specification. Nonetheless, in recent months as the certification effort winds down, we have been able to devote increasing effort to the pursuit of a lower level of evaporative emissions. These efforts have, as in the past, concentrated on further reducing the hot soak losses from the

carburetor and evaluating the need for added vapor storage capacity.

We have previously indicated to EPA our intent to apply an accelerator pump seal to one type of carburetor for 1978. In that particular application, the seal reduced hot soak emissions by one to two grams. Since in this case the application of a seal to that particular leak source constituted a "fix" of what might be considered an excessive leak, we expect lesser improvements from application of the same "fix" to a vehicle already operating at relatively low hot soak emission levels. Our experience has shown this to be the case. At lower levels of hot soak emissions, recent development work has indicated that such seals appear to reduce hot soak emissions by a much lower -- on the order of .25 grams -- but still, at least on some carburetors, a measurement amount. Our certification and production experience with the seal being applied to the 1978 carburetor will provide some better insight into pursuing that approach for improved evaporative emission control.

Another approach which appears to show some promise of a modest incremental improvement at low levels of hot soak emissions is the addition of charcoal to the air cleaner. As indicated in our March, 1976 submission, that particular approach was evaluated a number of years ago. Its current reevaluation is based on the concept that the carbon air cleaner would be used in addition to the carbon canister vapor storage device rather than an alternative to it. The experimental charcoal air clearner units thus far

evaluated have shown modest reductions at low levels of hot soak emissions. We have thus far been able to hold air flow restrictions to relatively low levels. The resultant power losses still represent an area of concern. In addition, the related questions of durability, safety and field maintenance have not been investigated.

While it is not clear that there will be a general need for increased vapor storage capacity in the canister -- beyond that being incorporated in the 1978 system -- larger canisters are being evaluated,and a first design has been completed and engineering samples will soon be available for evaluation.

We expect that certain vehicles, particularly for high altitude, may require multiple canisters, even for 1978.

We believe the issue of non-fuel background emissions is not adequately addressed by the California regulation being considered. This becomes more important for a control level below the 1978 six gram per test standard. The one gram per test allowance provided by California for the "Certification Data Cars" is appropriate and consistent with recommendations we have made in the past. No allowance is provided for the Durability Test Cars -- at any age or mileage accumulation. Yet the regulation would require that the interpolated emissions from the Durability Cars be under the two gram standard at both 50,000 and 4,000 miles. Therefore, the background emission treatment requires better resolution before a lower standard is established.

As EPA considers the evidence presented in the matter of this waiver, the special problem of evaporative emission control at high altitude should be reviewed. As we interpret the California regulations, the 1980 standard at issue here would not apply to high altitude areas, and we are planning accordingly. Our recent experience shows that a standard based on evaporative control capability near sea level may not apply to similar emission control at high altitude. As previously suggested, we believe this is one of the procedural areas which should be resolved before a new evaporative control standard is established.

Another area of concern is the question of evaporative control for trucks. The 1980 California regulations being considered would apply the same standard to light- and medium-duty trucks as to passenger cars. The passenger car test results used to justify the two gram per test standard do not relate directly to control of truck evaporative emissions. It is well established that fuel tank emissions are proportional to fuel tank size,and truck fuel tanks are substantially larger than passenger car fuel tanks. Also,the horsepower setting (imposed by the exhaust emission regulation) for trucks is higher, resulting in higher engine and exhaust system temperatures aggravating the problem of carburetor and fuel tank emissions. Additionally, the configurations of certain truck types, vans, result in higher engine compartment temperatures.

The issue of technological feasibility of evaporative emission control for trucks is an issue which has

not been addressed separately from passenger cars. The court, in International Harvester versus Ruckelshaus, directed that truck emission control should not be treated under the blanket of passenger car requirements. We therefore urge the EPA and the California ARB to give the earliest possible consideration to the question of truck evaporative emission control as a separate issue.

General Motors believes the feasibility of the 1980 California two gram per test evaporative emission standard has not been established. We recommend that EPA establish, in approximately 12 months, a uniform national evaporative standard for 1981 at a level determined by the additional knowledge and experience obtained from the 1978 program. Finally, we believe that truck evaporative emission standards should be treated separately.

Thank you.

Mr. Jackson, for the record we would also like to enter several documents. I will indicate briefly what these documents are, and pass them on to Ms. Herman. Is that satisfactory?

CHAIRMAN JACKSON: Yes.

MR. SCHWOCHERT: The first document is General Motors' response to EPA proposed evaporative emission standards and test procedures dated February 27th, 1976.

The next document is GM's response to proposed EPA evap emission standards and test procedures, a supplement to the first report. It specifically addresses the two gram standard. That is dated March 18, 1976.

The third document is a letter from General Motors, Mr. T. M. Fisher to Mr. John P. DeCaney, dated October 19th, 1976.

Another letter from General Motors, Mr. Tom Fisher, to Mr. John P. DeCaney, dated February 2nd, 1977.

And, finally, General Motors' statement to the California Air Resources Board when they adopted the present proposed two gram standard. That is dated November 23rd, 1976. And, of course, the appropriate section that talks about that standard, we would like to have as part of this record.

This statement also addresses some subjects we will be talking about tomorrow, and we would like to make that part of tomorrow's record, the specific sections that deal with those subjects.

Thank you.

MR. GRAY: Let me ask a question of the positive aspects of your testimony first, if I might. That deals with your recommendation that the EPA establish approximately one year from now a national automotive evaporative emission standard, a test procedure for 1981, at a level which available technology will allow, with consideration given to cost-benefit.

What is your current best judgment as to what that level should be?

MR. SCHWOCHERT: At this time I would like to reserve that best judgment, because we have programs set up to monitor the evaporative levels of production cars once we start

production, and we would like to see what those levels are relative to the certification levels.

MR. GRAY: So it may very well be below two grams?

MR. SCHWOCHERT: It is possible that it could be below two grams. I would not expect it to be below two grams based on our present experience, but it could be.

MR. GRAY: I wanted to ask some comments on your testimony regarding the study conducted by Exxon for the Environmental Protection Agency, and I would offer you to respond to those points, because they are points to mainly clarify what you have said to put it in the proper context.

First, you refer to one of three tests on a Pontiac car that measured 2.5 grams. I think it is fair to point out that that test was the only test out of the final 15 tests that was above two grams. It appears that since you have studied the Exxon report you also concur with this judgment, that since those three tests had high diurnal emissions, that the feasibility for even more significant controls was certainly there, and, in fact, as a result of that observation on our part, the Exxon Corporation replaced the existing canister with a Vega canister and Vega purge system, and that two additional tests were run. These tests were 1.52 grams per test and 1.75, and, of course, including background measurements.

I might also add that the purpose of that study was I think clearly expressed in the report, and that was to, among other things, provide a preliminary investigation of the difficulty of achieving the two gram level. In fact,

Exxon's responsibility was to achieve a two gram level and then stop. There was essentially to be no optimization beyond that level, even though in many cases it was felt additional control could be achieved.

I might add that, for example, with the Pontiac vehicle, that the fixes incorporated on that vehicle amounted to a cost increase of about $2.30, and about half of that was to get the vehicle from the base line level of about ten to eleven grams per test, as I recall, to six grams. So the added cost of getting the vehicle from six grams to below two grams was about $1.10, $1.20. And that seemed to be more typical of the kinds of technology which appear to be adequate in that program.

Commenting on the statement you made regarding the Chrysler car, the Chrysler car appeared to be the more difficult car in that test program. It was a large engine; the engine compartment was very hot and resulted in high hot soak emissions. The initial car that you referred to wherein the Exxon tests were only able to get to 2.1 and 2.5 grams per test at the best configuration is a bit misleading in that Exxon was only able to try a few things on that vehicle before they were facing some legal action to return that vehicle. It was a loan or a leased vehicle, and they had no opportunity to provide anything except a very preliminary effort to reduce those emissions. Because of that reason they subsequently obtained a second Chrysler of a similar configuration and did some additional work, and, of course, did bring that vehicle to below two grams. So that is the reason that it

was implied, that had there been time, the first Chrysler vehicle could have been brought to the same levels of the second Chrysler vehicle or lower.

MR. NELSON: Mr. Gray, I have a comment on your discussion. We are certainly happy to receive additional explanation, but the statements we have made were based upon the report as we saw the report published, and did not have the benefit of additional explanation. I would like to have the record indicate that statements we have made refer to the report as it was written.

MR. GRAY: I believe that my statements are simply a result of my review of the report last night. And I believe most the information I share with you now -- and that is why I offer it to you, to see if you would like to comment on the validity of those comments. I do not believe that it is privileged information. I think it is adequately expressed in the report.

MR. SCHWOCHERT: I guess I would like to ask a question. You indicated 15 tests, and, as we count them, I counted 13. Perhaps did you include the two additional Chrysler tests? If you did, both of those tests did exceed the --

MR. GRAY: No. I included the additional two on the Pontiac, which were the second go-around on the Pontiac.

MR. SCHWOCHERT: I do not think those data were part of the report.

MR. LIEFERMAN: It was mentioned in the report that two tests were run on the Pontiac.

MR. SCHWOCHERT: But the data --

MR. LIEFERMAN: With the Vega system it said that those tests were below two grams. However, I do not believe that the actual numbers were in the report.

MR. SCHWOCHERT: All right.

MR. GRAY: I think it may be in a footnote to one of the tables in the report. That is where I found the numbers last night, to be able to quote them. That table may not be the same table in the published report, and, if not, we can clarify that at a later point. But those were the values on those two tests, and the 15 were just included, or included those two as well, since those were the last 15 tests in the program.

MR. SCHWOCHERT: I do not think that we said anything in our statement that would conflict with your statement that says only one test of fifteen exceeded the two gram standard. I do not think there is anything in our statement that suggested there was a conflict there of our interpretation. We did later on talk about laboratory offset, and, of course, one can continue to talk about those 15 tests in that same light if you wanted to, and that changes the situation somewhat.

MR. GRAY: Yes.

MR. LIEFERMAN: I had another question or two on this Exxon report and some comments that you made in regard to it. You made one statement that preconditioning, vehicle preconditioning is done with weathered test fuel. I was wondering if you were referring to the point that fuel, a fuel drain

and 40 percent fuel was not done prior to the vehicle preconditioning? What did you mean by "preconditioning is done with weathered test fuel," if that was not the thing you were referring to?

MR. NELSON: I believe the statement refers to these as separate items. The point was made that additional preconditioning, over what is normally done, was done in this case, and fuel was weathered, and, therefore, did not have the normal volatility for the evaporative emission test, and therefore would tend to give artificially low emission numbers.

MR. LIEFERMAN: Due to decrease in the reed vapor pressure of the fuel? How much of a decrease in reed vapor fuel would you expect due to two or three LA four cycles?

MR. SCHWOCHERT: I do not have an estimate of the amount, but it is a function, of course, on the temperature that the fuel has been exposed to in that particular vehicle, and it certainly is significant, because this is the type of thing that causes a vehicle to have problems with cold starts after it has been operated and allowed to soak.

MR. LIEFERMAN: So you feel that two or three LA four cycles would result in a significant decrease in reed vapor pressure in the fuel in the vehicle fuel tank?

MR. SCHWOCHERT: I do not know how we would quantify "significant," but I would say definitely would have an effect on reed vapor pressure, tending to lower the reed vapor pressure for subsequent evaluation.

MR. LIEFERMAN: I talked to John Clark this morning, in fact, of Exxon, who is the author of this report, and asked

him what he thought it would, how much it would reduce reed vapor pressure, and he felt that a tenth or two-tenths of a PSI might be the maximum expected decrease for that type of operation.

MR. NELSON: We do not have available today any definitive data on the subject, but we would be happy to submit for the record some details of the effect of volatility of this type of thing.

MR. LIEFERMAN: We would be interested in seeing data like that.

MR. NELSON: We will submit it.

MR. LIEFERMAN: There were some analysis of the fuel in the appendix of this report. The fuel is analyzed during two different parts of the test for reed vapor pressure. Both of those analyses did show 9.0 reed vapor pressure. If there was a one- or two-tenths decrease due to this extra preconditioning, that would give you a fuel of maybe 8.8 PSI. Now, the federal spec for the test fuel is from 8.7 up to 9.2 PSI, so I think the point I want to bring out is that even if it did undergo that amount of reduction in reed vapor pressure which Mr. Clark had estimated, that it would still be within the reed vapor pressure range of the test fuel specifications.

MR. NELSON: We cannot guess on that right at this time, but we will submit for the record exact magnitude of the change.

MR. LIEFERMAN: One other point. You mention the cooling fan system provided lower fuel tank temperatures in

this study as opposed to, I presume, the standard emissions testing. Could you give me the details on why that cooling fan was different?

MR. SCHWOCHERT: It is my understanding that the volume air flow was considerably greater than the fans that are just used for emission, exhaust emission testing and during the run phrase of the evap test, so you would expect lower fuel tank temperatures.

MR. LIEFERMAN: Do you know what the volume flow rate of that fan was?

MR. SCHWOCHERT: No, I don't recall it offhand, but, again, we could review the situation and supply that information for the record.

MR. LIEFERMAN: Again, when I was talking with Mr. Clark this morning I asked him about that point, and he said that vanes were on the inlet of that fan, and it was adjusted to give a fifty-three-hundred cfm flow rate. So if you have different information, then we have a discrepancy that perhaps should be --

MR. SCHWOCHERT: We did visit Exxon and obtain some of this information in talking to Exxon. I did not bring that information with me. We can address these two subjects before the record closes.

MR. LIEFERMAN: Good. I think that needs to be cleared up.

MR. GRAY: I would like to get in in some depth into your discussion on variability, test variability. Beginning with that discussion on the second page, last paragraph of

your statement, you state, "We pointed out,in our March 18, 1976 response to the EPA two gram NPRM, that the existing data showed test variability to be very large relative to such a standard -- that is, .89 grams standard deviation about a 2.11 gram mean on two barrel Vega test cars. We esimated,that on the basis of test variability alone, a one gram test design target was necessary to provide reasonable confidence that a system could be certified to a two gram standard."

And you said, "Our experience since that time has not altered that conclusion significantly."

My first question there is, you say "two barrel Vega test cars." How many cars is that?

MR. SCHWOCHERT: That information is contained in our March 18th, 1976 response to the two gram standard. I do not know if you have that with you.

MR. GRAY: If this is based upon the data entirely that was submitted then, as we understood, interpreted that data, there were nine Vegas in that sample program. And I just wanted to clarify before I commented upon that discussion, that that was the same program that we reviewed in your submittal, and that there was no new information . . .

MR. SCHWOCHERT: That is correct, I think. There may have been a test or two additional -- basically the same program that you reviewed in our March 18th submittal.

MR. GRAY: If that is the case, I would appreciate any clarification for the record that you can provide as to how we would analyze that data to be sure that we are not

misinterpreting that data base, because you make such a significant point here -- that is, that you would have to design to a one gram level in order to meet a two gram standard.

MR. SCHWOCHERT: The clarification that is included is a reasonable confidence that we would test the cars below a two gram level at your laboratory.

MR. GRAY: Yes. And if you can comment upon this summary analysis of that data that I would like to read at this time for the record as to any areas where we may be misunderstanding or misuing that data, I think it would be quite valuable, considering the significance you place in your testimony upon the influence of that data -- that is, that you have to target for 50 percent of the standard. We have the understanding that that data comes from the nine Vegas, and that the test data takes into account car-to-car, test-to-test, and lab-to-lab variability. As we understand it, nine vehicles, of the nine vehicles included in the data base, two of them had accumulated 50,000, and one had accumulated 35,000 miles. The average emission level for these three vehicles was 3.65 grams per test, as compared to an average of 1.97 gram per test for the other six vehicles. Consequently, data from all nine vehicles show a car-to-car variability. The car-to-car standard deviation was about 35 percent. This contributes heavily to the low engineering design target you have calculated for one gram per test. The Vega that was used in the so-called first EPA MVMA, Motor Vehicle Manufacturer's Association, cross-check program

has generated the most recent information available to us, at least in regards to the test-to-test and lab-to-lab variability of a two gram per test vehicle.

I think the test on that vehicle resulted in a standard deviation of about .2 grams,or ten percent of the mean value. With this combined test-to-test and lab-to-lab variability of ten percent, the maximum mean emission level of a particular vehicle -- that is, that a particular vehicle can have in order to be below two grams of a single test at a ninety percent confidence level -- is 1.77 grams.

Also, in the certification process, a re-test can be requested if a vehicle fails the first test, or a ninety percent probability of passing at least one of the two tests -- again, assuming the standard deviation of ten percent, a vehicle mean -- the vehicle mean is 1.9 grams per test. The much lower engineering design target of one gram per test that you stated that you think you would have to target for appears to us to be mainly a result of two factors, a single test per car assumption and a high car-to-car variability. And the high car-to-car variability is because of what appears to be deterioration of the three high mileage vehicles in that nine vehicle sample.

Now, that is a summary analysis of how we see that data being appropriately used, and at this time we invite your comment as to how we may have misused that data.

MR. NELSON: I think, Mr. Gray, it will take us some studying to answer the questions you point out. I would like to indicate a couple factors in regard to trying to

certify a large percentage of the models that a particular manufacturer may have. The process with the variable that you describe does require the manufacturer to have a target somewhat below the standard. And I would invite you to look at Table 3 -- Table 4 in the copy of the statement, and note the types of numbers in general which show the degree below the standard we feel we have to be to avoid unnecessary risk of not being able to certify a vehicle because of lab-to-lab, car-to-car, and other variables in the program.

In regard to picking a level that would allow us to certify a vehicle, I might call your attention also to Table 2, which points out in a cross-check program that was conducted by Motor Vehicle Manufacturer's Association and EPA, where the individual member companies participated in testing the same cars at different laboratories, it points out that the difference can be as high as 68 percent; a car that looks like it would need a two gram standard comes out above four grams at one laboratory.

So when you take some of these factors into consideration, the manufacturer has to allow an appreciable cushion below the standard in order to certify large percentage of his products. But we would like to elaboratore on the data more before the hearing closes.

MR. GRAY: We would appreciate that, because we think that is at the heart of the real issue on variability.

We would be glad to comment on the tables that you provide in your submittal. I think that at least the comment is in order that the more recent MVMA correlation

program, as I recall, had no vehicles that achieved levels of below two grams per test, first of all; that at this particular time there is at least at EPA laboratory, a significant effort to install four new SHED's for the certification process; and we had at this point not even begun our check-out of those SHED's. And I think that probably some of the other motor vehicle manufacturers have had the same sorts of efforts underway to get their facilities ready to begin certification testing, and this program may not be indicative of the true test-to-test variability.

Beyond that, I think it is appropriate to mention that when we are talking about variability, that the variability associated inherently with the test procedure rightly is a responsibility of the regulating agency, at least in my opinion. But I think the responsibility becomes a little grayer when we talk about even the offset that might exist between laboratories, because the manufacturers generally had the opportunity to have a good feel for what that offset is, and in so doing, knowing how their lab correlates to the EPA lab, and, in a sense, can adjust their design targets appropriately. So, from a statistical standpoint, it is not a random effect, necessarily. So that is another factor that can be considered.

And the last factor is the car-to-car variability which I think probably is of more concern relative to the responsibility for that variability. It is very apparent from a technical perspective that someone to design a vehicles with an evaporative emission control system, that

could be very variable on the test. And if the regulating agency had to have, had to assume the responsibility for vehicle-to-vehicle variability or even test-to-test variability on the same vehicle, then there might be the very real opportunity for that variability to grow to such an extent that the standard would have to be significantly inflated such that you could account for variability.

So, to imply that a regulating agency should be responsible for a vehicle variability appears to be asking too much at minimum of a regulating agency. And I think that in this discussion the different types of variability should be cleanly separated and certainly discussed fully, but certainly cleanly separated so that judgment can be made independently.

MR. NELSON: Mr. Gray, I would like to comment. From my interpretation of your discussion, you are assuming that there will be a considerable amount of progress in understanding these areas as we go down the road. I think that is very consistent with what we are seeing -- and as soon as we have experience with the '78 SHED test, we can make a better assessment of an appropriate standard that could be adopted later on for application nationwide. So I am appreciative of your assumption that progress will be made in those areas.

MR. GRAY: Of course, the results that we ask you to comment on are over a year old, and results of that program with the only vehicle we have seen in a cross-check program below two grams per test indicated the design target

of 1.9 would be sufficient to give you 90 percent confidence that you could pass a standard with the two tests allowed. It is to that specific analysis that we would appreciate --

MR. NELSON: We will be happy to submit that additional information to the record.

MR. PETERSEN: Mr. Gray, you made a rather lengthy speech there, and made several conclusions that I do not think any one of us were able to copy all those down. So before we leave on Thursday or Friday could we get a copy of your specific questions in order to adequately respond before the record closes?

MR. GRAY: In regards to questions as a result of that discussion, three points were of significance, I think, relative to a GM response. That is, variability should be discussed in the context of the test procedure variability, test-to-test in a given vehicle, and, thirdly -- excuse me -- vehicle-to-vehicle of the same type. And, then, lastly, lab-to-lab variability. Because these increments of variability do not necessarily all lump together in a straightforward manner to allow calculations of a design target from a statistical base, and so it was just an explanation of why it seems appropriate that those four increments of variability be considered separately in any subsequent submittal you may provide, so that we can sort them out in an easier fashion, if you will.

I guess I do have a little bit more follow-up in that general area. You mentioned the variability problem in Tables 1 and 2, which Mr. Nelson, I think, called our attention

to at least Table 2 a moment ago.

From that data, which included all these types of variability, you concluded that, depending upon which end of the offset range you consider, that from three to ten of the twelve Exxon tests which you had been discussing would have been failures.

It seems very difficult for me at least to get from that data to that conclusion. And it appears that if any assumption is valid where we are really comparing, in a sense, apples and oranges, to come to that conclusion, that if anything, I think there are reasons why we can speculate that the Exxon test, had they been run in the EPA laboratory, would at this time have been even lower.

For example, the Exxon program did not control the maximum temperature of the SHED during the hot soak. And as GM comments to the EPA rule making action established a six gram federal standard would indicate, the temperature of the SHED during the hot soak would be expected to have a significant influence on the hot soak emissions. The point I am trying to make here is that if we get into the game of speculating what would have happened if we had tested those cars in the EPA laboratory, I think we have to do much more than we can do simply by referring to an aggragate of variabilities and then trying to cast some significant data upon the validity and appropriateness of that data.

If there is other data that you would like to offer in this area to more specifically support your speculation or your judgment, if you will, that that many of the cars

would have failed in the EPA laboratory, I think we would be very willing to review that data as well.

MR. SCHWOCHERT: As you know, Mr. Gray, that discussion merely uses the data as measured by Exxon, and applies the nine percent and sixty-eight percent offsets. It does not try to account for the differences in procedures that existed between EPA, present EPA practices and Exxon practices, or for the differences that you have just discussed regarding the control of the SHED temperature during the hot soak; it does not try to account for those differences.

MR. GRAY: That is true, but you could equally well conclude that since the average of those tests -- as I recall were 1.9 grams or less for the individual vehicles, that from the data that we have seen, that there would be more like a ninety percent confidence that they would have passed one of two tests at the EPA laboratory. So there seems to be a big void between these two areas of judgment that relate very directly to the argument you are making. That is, to meet a two gram standard you have to target to something like 50 percent lower than that standard. And it is a very significant point, and we would appreciate anything we can stimulate from you in that regard, as regards to clarifying this technical issue at hand.

MR. HANSON: Mr. Gray, could I make one comment on what you are saying? You have identified three different areas where variability has been established to some degree, and I guess it is the degree we are concerned with, and trying to project what that may be like in the future in the way of

design targets. There is another area where this variability does seem to crop into the picture, and that is in the determination of the deterioration factor. We see them positive and negative randomly, and overall it averages out about zero deterioration. But that is another one that has to be considered, and the manufacturer, of course, has to design for all these variabilities if he wants to be assured of getting certified.

If we ran enough tests and averaged them all out, I think that would be another matter. Then variability would not be such a big thing.

MR. GRAY: What I was referring to was statistical confidence, if you could pass one of the two tests for a given vehicle -- not an average --

MR.HANSON: Yes.

MR. GRAY: You can relate the two with averages and standard deviations as to what you would have to target for. And that was the only reason for using that type of discussion.

MR. HANSON: I understand that point in that example, yes.

MR. GRAY: Would you like to expand, Mr. Hanson, on the significance of the deterioration factor variability -- that is, how it relates or should relate to the issue of variability, again? Could you expand on that?

MR.HANSON: Yes. I think it has been our experience on these development vehicles that have run 50,000 miles of similar configuration that the DF's generated is

pretty well random in character, and it can go in either direction. But we think overall they average out to about zero. Of course, when we run for certification we are not talking about several cars within an engine family that will be averaged -- it's one that will determine what the DF is.

MR. GRAY: Do you have any repeat data on each of these cars? As I understand Table 3, which includes the data that you are referring to on the varying deterioration factor, that is a calculated 50,000 mile deterioration factor?

MR. HANSON: Yes.

MR. GRAY: Do you have any data on how a given vehicle from test to test varied in its emission level?

MR. HANSON: I think that may be in here but in a different table, not for those particular cars. I do not know how many repeat tests might have been run at each data point on these cars, but there probably was some.

MR. GRAY: Since they were development cars, I would assume that you would have run, with the investment of a fifty-thousand mile car, that you would have probably run more than the minimum required. Could you provide whatever data that you have that resulted in these deterioration factors, so we could get a better handle on the test-to-test variability, even if we are not able to have back-to-back tests so that we could at least have test-to-test as a function of changing mileage?

MR. HANSON: Yes. I would imagine that a few of the data points there might have been multiple tests run, and

we can supply that information.

MR. GRAY: But beyond that, your point is that there is a variation in deterioration factors. But as I understand this table, those are all different vehicles. How would you conclude that the only apparent reason that these deterioration factors are different is because of test variability when they are different vehicles?

MR. HANSON: I would not say because of "test variability" -- because of other factors that are strictly random. And if you can get a factor, either positive or negative, and you never know which way it is going to be, I think you have to allow for that when you are designing the system.

MR. SCHWOCHERT: In this context, the discussion of test variability applies to a very broad definition of test variability -- that is, it includes car-to-car, site-to-site, lab-to-lab, that type of context. The cars were all identical as far as they could be built -- that is, there was the same system on them, and they were of the same engine configuration, same carburetor -- Well, there were three different families represented, as you can see in the table. But within a family all the cars were identical. And in a broad sense, then, any differences have to be related to test variability if it includes the car-to-car definition as well -- in other words, the systems are identical but the DF's generated are not identical.

MR. GRAY: These being development cars, there is some possibility that these systems were not totally

identical, I assume -- Well, I think that by looking at the test-to-test data on a given car we will be able to better distinguish whether or not these were in fact real differences, whether or not in fact these were real differences between cars. And certainly if you have real differences between cars with what you feel is the same system, that is a problem that has to be addressed.

I am not trying to belittle that technical problem, but I am just trying to put it in the proper context of test variability versus technical issues associated with one system on different vehicles gives different results. And, in particular, I am concerned about using the data just as presented because of the negative deterioration factors, and, as you well know, the significant influence of background emissions on the deterioration factor may very well over-shadow these kinds of differences.

So it appears that it would take a fairly indepth technical analysis of these data and the condition of these vehicles and the possible differences among the vehicles before we can conclude anything about why they are different.

I would just ask that before we are asked, before the EPA is asked to accept the conclusion that the significant differences are due only to test variability, as the conclusion in the statement, that we be provided with a more complete picture as regards to the causes of these differences. I am not challenging that they are real differences, because that is apparent. But I do not think on the face of it we can be expected to accept that these would be due just to test

variability.

I would encourage you to provide at least the information related to system differences and to condition of the car as it might relate to background emissions, and, of course, any testing that you may have done for background emissions in particular.

MR. SCHWOCHERT: We would be glad to provide that additional information, but, as you point out, there are real differences, and, of course, you appear to be questioning whether we can build development cars the same and put the same hardware on them. That is one of the reasons why we feel need and it is imperative that we look at the emission levels of production cars. If we cannot build production cars the same, surely we ought to look at the variability associated with production cars and see what that looks like before we make a final determination of what the ultimate standard might be. So, I think we have similar concerns.

MR. GRAY: My only point is that before we can conclude really anything about why these numbers are different, we need to know more about the cars, just simply the influence that background emission might have, something that's completely within your control, might very well overshadow these kinds of differences. And I think that that is the point I am trying to make, that we need that kind of information before we can responsibly use these data.

MR. NELSON: We will provide the data you have requested.

MR.LIEFERMAN: I have one question here. I noted

in your presentation you mention two types of controls that may be needed to lower evap levels, one being an accelerator pump shaft seal, and the other being the addition of another caninster. I was wondering what your estimate is as to the cost of those two particular modifications?

MR. SCHWOCHERT: We cannot specifically comment on the cost. With respect to the accelerator pump seal, Exxon made some estimates, and we are not talking about large costs I think associated with accelerator pump seals. We do not think it is appropriate at this time to talk about the costs associated with the carbon caninster or in the air filter, because that program is really in its infancy, and there are lots of problems that might not make that a feasible program at this time.

MR. LIEFERMAN: Did you have any specific problems with the costs that Exxon stated in their study?

MR. SCHWOCHERT: I do not think we have any gross problems with the costs, no, I do not think so.

MR. LIEFERMAN: Very good.

MR. GRAY: Are they too high? I mean, realistically, that may sound a bit facetious, but we did try to be conservative in the estimation of those costs. Would you think that they are reasonable or perhaps conservative? Can you offer anything more than . . . I mean in specific, we did try to itemize the types of changes we are talking about so we could get constructive comments -- you know, a casting change to a carburetor, a seal change of this type, so that the manufacturers could really criticize us where we

need to be criticized. And if you have anything to offer there, it would certainly be helpful.

MR. NELSON: Mr. Gray, our primary objective in the early stages of development work is to find the combination of hardware that does the emission control job. Cost at that point of development is a second order kind of consideration. And so we have not looked at the Exxon report in the manner that would allow us to give you an accurate evaluation of their cost estimates.

MR. GRAY: Then if we do not hear anything in a follow-up submittal by GM, then it would be reasonable for us to assume that those costs would be as good as any costs that we can speculate on with regard to technology necessary to meet the two gram per test standard?

MR. NELSON: We will respond to the cost question.

MR. GRAY: Thank you. If you would like to refer to your written comments on Page 4, the middle of the first full paragraph. You are discussing the effectiveness of additional evaporative controls. You make the statement that a realistic distribution of emissions between diurnal and hot soak portions of the test at a two gram per test total level would be more like .5 grams for the diurnal and 1.5 grams for the hot soak. Could you provide us with the basis for that judgment?

MR.NELSON: Yes.

MR. SCHWOCHERT: The basis for that judgment, Mr. Gray, is, if you look at diurnal emissions from a large number of vehicles, it looks like that diurnal emissions are

on the order of .5 grams. And we assume then that a car is going to precisely meet the two gram standard, then that leaves a balance of one and a half grams for the hot soak. I think you probably have the data that we would make that judgment from, but we would be glad to assemble that again. But that is the basis.

If you look at a lot of historic data where diurnal emissions are controlled, whereas you do not have breakthrough on the canister, you will find that they are about half a gram.

MR. GRAY: I guess I would tend to agree with you, but let me be sure I understand your response there, because I think it is quite significant. You feel that it is reasonable to expect that diurnal emissions can be controlled to .5 grams per test?

MR. SCHWOCHERT: I think if we look at data on vehicles, present vehicles, and even vehicles of earlier vintage that may have had emissions as high as six or seven or eight grams per test, that generally the diurnal emissions were in that order. So I think that to answer your question, yes.

MR. GRAY: Let me give you one more chance at it. Do you think it would be a valid judgment for us when looking at the limited data at the two gram level or below to conclude that for those vehicles that have diurnal emissions above a half gram that their diurnal emissions could easily be controlled to a half gram, thus reducing the total overall evaporative emissions?

MR. SCHWOCHERT: I would not want to conclude on the face "easily controlled to a half gram." One would have to identify why you are getting higher diurnal emissions -- what is the source of that higher diurnal emission? Then you would measure on a fair number of vehicles.

MR. GRAY: I guess the reason I am pursuing that type of questioning is that when skimming through the test results on the vehicles that are achieving levels on the order of two grams per test, there are some number of those vehicles that have diurnal emissions that are quite significant, more like the one gram level -- in fact, some of the vehicles have higher diurnal emissions than hot soak emissions. And so at this stage it is a problem of projecting what can be done based upon the preliminary studies that have been accomplished thus far. What I was asking for was the reasonableness of making that judgment when looking at vehicle emission results.

MR. SCHWOCHERT: I do not think we can make a general statement in that regard. As you know, the fuel tank, or diurnal emissions are quite high for an uncontrolled vehicle -- that is, if you just vented the tank in the atmosphere they are quite high, so you're talking about essentially collecting all of the vapors, from a practical standpoint, and so just a very small amount of vapor is being uncollected, of course, will have a big effect on the ultimate number, ultimate level that you achieve during that diurnal. So I think it is difficult to make a blanket statement.

MR. GRAY: You have discussed in a general sense

some of the work you have been doing in an effort to achieve levels below the six gram standard and at least a couple times mentioned you are planning more work. Could you give us more of a quantification as to what that program currently involves and what you anticipated involving in the next few months, like number of vehicles, types of systems? The discussion was of a general nature. We are looking at charcoal in the air cleaner. We are looking at larger canisters. I mean, is this one engineer that is looking at it from just a concept feasibility standpoint, or do you have in a large fleet of vehicles where you're actually trying out these concepts? I mean, could you expand some more upon actually what you are doing with regards to advancing the technology for evaporative control -- something as simple as how many vehicles are in the program would help quantify.

MR. SCHWOCHERT: I cannot give you that information right today, how many vehicles we have in test programs devoted to achieving lower emission levels than the 1978 certification and production will yield. I cannot give you that exact number today.

But the types of things we are trying to do are to, besides the programs we have talked about, the specific control techniques we are talking about, we are trying to identify the source of the remaining small amount of hot soak emissions, and will develop programs that try to control those sources once we have identified them.

MR. GRAY: As you might guess, I am leading up to trying to encourage GM to provide us any new information that

you may have, new test results of vehicles designed to meet lower levels, since it has been some time since we have received any test results from General Motors, so let me leave you with that request, that to the extent that you have test results with these concepts, employing these concepts, I think it would be beneficial to the determination before us if we were able to review that data.

MR. NELSON: We will certainly try to provide EPA with any data we can, and I thought we were having a pretty good record of sharing or reporting to EPA the status of the various programs that we do, at least on an annual basis. And, as you can tell from the volume of these reports, there is a considerable amount of activity on each program.

MR. GRAY: Maybe I misunderstood that, Mr. Nelson. To my knowledge, and I take the risk of being mistaken here, I am not aware of any test data that EPA has received from GM on systems that have a potential for meeting the evaporative emission levels of two grams or lower, since the March, 1976 submittal.

MR. SCHWOCHERT: I think that is basically correct. I think that is right.

MR. GRAY: Is there a chance we can get any additional information that you may have?

MR. NELSON: As I understood your request, you were saying that you would appreciate for General Motors to share some of the data that they were obtaining on future evap emission systems. We would be happy to try to provide that to EPA.

MR. GRAY: Thank you. Yes, that was my request.

I guess there is one more general area that you mentioned two or three times in your statement. That is relating to your belief that technological feasibility for the two gram per test standard has not been demonstrated. I think that was the general statement, it is in different forms repeated a couple of times in the statement.

What is behind that kind of a statement? As I understand Section 202 of the Clean Air Act, it is not the burden of the regulating agency, whether it be the California Air Resources Board, because of their need to be consistent with that section, or the EPA, as far as that goes, to demonstrate technological feasibility as I understand General Motors defines it, which is essentially that the regulating agency first has to develop the technology for every evaporative emission family before that concept is provided. And that seems to go so much beyond the requirements of 202 (a), which as I think a layman would read them, say, make a judgment regarding the potential for developing technology, and make a reasonable judgment as to the time it would take for that technology to be developed. And in this particular case, even as long as a year ago there were, I think, eight production cars and at least fifteen experimental cars that were achieving levels of 1.9 grams per test or lower. That is over a year ago. And, of course, there has been new information presented today, and I trust additional work done by the manufacturers that would add to that demonstration of at least technical feasibility.

What is behind your contention that it is important to even consider"a technological feasibility in the pure sense has not been demonstrated." Where do you think the burden of the regulating agency should be drawn with respect to 202 (a)? I mean, that statement creeps in so many times, maybe it is a good time to get better explanation of what you mean by it.

MR. PETERSEN: Let me respond briefly to that, and I think perhaps Mr. Schwochert has some comments on that question.

I am glad that you raised it. If you hadn't, I would have. Several questions have been raised here this morning, and as Mr. Nelson and Mr. Schwochert have stated, we'll attempt to submit for the record information pertaining to some of the questions raised -- many of the questions raised serious doubts as to the validity of California's contention that adequate technology exists to meet the proposed standard. And, in this regard, I think that, and in direct answer to your question, I think that the regulatory agency -- there are two of them involved here -- both California and EPA -- have the burden of establishing or making a finding that adequate technology will exist in the proposed regulation. You cannot reverse the burden and place the burden on the manufacturer to prove that adequate technology does not exist. That is too big a burden to place on a manufacturer. I think it would be impossible to carry that burden.

MR. GRAY: Let me be sure I understand it --

MR. PETERSEN: I think that history has shown that that burden does rest with the regulatory agency.

MR. GRAY: I think if -- you challenge the California Air Resources Board has not fully demonstrated technical feasibility -- I think that even looking at a GM lead time chart for implementing evaporative emission technology on production vehicles, which was, I think, submitted in response to the original California request for waiver of their six gram per test evaporative emission standard, and if we were at that point we would not be talking about 1980. We would be talking more of, not later than 1979 --

MR. PETERSEN: Are you talking about a lead time chart that goes to a six gram standard or two gram standard?

MR. GRAY: I am talking about lead time, a lead time chart that relates to hardware incorporation, this lead time --

MR. PETERSEN: Which standard applies here is certainly relevent.

MR. GRAY: The chart does not reference a level. It talks about types of changes to be made to evaporative emission control hardware. At that particular point in time I think it is fair to say that the hardware was not totally defined with respect to that necessary to meet the six gram standard, so I assume it was for that reason that this chart was put together in the framework for these types of changes, that it would take this kind of time. I am saying that if we were talking only about a requirement to implement existing technology, the lead time picture would be quite different.

MR. PETERSEN: I do not want to detract from what Mr. Schwochert will respond on this question, but I think that the standard is certainly relevant to that type of lead time question. And I think that the record is going to establish this morning that several of the questions that you raised are directly relevant to the California contention that adequate technology does exist or has been demonstrated, if for no other issue than lab-to-lab variability.

MR. GRAY: Setting aside the issue of whether or not this morning, today the question of technological feasibility will or will not be determined, are you saying that it is the burden of the regulating agency to show that a regulation is technologically feasible in GM's definition --

MR. PETERSEN: Certainly. Of course I am saying that. Otherwise the agency could adopt any standard --

MR. GRAY: According --

MR. PETERSEN: -- could pull a standard out of the air and say, "Unless the manufacturer can prove to us that that standard is not feasible, it is a valid, legal standard."

MR. GRAY: I call your attention to GM's definition of technological feasibility, and that is the context in which I asked the question. And that is, that technology be demonstrated on one of at least the basic types of vehicles that would be applicable under the regulations, and for evaporative emission control, that would be at least a hundred different systems. And to expect a regulatory agency to demonstrate those levels --

MR. PETERSEN: I do not think we are going that far.

MR. GRAY: Well, that is the past definition of technological feasibility that GM has offered, and the terminology is used again here. And that is why I raise the issue.

MR. PETERSEN: I am unaware of any publication by General Motors that says technology has to be adequately demonstrated on 100 percent of configurations which we plan to make available in order for the regulator to promulgate a standard, but I think perhaps we are getting into --

MR. GRAY: I think you can find your definition of technological feasibility in the GM response to the EPA notice of proposed rule making for an evaporative emission standard, and in that document, technological feasibility, as I recall, is defined in the sense of technology being demonstrated on the variety of vehicle configurations, and, by definition, vehicle configuration --

MR. PETERSEN: I think that is different than saying a hundred percent of the configurations --

MR. GRAY: That is why I used "100," because by the definition of "evaporative emission control system," that corresponds to an evaporative configuration, as best I can understand your description of what a configuration is.

MR. PETERSEN: I was not referring to "evaporative configuration." I was talking about individual vehicle configurations --

MR. GRAY: Someone said there are no two vehicles alike. But as regards to the basic factors that you have to consider, there are 100 emission families, about, we are right

now considering, and for a regulating agency to take on the burden of demonstrating that technology means that that agency would have to develop the technology and essentially to find the required hardware for all the manufacturers before the agency could implement a standard.

CHAIRMAN JACKSON: I think it is fair to say that whatever definition General Motors used does not necessarily define the definition for the agency in its interpretation of its regulatory functions or its deliberations over California waivers.

MR. GRAY: I guess that just to get clarification here, is it GM's position that we are dealing with technological feasibility as you mentioned in your statement, or not?

MR. SCHWOCHERT: I think one thing that should be considered regarding assessing technological feasibility is to, if you applied a certain type of control concept to a group of vehicles, and some of the vehicles did not achieve the level of control that you were striving for, that you at least would understand the reasons associated with the high emissions. And I think part of our discussion involves your saying that a reasonable target to provide a certain amount of assurance that we would certify vehicles at two grams is 1.9, and we believe the target was considerably different than that. And I think that is perhaps the big reason for the questioning that is occurring.

CHAIRMAN JACKSON: I think it is rather immaterial, really, because General Motors has stated by 1981 they could do it -- in fact, they recommended a standard in 1981.

So the technology is there. It is not a matter . . .

MR. PETERSEN: Not a two gram standard, I do not believe.

CHAIRMAN JACKSON: You recommend just a standard, but not a two gram standard?

MR. SCHWOCHERT: We are recommending that we look at the data that becomes available upon completion of certification, and, in our case at least, an assessment of what the production, the levels of production cars are, use those data to establish a standard that --

CHAIRMAN JACKSON: What production cars? The '78's?

MR. SCHWOCHERT: Yes, sir, the '78 production cars. We have internal programs where we plan to look at production evaporative emission levels or evaporative emission levels of production cars as soon as we start producing them.

CHAIRMAN JACKSON: It seems a bit backwards. I thought you went through development cars first and then projected that to production. Are you saying you have to go through production then before you can go back through development?

MR. SCHWOCHERT: I think maybe a little discussion of evaporative controls compared to exhaust emission control, for example, might be in order.

In exhaust control we have some freedom regarding calibrations and the calibrations we can make to achieve certain levels, and there are fuel economy emission trade-offs that we are considering.

With evap control it is quite different. You provide

a certain type of hardware, and that hardware achieves some emission level. And that is what we are talking about in 1978. We are providing the type of hardware that comes close to limiting, we think, the ultimate level of control that you can achieve from an evaporative emission standpoint. So we believe that is necessary to evaluate really where we stand with the use of the hardware that is going to be used in 1978.

CHAIRMAN JACKSON: I think just on the basis of my experience, which certainly is limited to some extent, that we have more data here in front of us with regard to technological feasibility of this particular standard than we have some other standards in the past that have proven achievable after the industry finally was convinced that that standard was going to remain on the books.

I just, a cursory review of the information that we do have, appears, though, that it is fairly well established that it can be done.

My question, I guess, to General Motors is, what would be the consequences of granting the waiver that California has requested in specific terms, given that by appears to be technology at hand which will enable cars to meet a two gram standard?

MR. NELSON: Well, Mr. Jackson, I think that it is an impossible question to answer because of some of the things we discussed earlier in our statement about variability of testing and all the eventualities that could occur in the down-the-road process of getting certification. Certainly we do not want to speculate on what might happen in such a

theoretical case at this point in time.

CHAIRMAN JACKSON: I do not know how theoretical it is to you. It is not all that theoretical to me based on the information I have seen here, that it is not like a situation where we haven't seen any hardware at all that will produce this result. We can argue about variability, we can argue about a hundred percent configuration. There is evidence to indicate that there is technology which, if applied correctly, will reduce emissions to the below two grams, as measured by the SHED.

Now, given that, and given that General Motors is obviously aware of that and has the development programs in place to a certain extent which allows us to evaluate the consequences of an action that is before us -- my question is in more specific terms: What would be the reaction of General Motors to such a granting? What measures would you take?

MR. PETERSEN: Are you asking whether we legally challenge the waiver?

CHAIRMAN JACKSON: No. I am talking about what you would do with regard to your development programs. What are the consequences? What General Motors be in a position where they could not manufacture cars in 1980 for sale in California?

MR. SCHWOCHERT: First of all, with respect to the General Motors vehicles, I assume there are some General Motors vehicles in this category of vehicles that demonstrate feasibility in your mind. We are basically providing the same type of control on all our vehicles, and will be providing that same type of control in 1978. Some of these vehicles

achieve lower levels than others. There is no holding back of evaporative control, in a general sense at least, in 1978, providing this next step, that is going to meet the six gram standard. So it isn't a question of applying the technology from our vehicles that achieve two grams, to ones that achieve 2.5 or three or 3.5 or four, whatever they achieve; it is already there. It is identifying where we can get additional control. I cannot speculate on the consequences of --

CHAIRMAN JACKSON: You have not done that? You have not identified where you are going to get additional controls?

MR. SCHWOCHERT: That is right. We could not take specific vehicles and tell you where -- right now what we have to do on those specific vehicles to achieve the lower level.

CHAIRMAN JACKSON: Well, what percentage of the vehicles are you talking about that would not be able to meet a two gram standard with your '78 hardware?

MR. SCHWOCHERT: I do not think that we could identify those percentages right now. We would be guessing as to whether they could meet the levels --

CHAIRMAN JACKSON: There are cars that are going to be certified --

MR. SCHWOCHERT: Yes.

CHAIRMAN JACKSON: Is certification under way, completed or what?

MR. SCHWOCHERT: It is under way.

MR. PETERSEN: I think that is one of our

recommendations, to wait until the certification is completed, because that program is going to provide a lot more insight into this whole question.

CHAIRMAN JACKSON: When will it be completed?

MR. PETERSEN: July.

MR. NELSON: Sometime this summer.

CHAIRMAN JACKSON: But is it fair to say that that is a full scale effort on the part of General Motors to meet a two gram standard? It is not, is it? It is an effort to make sure that you don't bust a six gram standard.

MR. PETERSEN: There is an across-the-board application of our best technology at hand, that is correct.

CHAIRMAN JACKSON: That is the best -- '78 cars have the best technology known to General Motors for evaporative emission control?

MR. SCHWOCHERT: At this point in time.

CHAIRMAN JACKSON: The best technology known to General Motors.

MR. PETERSEN: I think we have answered that. It is feasible. I mean, certainly you can build a system that -- And I am not an engineer -- that that's best technology within reason, that is feasible.

CHAIRMAN JACKSON: I am looking at data here which Mr. Gray points out to me is certification data.

MR. GRAY: Table 1.

CHAIRMAN JACKSON: This is for General Motors. And we see evaporative emissions that exceed the six gram standard at EPA, and at General Motors that exceed the six

gram standard, on one car.

On another car, General Motors is 5.06, and another car, General Motors, 1.95.

MR. SCHWOCHERT: That table was included to indicate or display the paired car certification test data that were available at the time this report was put together between General Motors laboratory and EPA laboratory on certification of cars at that time.

CHAIRMAN JACKSON: Are these the cars that have the best available technology on them for evaporative emission control?

MR. SCHWOCHERT: They have the 1978, the hardware that obviously is going to be used in '78 production.

CHAIRMAN JACKSON: I assume that, but is it the best available evaporative emission control hardware available to General Motors?

MR. SCHWOCHERT: How do you define best available hardware?

CHAIRMAN JACKSON: That which gives you the lowest emissions.

MR. SCHWOCHERT: The answer would have to be no, in that broad sense of definition. You could put fuel injection systems on those cars, for example, and probably from past test results, those vehicles would achieve lower levels of evaporative emission control.

CHAIRMAN JACKSON: Is there any difference in the system on the last vehicle and the first vehicle?

MR. SCHWOCHERT: I guess the first vehicle, there are

two repeated tests. The first and second displays are the same vehicle. It may be that a description of those test results are in order. That vehicle has undergone additional testing at both EPA and General Motors, and it was found that the vent line from the carburetor float bowl to the canister distorted the air horn such that we were not getting a proper seal. There has been some additional work done on the vehicle because of the prototype nature of the carburetor, and the emission levels, the latest emission levels on that vehicle I think are like four and a half grams. So that vehicle, it wasn't displayed to represent what the '78 hardware will do. It was back-to-back tests at both laboratories.

CHAIRMAN JACKSON: Does it have the same hardware on it, the control hardware as the last vehicle? Is it different hardware?

MR. SCHWOCHERT: Basically it has the same control hardware, yes.

CHAIRMAN JACKSON: What accounts for the difference in performance? Do you know?

MR. SCHWOCHERT: No, I do not know. And, generally, that is, I think, where we are. It is identifying a couple of grams of hot soak emission and their source.

CHAIRMAN JACKSON: What is this -- back to Mr. Gray's point a while ago for which we did not get a definitive answer on, it appears as though, if I can glean anything at all from the conversation, is that your 1978 certification completes your 1981 development fleet. Do you have any other cars running for development purposes for the 1981 standard

that we are talking about here?

MR. SCHWOCHERT: Yes.

CHAIRMAN JACKSON: For 1980?

MR. SCHWOCHERT: In a general sense we discussed the programs that we are looking at to achieve lower evaporative emission levels. For example, we are looking at the sealing of the accelerator pump shaft.

CHAIRMAN JACKSON: You do not know how many cars you have in that developmental program?

MR. SCHWOCHERT: Right today I cannot tell you how many, specifically how many. We have indicated we are going to supply for the record additional test data to EPA regarding these development programs.

CHAIRMAN JACKSON: You have indicated that the California approach lumps gasoline fuel trucks in with light duty passenger cars, and that you think they ought to be separated out with some reference to International Harvester versus Ruckelshaus. Is there any other reason why they ought to be separated out?

MR. NELSON: Mr. Jackson, the basic difference between the truck and the car is the, what you might call the vocational function of trucks -- in other words, it is designed and built to carry a load of cargo or people, which causes the truck to have different characteristics on emissions, both exhaust and evaporative, than passenger cars -- such things as higher axle ratio, heavier vehicle loads, larger frontal area in the case of many of the delivery trucks. The truck exhibits different characteristics than the car. So

that was the point, that trucks, according to the court decision as I understand it, were looked upon as being different in emission characteristics than cars, and so technological feasibility ought to be looked at on trucks separately from passenger cars.

CHAIRMAN JACKSON: Fine. What are the consequences of the different look? I mean, does that mean that it cannot be done or can be done? It's easier to do, harder to do?

MR. NELSON: Basically what it means is that the evaporative emission characteristics you measure from a truck will be higher than a similar type of vehicle that happens to be a passenger car. A truck, as I pointed out, was designed with different axle ratios and the ability to carry a load, and generally it runs with temperatures in the engine at a higher level than the temperature of a comparable passenger car and causes more carburetor emission losses and more tank emission losses because of the increased temperatures underneath the vehicle, and, in some cases, increased temperature in the engine compartment.

So the basic problem is, it has higher evaporative emissions in its uncontrolled emissions, so to give it the same level of control requires a different approach, more technology than the passenger car.

CHAIRMAN JACKSON: We know that for a fact? That is documented somewhere, that you have a level of control down to something approaching two grams, and you know what the hardware differential is in terms of that control?

MR. SCHWOCHERT: We do know that evaporative

emissions, both diurnal and hot soak, are higher from trucks. This subject has not been treated at all in the discussion -- truck emissions have not been treated at all in discussion of technological feasibility, and we are just suggesting that we take a separate look at it. Again, once the '78 certification is complete, we can look at the truck versus passenger car data.

MR. PETERSEN: Are we using the same control hardware on light trucks -- that data should indicate some difference.

MR. HANSON: Yes.

MR. SCHWOCHERT: In some cases we are using more control hardware with respect to dual canisters, for example.

CHAIRMAN JACKSON: I guess it is fair to say that you conclude that they have higher emissions, but you do not know the effectiveness of the condition of more of the same kind of technology you have will cause emissions to go down below or around two grams?

MR. NELSON: Mr. Jackson, the main point was that the same hardware based on previous experience does not do the same job on a truck as it does on a passenger car, so it takes more, either a bigger canister, different control system, than it does on the car because of the truck's higher emission characteristics.

CHAIRMAN JACKSON: I can go along with bigger canisters. That is the same technology, just more of it. That seems to be what we are talking about. Are you really talking about different kinds of systems as opposed to just

systems with better capacity because emissions are higher?

MR. SCHWOCHERT: I do not think we can comment on that, because we do not know how to achieve two grams right today; we do not know how to achieve two grams on the various passenger cars or trucks. So we do not know if the hardware will be different or not.

MR. GRAY: Do you have any data, say, comparing under-hood temperatures of trucks, light,medium-duty trucks, to light duty vehicles with the same engine?

MR.NELSON: Sorry, Mr. Gray, I did not hear the question completely. Would you kindly repeat that?

MR. GRAY: I asked did you have any data that would compare the under-hood temperatures, any under-hood temperatures -- carburetor temperatures or just any under-hood temperature -- of light- and medium-duty trucks to light-duty vehicles with the same engine?

MR. NELSON: I am sure we probably have such data back in Detroit. We do not have any with us today.

MR. GRAY: It is your recollection that that data indicates that when the light-duty truck is driven over the same preconditioning procedure as the light-duty vehicle, as specified in the regulations, that the under-hood temperatures for the truck are higher?

MR. NELSON: In some cases it definitely is, because the truck engine operates at a higher speed and, in some cases, the truck does not get the same engine compartment environment that the passenger car gets, so it is definitely different, and in many cases higher.

MR. GRAY: Would you provide us those data that show that?

MR. NELSON: We will be glad to look and see what data we have available. We have provided in the past, and will be happy to do so for the record detailed explanation of why trucks are different than cars.

MR. GRAY: I think the issue is whether or not the technology would need to be different because of different operating conditions. Some people have provided the judgment that because there is more open space under the hood of a light truck or medium duty truck that the under-hood temperatures would even be maximum -- hot soak temperature would even be less than for the same engine in a light-duty vehicle. And that is the area that I would specifically appreciate information on. And the specific temperature of interest would be maximum hot soak temperature, and, if you have carburetor temperature, that would be preferable. But ambient under-hood temperature would be satisfactory.

MR. HANSON: Mr. Gray, different vehicles have different configurations. In some cases you might find a larger engine compartment in a truck, and in other cases you will find a smaller engine comparment. I guess the point is here, even if they were equivalent, there are inherent reasons why trucks are going to heat the fuel tanks and the carburetors higher than the comparable passenger car.

MR. GRAY: I imagine there is a wide variation within light-duty vehicles. I am not saying there isn't. But the issue is, is there a wider variation in light-duty

vehicles with or without light-duty trucks being considered?

In other words, are light-duty trucks at the top end of the light-duty vehicle variations, or do they fall within those variations? Where do they fall relative to the light-duty vehicle driving forces for evaporative emissions? And I do not think we are really addressing the issue of fuel tank size, because it is generally acknowledged that the fuel tank, at least the tanks of some trucks, have larger volume than light-duty vehicles. But even in that area you have overlap again. I think the hot soak emissions, as your own testimony would support, is a more difficult emission to control. Since it is generally accepted that peak carburetor temperature is the best correlator to hot soak emissions, I think if you have that kind of data, you could support your argument very strongly.

MR. HANSON: If we do not have it, we can certainly generate it. But within this range, the smallest and tightest engine compartment we know of is the truck, it is in the vans. I do not think you will ever find a passenger engine compartment that small, because that is really squeezed in the passenger area of these vehicles. And the same thing with the range you are talking about on fuel tanks -- yes, there is a range of sizes on cars and a range of sizes on trucks, and they overlap slightly, but there is still considerable difference within that range.

MR. GRAY: I trust that the information you provide us will cover vans as well as other types of pickups, and, to the extent you can, the range of passenger car applications

as well.

CHAIRMAN JACKSON: I suppose it has been pointed out to us by the CARB that in their statement on Page 14, Table 1, that there is a list of vehicles that I believe are '78 durability vehicles, evaporative emission vehicles. One is listed as having evaporative emissions of 1.78 grams per test. And I think it has been pointed out that that is a light- or medium-duty truck.

And then on Page 15, GM Vehicles 3, 4 and 5, which have evaporative emissions ranging from 2.49 to 2.62, are also either medium- or light-duty trucks. Compare that data with the data we just saw from the certification of General Motors '78 fleet, this data would seem to be lower in its light-duty trucks, medium-duty trucks.

MR. PETERSEN: I think Mr. Gray has asked a number of questions which we will be glad to respond to on how trucks differ from passenger cars in regard to their evaporative emission characteristics.

CHAIRMAN JACKSON: It doesn't look to me like it goes in the right direction.

MR. PETERSEN: One point that we have raised is that it is our knowledge that the regulator has not treated trucks separately from the passenger vehicle.

CHAIRMAN JACKSON: Has General Motors in the application of this technology here with regard to these vehicles that I am talking about, one with 1.78 grams per test, did you treat it differently? Did you use the same kind of control technology?

MR. PETERSEN: I am not sure we know exactly what those vehicles are today, and I think that unless my colleagues disagree, we would prefer to respond to that before the record closes.

MR. HANSON: I think we have already answered that. On the trucks we are using all the hardware we are using in the cars in '78, and in some cases more of it.

CHAIRMAN JACKSON: So, getting back to my point a while ago with Mr. Nelson, it appears more of a volume issue as opposed to "it's harder to control."

MR. HANSON: For the six gram standard, that may be correct.

CHAIRMAN JACKSON: I am talking about this level of emissions.

MR. HANSON: This level of emissions is the result of our efforts to meet a six gram standard.

CHAIRMAN JACKSON: Yes. But, again, getting back to those 1978 cars, the data that we were just looking at a while ago, we were seeing emissions around four to six.

MR. HANSON: Yes?

CHAIRMAN JACKSON: And I assume they have the same technology on them that these have, but the point was that these are harder to control, but you are getting lower emissions out of these.

MR. NELSON: Mr. Jackson, I object to the assumption that these trucks -- We do not know at this point in time which of these are trucks and which are cars, and we would certainly like to have an opportunity to review the data and

submit for the record a response to the question you are posing.

CHAIRMAN JACKSON: I would appreciate it.

MR. NELSON: We will do that.

MR. PETERSEN: I am not sure any valid conclusions can be made on the basis of three or four emission results anyway.

MR. LIEFERMAN: There is certainly a wide variation in engine compartments in trucks. Trucks go anywhere from around 6,000 pounds or under up to large, much larger trucks. Do you have any feel for the hot soak losses, how they compare between, let us say, light duty trucks and a much larger, heavy duty gasoline vehicle?

MR. NELSON: We do not have any specifics with us today to tell you exactly how they differ. We told you in general terms, and we will be happy to submit more indepth analysis of the data we have.

MR. LIEFERMAN: We have done some limited testing, and we find generally that on the very large trucks, the engine compartments are much more open than on the lighter ones, and your under-hood temperatures are typically less than your tighter engine compartments, and hot soak losses do not seem to be any different on those large vehicles than they are on passenger cars. I just asked the question, wondering if you had done any tests on those larger vehicles.

MR. SCHWOCHERT: I am not aware of the recent testing -- I assume we are talking about heavy duties and connotation of extremely large vehicles. And, of course, when you address that group of vehicles, the question is, what

does the run phase look like for those vehicles? And I do not know what you have assumed the run phase looks like for those vehicles, but certainly it does not look, as far as the demonstration of exhaust emissions go, it does not look like the one phase of the light-duty smaller vehicles. So that certainly is a question -- you know, what is the history of the vehicle prior to subjecting it to the hot soak portion of the test.

MR. HANSON: If you are comparing the engine compartment of, say, the pickup line up through 60 series, which would include most of the conventional jobs, I think those engine compartments are exactly the same. It is the same sheet metal, essentially, used on those. But what generally happens is, though, it gets lifted up higher in the air, and there is generally more ground clearance as you go to bigger axles and wheels.

MR. GRAY: I think the concern we were trying to address was that for those trucks, the factors you were mentioning that might be expected to result in higher emissions -- that is, higher road load, different axle ratios, generally just a greater load on the engine for the same drive, that at least from the limited testing that we had done, that because probably of the greater volume of air around the engine that we did not see any significant differences. So I do not know if this is saying we have a worse case situation somewhere between light- and medium-duty trucks or whether it says anything, but if you have any additional information there, I guess that would help clarify it.

MR. SCHWOCHERT: I guess we were just suggesting that this issue be addressed separately, and we were not aware of any separate addressing of the issue prior to oral discussion here today. And you apparently have addressed this issue separately, and we are not aware of that information again -- at least I was not aware of that information.

CHAIRMAN JACKSON: Thank you very much.

We will now take Ford's statement and then break for lunch.

MR. BUIST: I am Donald R. Buist, Executive Engineer, Automotive Emissions and Fuel Economy Office of Ford Motor Company. With me today is Mr. John P. Eppel, Associate Counsel, Ford Motor Company. We appreciate this opportunity to present our testimony relative to California's request for a waiver of preemption to enable California to enforce its 1980 Model Year Evaporative Emission Standard of two grams per test. This standard is applicable to light-, medium- and heavy-duty vehicles.

As we have indicated in the past, Ford has long been a supporter of further control of evaporative emissions as a logical step in reducing overall hydrocarbon emissions. Basically Ford supports California's request for a waiver with respects to its two gram evaporative emission standard for 1980, assuming that three important matters of test procedure can be resolved. Let me first address the two that deal with light- and medium-duty vehicles.

Ford currently has a development program in place which is targeted to have proven technology available in time

for 1980 California certification. Our program is in its early stages and we, to date, do not have the technology across all our car lines to meet a two gram SHED requirement. Our basic approach is to first develop a solid data base on the following points:

Determine representative vehicle background levels and how they can best be controlled.

Assure compatibility of evaporative emission controls with exhaust emission controls for future systems.

Quantify and qualify all sources of evaporative emission leaks that require control.

Resolve current test-to-test variability problems.

We are now in the early stages of this program. Once completed, we plan to proceed to final hardware system development and proveout.

We remain apprehensive about the risks inherent in this two gram program, particularly our ability to successfully complete 50,000 mile durability. At this point, the two issues that give us the most concern are background levels on aged vehicles and test variability. At the November 23rd, 1976 CARB Hearing, Ford testified in support of the decision to grant a one gram allowance for 4,000 mile vehicle background and test variability. Because of the length of that hearing and the very many new requirements being considered, there was little opportunity for consideration of Ford's proposal for allowance for 50,000 mile vehicles. However, we were told by CARB staff that the matter could be addressed at the EPA Waiver Hearing.

We are now convinced, based on test data included in Exhibit 1 of this statement, that the lowest practical background to be expected on typical durability vehicles (after doing everything practical to get the level to a minimum) is in the range of .2 to .6 grams per test, or ten to thirty percent of the standard.

Coupled with the .2 to .6 gram per test background is SHED test variability. Current SHED test variability experience indicates that results are only accurate to within plus or minus .8 grams per test. Over and above "expected test variability " is an associated phenomenon we call "test fliers." These are results which, for some unknown reason, are extremely beyond the expected variability range and usually exceed the standard. Test fliers are currently being experienced in the 1978 Certification Program. To date we have had a total of four vehicles out of thirty with fliers. The flier situation becomes extremely serious because we have found that, unlike exhaust emissions, the majority of evaporative test fliers do not produce customer complaints and, therefore, can only be corrected in the certification program with the start of a new vehicle, which, of course, substantially delays completion of certification.

Similar situations of wide varidations in test results have also recently been experimented at both the Ford and EPA labs with vehicles in the MVMA SHED Correlation Program. Unexplained variations up to four grams per test have occurred. Ford appreciates the fact that CARB has taken steps to handle the large fliers on durability vehicles with

the use of their "outlier criteria." However, the deterioration factor will still be greatly influenced by test variability and, of course, emission data vehicle results will be influced by both expected variability and fliers.

Although we are not positive, we suspect the reasons for test fliers and rather large variability is a combination of vehicle hardware and SHED test technique variability. The hardware variability is obviously our problem,and we are working hard to resolve it.

The test technique variability is, we feel, due to the fact that everyone is working with a new procedure and associated test hardware. In fact, EPA itself has only within the past week completed construction of its new certified SHED's.

Of course, we anticipate that much of this concern will be alleviated as everyone gains more experience with both vehicle hardware and test technique. However, until that experience is gained, Ford believes that to be eligible for a waiver the CARB procedure should incorporate a durability vehicle background allowance of .5 grams per test. Ford would suggest that CARB's waiver be conditioned upon CARB modifying its regulations to authorize the Executive Officer to grant such a background allowance to a manufacturer who can demonstrate that he has taken all reasonable steps to reduce background to a stable minimum prior to start of durability.

In addition, Ford believes that in order to protect two grams per test feasibility, California's evaporative

emission procedures should be made consistent with its exhaust emission procedures by permitting durability vehicles to exceed the standard at the intercepts. Emission data vehicles would, of course, be required to go below the applicable standard. This is commonly referred to as line-crossing. This would greatly reduce the very real and demonstrated risks associated with test variability.

Ford believes a provision for line-crossing is technically sound. There is no basis for concluding that the deterioration factor generated under a procedure permitting line-crossing is any less meaningful than one obtained in the absence of line-crossing.

On the other hand, line-crossing mitigates the spurious effects associated with shortcomings in the present procedure and, as a practical matter, renders technologically feasible a requirement whose feasibility might otherwise be subject to serious question.

A "background" allowance of .5 grams for durability vehicles has much the same effect. Without debating the propriety of, in effect, imposing a standard on nonfuel hydrocarbon emissions, Ford does not believe anyone has analyzed the feasibility of controlling background emissions. In the absence of any data which indicates that real life background can be controlled to essentially "zero" levels (as opposed to stabilized to "zero" levels), such control is improper.

In summary, with the ability to line-cross and a durability vehicle background allowance, Ford's confidence

to successfully certify at a two gram level for 1980 would be at an acceptable level.

Mr. Jackson, I originally planned to read the rest of the statement which deals with our concerns associated with the heavy duty vehicles. However, in view of Mr. Austin's statement, we appreciate the fact that he has taken our recommendations into consideration, and I will not -- although I want to submit my statement for the record -- I will not bother to read it with respect to heavy duty vehicles.

We, however, look forward to reviewing the final language that goes into the carb procedure with respect to heavy duty vehicles and their certification.

That completes the reading of our statement.

MR. EPPEL: Mr. Jackson, I have a couple of points if you want to go through a little longer before lunch. There was a discussion this morning of what the meaning of technological feasibility is. It was surprising to me in view of the International Harvester case. I do not think engineers or lawyers have to speculate when a judge tells you how to do it. And I guess I direct Mr. Gray and the others to go back and read that case. It tells the agency what its responsibility is, and it tells the manufacturers what their responsibility is. I think that is a closed issue. If you want, I can burden the record by reading it to you.

CHAIRMAN JACKSON: I think we have copies of that which we can refer to. I appreciate your edification there.

We will now adjourn and reconvene at 1:30.

(Luncheon recess taken at 12:30 o'clock p.m.)

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TUESDAY, MAY 17, 1977 1:30 O'CLOCK P.M.

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MR. LIEFERMAN: I had a question on the curves that are shown in Exhibit 1 for the background levels of several different vehicles. I was wondering what curve fitting technique was used to generate the shown curves on that particular graph. Was there a certain curve form used for those lines, or were they . . .

MR. BUIST: As I recall, there was a curve fit technique used for the upper curve, which was the average of 12 cars. I am not positive, but I think the other curves were just drawn in on based on the data points.

MR. LIEFERMAN: On that bottom curve, that one vehicle that was tested without any sealer or sound deadener in it, it looks as though the last data point shown there, which is Day 19, seems to be -- well, it is lower than the other data points prior to that. I was wondering if you had gotten any more data on that particular vehicle since the data shown here?

MR. BUIST: I think we picked up one more data point since this, which is about 40, and I can submit this data for the record; but it was out at about 47 days, and if you go to the 47th day and put a little box in at .2 . . .

MR. LIEFERMAN: Well, I think by looking at that curve then that does suggest a stabilized level of very near .2 grams.

MR. BUIST: Right.

MR. LIEFERMAN: Is there any reason, or would there

be any difficulty in preparing durability vehicles with sound deadener and sealer removed, as was done with this vehicle, which showed a level of essentially .2 grams within five or fifteen days after production?

MR. BUIST: I do not think it would be basically difficult to do. We would just by-pass that particular step in the build process.

The data indicates to us that that may not be necessary because of the slope of the other curve without the sound deadener out at the 30 to 40 day point, the scatter of data indicates that possibly does not make any difference. It kind of says to us that, yes, there is a significant difference in the five- to twenty-day area, but after that the two start to come together again for some reason, and that reason we are not sure of.

MR. LIEFERMAN: I guess looking at the bulk of the data here then on the '77 vehicles implies a stabilized level of very near .2 grams at the 40-day level and thereafter, regardless of what sealer was removed or not.

MR. BUIST: We conclude that there is some kind of a background level at about the 30-day point that at least at this point in time everything we have determined that could be reasonably done to a vehicle to bring its background down would be somewhere between maybe .3 and .6, and the data is scattered there, so we are not sure where that actual point will be.

We are looking at a hundred durability vehicles, and the background on a hundred durability vehicles is going to have some variability, but we anticipate it will be in the area

of half a gram -- some below, some above.

MR. LIEFERMAN: I think we need to really recognize the factor, though, that for that one vehicle, which was essentially a "best try," where no sealer --

MR. BUIST: It was not a first try, it was the "only try."

MR. LIEFERMAN: All right, the "only try." It is about .2 grams?

MR. BUIST: Yes.

MR. GRAY: Let me just ask a point of clarification. Did you say a hundred durability vehicles would be used next year?

MR. BUIST: That is a typical Ford Motor Company durability fleet.

MR. GRAY: For the evaporative emission control families concept?

MR. BUIST: For the total.

MR. GRAY: For exhaust standard evaporative emissions?

MR. BUIST: Yes. We cannot really say at this point how many would be run for evap.

MR. LIEFERMAN: I might just bring out the point that on Exhibit 2 you show some curves there for some background data on some heavy duty vehicles. Those tests were run at our lab in Ann Arbor, as you know.

MR. BUIST: Right.

MR. LIEFERMAN: We do have data now beyond the data shown here out to about 65 days of operation. That more recent data has shown that the levels have gone down considerably

more than what is indicated here by the lines that are drawn. At the 65-day level, used an exponential curve fit for the data. Some data was eliminated due to the fact that we found some tests where we had propane leaks --

MR. BUIST: Correct.

MR. LIEFERMAN: -- from the system. And at the 65-day level the "hot" background value on the exponential curve was right at .5 grams.

MR. BUIST: What was "cold"?

MR. LIEFERMAN: And the cold was about .2 grams for that one truck that we did test. I just wanted to bring out the point that we did get some more data here.

MR. BUIST: My point in presenting it out through the 30 day, roughly 30 days, is to equate it to light duty vehicles and what background could be expected at a 30-day level, which is kind of a four-thousand-mile car, at the four-thousand-mile point.

MR. EPPEL: Would you submit those for the record so we could see them, the test results?

MR. LIEFERMAN: Yes, we can do that. I have given those test results to Ford people connected with the test, but we can submit those.

MR. BUIST: I was not aware of that.

MR. GRAY: You mentioned, I guess, that there were two major issues that gave you concern with regard to the two gram level, the first being background, and the second being test variability. I think we probably covered test variability in a broad sense this morning well enough.

You do bring up one new aspect of test variability, I guess, an aspect that you called "test fliers." When you see such an abnormally high test result on a vehicle, is this a random occurrence -- in other words, would the following tests likely give you the same high result?

MR. BUIST: Not necessarily, and that is what bothers us. If it did, it probably would be easy to find. I can give you an example. We had a four-thousand mile car in the '78 certification program which got a very high level, like seven to eight gram area on the first test at our shop at four-thousand miles; the second test it got down much lower that. It went to EPA and repeated that same high level, and then came down again. And I cannot explain why.

MR. GRAY: Have you been seeing this long enough that you have started investigating the problem?

MR. BUIST: Oh, yes. We have seen it all along through SHED development.

MR. GRAY: And you haven't anything that you can offer us as to why it might be happening?

MR. BUIST: No. I guess if we could solve it we wouldn't be talking about it here now. When we have a vehicle like that, the standard procedure is to go into the SHED with a sniffer, FID sniffer, and try to find the source of the high level. The problem is, by the time you find the high level you have lost the rabbit. The vehicle is out of the SHED most of the time, if it is going through its normal grimbo of being tested, so the trick is to find the level while the vehicle is still in the SHED, and then sniff around and try to

find the source, and it's not always that easy, particularly if you put the vehicle back in for a second test and it is down to where you expected it to be.

MR. GRAY: Have you seen the high levels in any two repeat tests? Maybe that's a different way of asking it, but . . .

MR. BUIST: I do not recall any, but I am sure statistics would have to say we have had it in development.

MR. GRAY: I am just trying to get at whether or not it is a random occurrence or somehow related to the preconditioning of the test sequence or something of that sort.

MR. BUIST: At least in the certification process the preconditioning is the same is every instance -- and that is our objective, of course, in development, too, or the test isn't worth anything.

MR. GRAY: Of course, the preconditioning could be different, depending upon the situation of the vehicle prior to the test, of course -- at least in the first test it could be quite different as compared to the second.

MR. BUIST: Yes, but that is an easy one to find and flag out once you go back and review the data and how the test was run. That falls out rather quickly.

MR. GRAY: Have you looked at it to the extent that you can offer a judgment of statistical confidence that when a vehicle experiences this abnormally high result, what confidence you have it would not experience that same high level in the second test? In other words, how it relates to the

certification process which allows the two tests?

MR. BUIST: I do not think we are smart enough, Mr. Gray. I could not step up to that one. I do not think I know.

MR. GRAY: Is there any way you can look at the data with regard to that kind of a question to give you a judgment as to what percent of your configurations would fail both tests because of this problem so that we can get a better grasp of the problem, the significance of it?

MR. BUIST: Well, as I indicated in here, we had four out of thirty thus far in the program, in the initial throes of the program --

MR. GRAY: That experienced a test flier?

MR. BUIST: Right.

MR. GRAY: But my point was, as I understand the test flier concept, it's experienced, but it is not consistent, it is not repeated. And that is why I was asking the question of what confidence would there be that of those four vehicles that for two back-to-back tests they would fail both tests?

MR. BUIST: I do not know. I cannot answer the question.

MR. GRAY: You make a very positive constructive recommendation with regard to this matter before us. Can I press your recommendation a bit in the area of, while you have recommended essentially a 2.5 gram level for the durability vehicle . . .

MR. BUIST: We have indicated that we are trying very hard to get our confidence level to an acceptable point to

meet two grams in eight, and we are trying to get there, and hopefully we will in time.

Our point in addressing the background issue and the ability to line cross is to reduce the risks associated with getting there. And that is the sole reason for it.

We also believe, though, that in addition to that, that the data that we have been able to collect thus far indicates that problem the best we can do on background on a vehicle, on a fifty-thousand mile vehicle, is in the area of two-tenths to six-tenths, maybe three-tenths to six-tenths, somewhere in there. That is probably the best we will be able to do to get it down. And it looks like it will probably stay there.

So those two items would greatly reduce our risk of not being able to make it.

MR. GRAY: Do you have any feel at all about the risk that you would have with just the California standard as it exists now, the two gram, the durability vehicle . . .

MR. BUIST: That is very difficult to assess at this point. At this point in time we have roughly one year, twelve months, maybe fourteen months to be ready, approximately a year from now that people, manufacturers will be starting '78 -- or '80 certification durability. In that year we have to get our confidence level up to an acceptable point to us to start the durability program. Right now it is not there, and we do not feel we have the feasibility across the total product line right now to get there, but in a year we hope to.

MR. GRAY: Do you anticipate a need for different hardware to meet this requirement as compared to the existing six gram requirement?

MR. BUIST: Yes, of course.

MR. GRAY: Could you elaborate on the kinds of different technology that you think will be used?

MR. BUIST: We are anticipating maybe more use of dual canisters, more than one canister per vehicle; possibly a different type of charcoal; additional sealing in the carburetor area will undoubtedly be required -- choke shaft seals, carburetor-to-air cleaner, different type of seal there, possibly. That is the kind of approach.

MR. GRAY: Do you see the problem being any more difficult for your light duty trucks and medium duty trucks as compared to your light duty vehicles?

MR. BUIST: In trucks they have their own little unique situation in that the fuel tank configurations are different than passenger cars; fuel tanks are located on some trucks behind the driver's seat, other trucks they are way in the back, or they are in the quarter panel or the truck panel.

There are different situations for trucks that probably will require more hardware, but probably essentially the same kind of hardware. Maybe trucks will require dual canisters across the board -- that is just as an example -- where passenger cars may not; maybe only unique passenger cars would require dual canisters.

MR. GRAY: We have often heard it argued that the exhaust system heats up the fuel tank on light duty vehicles

because of the limited space available to put a fuel tank. I would guess that on some light duty trucks that that problem is not as significant.

Is there any situation where, that you can think of where the control might even be easrier for light duty or medium duty trucks?

MR. BUIST: No. One does not come to mind. I think that the hardware we are looking at to get from six to two would probably -- with the exception of canister sizes in relationship to fuel tanks and the number of fuel tanks on trucks -- in a lot of cases there are fuel tanks, auxiliary tanks -- will probably dictate a canister change, but the same type of seals will be used.

MR. GRAY: Is it fair to say that when all of these differences are considered that it is not a significantly more complex technical problem with light and medium duty trucks as compared to the spectrum of light duty vehicle problems?

MR. BUIST: We did not address that issue in the statement.

MR. GRAY: If you do not feel comfortable making a judgment at this time, I think a follow-up submittal would be appreciated for sure.

MR. BUIST: I think the fact that we did not make the judgment or address the issue in this statement answers your question.

CHAIRMAN JACKSON: Oh, you don't think it is. I see.

MR. GRAY: I see.

MR. BUIST: It is not flagged out in the statement.

CHAIRMAN JACKSON: It's not that big a deal. I see.

MR. EPPEL: The things that are a big deal to us are addressed in the statement.

MR. GRAY: I am sorry. I misunderstood what you were saying.

This is not specifically covered in your statement -- the subject is -- and let me press on it a bit if I may.

In discussing the concept of line crossing, you indicate there is no basis for concluding that the deterioration factor generated under a procedure permitting line crossing is any less meaningful than one obtained in the absence of line crossing. That is on Page 4 at the bottom.

To get a situation where one vehicle would line cross and another would not, the former vehicle would have to have higher emissions. Is it reasonable with respect to evaporative emission control technology in the physical process to conclude technically that the influence of the evaporative emission levels would not, could not have any influence on the deterioration characteristics of, say, the charcoal in the canister, the amount of . . .

MR. BUIST: I do not think it is related to charcoal in the canister. We are afraid it is related to plain variability. We suddenly line cross at 45,000 miles or 50,000 miles -- we're in trouble. That is the whole point I am trying to make, that line crossing would eliminate that last minute risk, and also make it consistent with exhaust emissions.

MR. GRAY: I understand that point associated with the risk of certifying or the risk of losing a durability vehicle, but what I am asking is: For two vehicles, one with a higher emission level than the other, the former with a higher emission level which line crossed for -- I guess it is somewhat independent of whether or not it line crossed for the question (sic) -- two vehicles with different emission levels.

MR. BUIST: From the beginning?

MR. GRAY: Yes, from the beginning. Is there any reason to believe that they would have the identical same slope, which for evaporative emissions would give you the same additive deterioration factor? In other words, does . . .

MR. BUIST: I still do not understand your question.

MR. GRAY: Does the evaporative emission level influence the slope of deterioration?

MR. BUIST: I do not understand.

MR. GRAY: Would the evaporative emission level influence the deterioration characteristics, the deterioration factor?

MR. BUIST: It would influence your factor; greatly influences your end result or the factor you get.

MR. GRAY: Would you think that a vehicle that had higher evaporative emissions would have a higher deterioration factor initially at higher initial evaporative emissions?

MR. BUIST: I do not think you can generalize that, because we have concluded that DF's are very sporadic. You can run ten cars and get ten different DF's, some plus, some

minus, some zeros. I do not think you can generalize the statement.

MR. GRAY: So, based on your experience, you do not feel that you can correlate the deterioration factor to the initial emission levels? Is that a fair conclusion?

MR. BUIST: Yes, I think so.

CHAIRMAN JACKSON: Mr. Buist, would you characterize the state of technology with regard to evaporative emission control as existing to meet the 2.0 gram per test standard, but in need of optimization?

MR. BUIST: Our objective to meet a two gram standard, our design objective is to somehow get a tight handle on what vehicle background levels are, and then hopefully between background levels and some minimum level of background fuel system, the combination of those two, hopefully will be less than one gram. That is our design objective.

The thing that makes that difficult is that for every design engineer that has to work with a vehicle to develop a two gram level, he has to be confident that he knows what the background is on his vehicle so that every time he runs a test he knows what piece of that or he can assume what piece of that total is background, and that has been very difficult for us. Background has been jumping around on the development vehicles.

MR. EPPEL: Could I comment for a minute? I think you are asking for an exercise in semantics. The basic issue is, is there something there that is going to allow people to get certified? You have to make a judgment. And whether you

characterize technology as existing but in need of optimization, or whether you characterize it as non-existent, to me is irrelevant. The question is, can people get certified and using what is available now and using what can be reasonably expected to be available in the future. That is the agency's judgment. And whether we characterize it one way or the other doesn't really matter. It seems to me you have to look at the data you have; you have to explain away the data that we might have to the contrary; and you have to justify the fact that your data, and our data "explained away," if we have them, can sustain a finding that enough vehicles could be certified to satisfy the demand that people in California in this case, or nationwide in the case of the 202 (a) decision, will have automobiles when they want to go buy them. It is as simple as that.

CHAIRMAN JACKSON: Let me ask you this, without characterizing your non-response: Do you feel like you are going to use any new or different technology to certify for 1980 to two grams per test?

MR. BUIST: Short of not having a system, Mr. Jackson, I guess I would say it is possible we will need new technology. But we do not have the system today, so that is hard to answer.

CHAIRMAN JACKSON: What is your projection based on that you can certify two grams?

MR. BUIST: I do not understand.

CHAIRMAN JACKSON: What are you basing it on? You certainly have shown a great deal of confidence of your ability to do it. What is it based on?

MR. BUIST: It is based on our ability to get from today's six gram level to two, and just one year from the time we have to do it our confidence level is not as good as it should be but it is at least at the point where we anticipate that with a little help in reduction in risk we probably could get there. And we are going to try.

CHAIRMAN JACKSON: But is that as a result of using some techniques that you have not described here?

MR. BUIST: No. It is as a result of working with prototype pieces of hardware like I described, sealing various areas and trying those in the SHED, going to different types of canisters or putting dual canisters on, trying different purge rates, et cetera. And I guess we have concluded the data we have today makes us feel that it is reasonable to expect to get there a year from now with a little help, with greatly reduced risk.

CHAIRMAN JACKSON: And the little help you are asking for in terms of these conditions is basically to reduce the risk associated with the variability, I guess you would say, in the measurement technique?

MR. BUIST: Right.

CHAIRMAN JACKSON: But not necessarily any question or concern about the technology itself?

MR. EPPEL: To reduce the risk so that in our judgment, anyway, then you can make a finding consistent with what the statute requires you to do. We are telling you what we think we need in order to have an acceptable confidence that we can supply vehicles to the public and meet this standard.

CHAIRMAN JACKSON: But you have no question at all if we were to grant the waiver that you would be producing cars for sale in California in 1980?

MR. BUIST: I do not have the confidence to answer that question right now. We are going to try to be ready.

CHAIRMAN JACKSON: Have you made any judgments in the corporation about what percentage of the model line would be available?

MR. BUIST: I am not aware of that judgment.

MR. EPPEL: We told you, these are risks. Who knows? Maybe the risks will all go our way and we'll have a hundred percent of our products and everybody will be happy.

CHAIRMAN JACKSON: What I am trying to get at is the characterization of the risk -- in other words, how much of a risk is it? Are we talking about a substantial risk? I mean, to make the recommendation that you have with the potential impact it could have would seem to characterize the risk as very minimal in my judgment, that you are fairly well confident that you can meet the two gram standard, because to make a recommendation as you have done here without that -- with the obvious consequence of not being able to sell cars in California in 1980 -- would be fairly dubious.

MR. BUIST: I would say the risks are substantial without the two recommendations.

CHAIRMAN JACKSON: Without the two recommendations, which account for --

MR. BUIST: You asked me to put a number on what "substantial" is, and I can't.

CHAIRMAN JACKSON: But those two recommendations account for -- the variability associated with testing in the SHED as opposed to the risk that you won't be able to come up with technology that you think is a necessary requisite?

MR. BUIST: They are tied together, technology and variability.

CHAIRMAN JACKSON: I was just saying, if it was test-related variability or if it was car-related variability.

MR. BUIST: It is both. I indicated that it is both. We are trying to get rid of the car variability, a piece of it. That is --

CHAIRMAN JACKSON: That is separate from the "fliers"?

MR. BUIST: Fliers could be caused by the way the SHED was run, or could be caused by the variability in a vehicle, maybe the carburetor didn't act the way it should have or something. It could be either one.

CHAIRMAN JACKSON: And you have not failed to include in the list that you gave the panel earlier any other control techniques that you might consider for 1980?

MR. BUIST: Well, if you are asking, "Did I miss one piece of hardware that may be on for 1980," yes, I probably did. But the basic approach for 1980 is to seal the vehicle up. Ideally, that is what we would like to do. We would like to be done to where we would worry about nothing but vehicle background -- but that's an ideal approach. Hopefully, we would love to get there someday.

CHAIRMAN JACKSON: So that is the technology we are

talking about?

MR. BUIST: Yes.

CHAIRMAN JACKSON: Sealing of the --

MR. BUIST: The fuel system.

CHAIRMAN JACKSON: Sealing the apertures that would permit evaporation of gasoline . . .

MR. BUIST: That is the name of the game.

CHAIRMAN JACKSON: And the only other issue is background?

MR. BUIST: Yes. Now, to get it sealed on one test is one thing; to get it sealed for all vehicles and make the vehicle operate properly once it is sealed is another. That is what takes time.

CHAIRMAN JACKSON: Have you projected any costs associated with your configurations that will meet the two gram standard in 1980?

MR. BUIST: No, I am not aware of a cost projection for that.

CHAIRMAN JACKSON: Can you make any judgments about whether the $25 cited in the Exxon study is reasonable or unreasonable? Is that an upper limit?

MR. EPPEL: The $25, was that an RP -- retail price equivalent number? What kind of number was it?

MR. LIEFERMAN: It was supposed to be the cost increase to the consumer for buying a new vehicle so equipped.

MR. EPPEL: On a particular vehicle, an average vehicle or --

MR. LIEFERMAN: Across the board --

CHAIRMAN JACKSON: An across the board --

MR. GRAY: It was an extreme range. It ranged from one dollar to, in one case, twenty-five dollars -- that man had a fan.

MR. LIEFERMAN: Of the six vehicles, the lowest was two dollars and the highest one was twenty-five dollars. The others were in between there.

MR. EPPEL: I think the problem we are having is we do not keep numbers that way. I guess we could give you the retail price equivalent cost of what a six gram system is.

MR. BUIST: I think we have indicated in the past that six gram per passenger car was around seven. Per trucks it was around 18, and the difference is dual, additional canisters.

MR. EPPEL: As to the rest of it, I think that what Don was saying is that we have not yet established a system so that the finance people can account for the costs and spread them across the product line and come up with a retail price equivanlency.

MR. GRAY: Do you see that there is any possibility that you will need an under hood ventilating fan?

MR. BUIST: That is the last thing in the world we want.

MR. GRAY: It seems to me that that is the most significant cost increment. And I was just wondering if there is . . .

MR. BUIST: We are doing everything in our power not

to have an under hood fan.

CHAIRMAN JACKSON: That is not a part of your technological approach?

MR. BUIST: Oh, it is there. And I suppose if we need it --

CHAIRMAN JACKSON: It is available, then?

MR. BUIST: I do not know if it is available.

MR. GRAY: You do not anticipate having --

MR. BUIST: But you talk about under hood fans -- we have looked at them, but their ability to operate on a reasonable, reliable basis, we have not been able to develop one that is acceptable to us.

MR. GRAY: But do you anticipate having to use them? Do you think that the other techniques that are available in the spectrum of ways to seal the system, et cetera . . .

MR. BUIST: I do not anticipate at this point that we will need an under hood fan.

CHAIRMAN JACKSON: Have you developed any data, developmental data or other data that relates to technology to meet the two gram standard that is not available to EPA?

MR. BUIST: We submitted data last December in the annual report that I am sure, as I recall, addressed two grams. We submitted a letter to Mr. DeCaney in September addressing two grams specifically.

CHAIRMAN JACKSON: I would ask then that any such data that you may have in your possession now that you would go ahead and forward it for our consideration in this

proceeding.

MR. BUIST: Data since our last submittal?

CHAIRMAN JACKSON: Yes. No repeat data.

It may be also appropriate to characterize the technology that you use with regard to the vehicles that the data is from.

MR. BUIST: Very good.

CHAIRMAN JACKSON: Thank you very much, gentlemen.

Please proceed.

MR. JONES: I would like to introduce myself. My name is Bill Jones. I am representing American Motors. My function is Manager, Emissions and Energy Standards.

Addressing the proposed 1980 evaporative emission standard of two grams per test,American Motors Corporation necessarily agrees the California evaporative emission standard of two grams per test for the 1980 model year constitutes a more stringent standard than the applicable federal requirements. On the other hand, this standard is not consistent with Section 202 (a) of the Clean Air Act, specifically as respects the technological feasibility of the standard within the lead time available; and,therefore, the Administrator must deny the waiver.

We believe that we have demonstrated good faith toward achieving low SHED emissions levels. We were among the first in the industry to demonstrate a completely functional SHED installation that meets the requirements of both California and the EPA. We have two SHED's fully operational at this time.

Our position is that insufficient lead time remains to comply with a standard of two grams per test by the 1980 model year, and is based primarily on the following two points:

There has been inadequate opportunity for American Motors to commit engineering manpower and equipment to this task due to the difficulty and the short lead time allowed for the development of systems to meet the standard of six grams.

The imposition of the more stringent and complex durability requirement for the 1979-1980 model years will delay our development efforts.

I am going to give you a candid look at our emissions control development results, our evaporative emissions control development results.

I am not holding anything back here, although I am not giving specific data; I am giving figures here which we are encouraged by, but I will get to that.

Development of our systems to control evaporative emissions for 1978 began in January, 1976, and by May, 1977, the program is essentially 90 percent complete. During this period of 16 months our SHED testing capabilities have been expanded and almost totally committed to the 1978 program. Our achievements in evaporative emissions development to date have allowed us to bring the level of emissions as determined by the SHED test for the pre-1978 vehicles from an average of about 15 grams per test down to the range of three to five grams per test. In fact, recent development work on a few stabilized vehicles has been in the range of one to three grams

per test, which is very encouraging to us.

The best result achieved to date is 1.1 grams on a two gram development system on a stabilized vehicle. A 1978 system on this same vehicle tested at 3.3 grams. This in effect is a sixty-seven percent reduction, but still a long way from the zero emissions level required to assure compliance with the more stringent durability factor and the unknown test and vehicle variations encountered in the certification program.

The proposed standard of two grams for 1980 passenger cars, light-duty trucks and medium-duty vehicles requires a vapor tight fuel system. Despite close intensive work with our carburetor suppliers we have not been able to demonstrate that a completely sealed carburetor is available for the 1980 model year. In view of this, we are forced to conclude that current non-fuel injection technology does not support a standard of two grams in 1980.

We believe the non-fuel hydrocarbon allowance of one gram per test for emission data vehicles fails to make the task of a standard of two grams significantly easier to achieve, because we are required to determine deterioration factors on "stabilized" vehicles with emission levels that are below the standard for the equivalent of 50,000 miles. If a compelling need for a standard less than the current standard of six grams per test is determined, we believe that a standard of four grams is the lowest that available technology will permit. In addition, we would recommend that all tests be conducted on stabilized vehicles until more facts

have been developed to define the magnitude of this non-fuel hydrocarbon background.

A little bit about an area that impacts our lead time, but I recognize is not a genuine item for discussion here today -- but since it does not impact our lead time, it is the '79 bench test.

The California procedures amended October 5, 1976 required us to develop a bench test for the determination of deterioration factors under some rather severe conditions for the 1979 model year and beyond. On February 11, 1977, the ARB issued Manufacturers Advisory Correspondence No. 76-3, which clarifies somewhat the bench-test methods for determination of the deterioration factor for the 1979-1980 model years.

This correspondence outlined the specific consideration to be contained in a proposal submitted for approval of a durability bench test. The "acceptable component test schedule" was useful in defining the test fixtures required for the bench test. This equipment as described involves special orders and long lead times.

It was obvious to American Motors after analysis of this test specification that use of this test constitutes a more difficult standard for 1979 and will consequently delay our efforts to concentrate our resources on the proposed 1980 standard of two grams.

In the past it has been the policy of the federal and state agencies to prescribe detailed, proven and universally applied test procedures to show compliance with a

regulated standard. The ARB bench tests are a departure from that more desirable and fair policy. The ARB proposal allows approval of varying proposals by individual manufacturers, and this could result in unfair advantage to some manufacturers.

In addition, after a new test procedure has been regulated, a manufacturer needs at least 18 months of lead time for its orderly application to certification vehicles.

Since American Motors is unfamiliar with this type of testing, and none of our components have ever been subjected to it, we have no assurance that all components will pass the test or what types or degrees of failure we will encounter. Failure of any one item would, in most cases, result in emissions in excess of the standard, which would require further design modifications to the system plus additional verification testing. Many components are special order items requiring development/design/tooling and therefore are long lead-time items. Also, correlation of bench test results with actualvehicle experience is another time consuming effort that must be considered.

Although American Motors is in agreement with the bench test concept and recognizes its technical superiority to the 50,000 mile durability vehicle test, we realize that it may place a more stringent requirement on our 1979 and later model year programs. This would require system modification and verification testing and would further dilute our efforts to develop systems to meet a new standard of two grams per test for the 1980 model year.

We submit that lead time evaluations for establishing

the consistency requirement for waivers under Section 209 of the Clean Air Act must be based on the evidence introduced at the waiver hearing. As the EPA indicated by its thorough discussion on considerations of lead time in the May 20, 1975 waiver decision, lead time is measured from the date of the EPA's waiver decision; and, clearly, under the Act, a more stringent California requirement is not final or enforceable until the waiver is granted.

In this particular case, the waiver was not granted, finalizing the California requirement until at least January 17, 1977; and, in fact, it is still open to question because of the EPA's consideration of it at the January 27, 1977 hearing. This week we were notified that it was signed. So this is a little out of date, but not by much. Days are hardly an improvement.

Again, the law states that reasonable lead time must be provided. In this instance, reasonable lead time is not being given under the proposed schedule of requirements.

To summarize our position, American Motors urges the EPA to deny the requested waiver for the standard of two grams per test for the 1980 model year for the following reasons:

A more stringent requirement has been proposed by California which does not withstand the test of Section 202 (a).

The standard of two grams per test SHED requested by the waiver is not technologically feasible within the lead time remaining, even with the addition of one gram for

non-fuel hydrocarbon background on emissions data vehicles.

We have applied our engineering capability to its fullest extent and, consequently, have demonstrated good faith effort toward achieving low SHED emission levels.

California requires, but has not prescribed, a detailed,proven and universally applied test procedure for the 1979 model year for the determination of deterioration factors. This will result in a dilution of effort in developing evaporative emission systems which will meet the proposed standard of two grams per test.

That is the conclusion of my remarks.

MR. GRAY: Your principal position regarding the two gram per test standard was that insufficient lead time in your opinion at this point remains to comply with that standard by 1980 model year. Is that to say that with additional lead time that you feel that the two gram per test standard is feasible? I am trying to clarify exactly what your position is in that regard.

MR. JONES: We do not have answer as far as the technological feasibility of the two grams per se.period without putting a year on it. We are not used to thinking in those terms. We have always had a deadline.

You would have to give me the other part of the question in order for me to analyze that. I just cannot give you a definite answer. You have not given me a total question. Every standard has a date. I do not know of any standard that doesn't have a date.

MR. GRAY: Your statement here was that your

position is that there is insufficient lead time for that level of control for 1980 model year --

MR. JONES: Correct.

MR. GRAY: And my question is, can you meet that level for 1981 model year, 1982 model year -- at what point is there sufficient time in your judgment for American Motors to meet that level?

MR. JONES: We have been encouraged by some very recent test results down around the one to three gram level. I would be naive to say that there is sufficient evidence at this date that would allow us to meet the two gram standard. We depend on some of the major automotive companies, two of whom you have heard this morning, to supply us with carburetors. We cannot move past their technology in carburetor sealing. We depend on them to supply us carburetors that will meet adequate sealing requirements.

MR. GRAY: Can you buy from either, or are you constrained to buy some carburetors from one and others from the other?

MR. JONES: We are not constrained from purchasing -- we can purchase from either, and all that we want, too.

CHAIRMAN JACKSON: That would leave you with an obvious option if you wanted to meet the standards in 1980, then.

MR. JONES: Well, yes. There are other considerations as well. When you have been dealing with a certain carburetor manufacturer, you are not going to switch to another carburetor manufacturer because Carburetor Manufacturer B offers

you the seal that you desire from Carburetor Manufacturer A, because there is also the other side of the coin called "exhaust emissions," and it may be superior there. So there are many considerations to take into account. You don't just jump from one carburetor manufacturer to another carburetor manufacturer. You usually work with them in concert, hoping that they will develop, because the incentive is there for them to develop --

CHAIRMAN JACKSON: Aside from the fact that you don't do that as a general practice, is that the case indeed, that carburetors you get from Ford have an emission problem?

MR. JONES: I cannot answer that question. I do not understand it.

CHAIRMAN JACKSON: You said that the reason you could not jump from one carburetor manufacturer to the other is because of emissions. You said tailpipe emissions were a consideration.

MR. JONES: Yes.

CHAIRMAN JACKSON: We were asking with regard to sealing technology why you couldn't buy from one or the other that would obviously have the sealing technology. You said the reason you couldn't do that was because of emissions. Does that mean that one of those manufacturers has a carburetor that has emission problems?

MR. JONES: No, that does not mean that there is an emission problem. I am saying that it is a consideration. I do not even want to use the word "problem." It is a consideration, a vital consideration.

CHAIRMAN JACKSON: All right. Now, aside from the fact that you generally do not want to change carburetor manufacturers for one reason or another, why couldn't you?

MR. JONES: Ideally and theoretically there is no reason why we couldn't. It would incur extra costs. There would be considerations of that nature -- recertification, recalibration, working with a new supplier, that does take additional lead time in some cases. They are not insurmountable problems. Certainly, we have the flexibility to do as you say, as long as we do it in an orderly fashion.

MR. GRAY: Going to control levels, you make a statement that the best results achieved to date is 1.1 grams on a two gram development system on a stabilized vehicle. You say that a 1978 system on the same vehicle tested at 3.3 grams. What was the system on the '78 vehicle?

MR. JONES: It is what we are certifying.

MR. GRAY: What was the basic system? Could you elaborate on the components of the system, the characteristics of it? I would like to establish a base line so I can then ask you what changes did you make.

MR. JONES: I am not intimately familiar with all of the hardware that constitutes our '78 system, although I could reference you to our '78 Part 1. It is in there.

But I recognize you want to ask the next question, and maybe I would be more prepared to answer that one than going through and listing the base line. Maybe if I gave you the differential that would satisfy you.

MR. GRAY: Let me ask you one question before you

address the differential, then, in the absence of specifics on the base line.

Can you generalize and say that that system, that '78 system, is a similar system that you would use on all your '78 vehicles, or is there a significant variation among the vehicles?

MR. JONES: We have a basic system, and we have some vehicles due to plumbing problems that we have had to introduce some rather drastic measures that we would not like to think are long-term measures as far as evaporative control.

We have had to include on some of our larger engine vehicles, where space under the hood does not permit a real neat plumbing arrangement, liquid traps in our line. This is something that when we experienced very high SHED results from some of our V-8 engine installations, the only way we could bring the vehicle down to our engineering target of around three grams is to make sure there wasn't any liquid in the lines. This required a trap, because we could not reroute the lines. The lines were high cost real estate areas, and it would require longer lead time than we had for the '78 program. In other words, we had some Band-Aids on our '78 system that I would not like to characterized as things that we would be projecting on out into the future.

MR. GRAY: What lines are you referring to? The purge lines?

MR. JONES: Yes. We were overloading our canisters -- not just to the normal route, but with actual liquid.

MR. GRAY: Can you characterize the percent of your

vehicles that would be subject to those special fixes?

MR. JONES: Primarily our V-8 engine installations, which constitute approximately 15 percent of our vehicles.

MR. GRAY: Is it fair then to say except for those cases, that the other vehicles employ the same system?

MR. JONES: Yes.

MR. GRAY: Now, if you could address the question then, from that basic system, what changes did you make to achieve that level of 1.1 grams per test?

MR. JONES: The difference between the 3.3 and the 1.1, it was a new, high absorbent charcoal in the same size canister; charcoal in the air cleaner, the ring; and an improved choke shaft seal. Those were the three prime -- and only ones that I am aware of.

MR. GRAY: How many test results did you have? I mean, this is a very encouraging level, and I am just wondering how many tests . . .

MR. JONES: That is a single car.

MR. GRAY: A single test result, or is that an average of several tests?

MR. JONES: That is an average of three or four tests, to my knowledge, on a single car.

MR. GRAY: Have you see any noticeable change in the vehicle's performance characteristics as a result of this charcoal in the air cleaner? Or do you think it impacts --

MR. JONES: We have not been able to take this car out and give it an adequate performance test or hot fuel handling test or any of the other normal performance tests that

we would conduct on a finalized system.

MR. LIEFERMAN: Have you evaluated the exhaust emission characteristics with that system?

MR. JONES: To my knowledge, there is no significant interaction at this point on that particular car with exhaust emissions. We do not run as many exhaust emission tests as we want because it is primarily an evap test car. But we do have data that does not suggest that we are losing on that car. We have other cars that say we are on other systems.

MR. GRAY: That kind of leads me back to the question that I asked you earlier and really did not press on, and that is lead time. Those changes, in and of themselves, seem pretty simple on the face, at least. If those changes could do it for your basic system, why would it require significant lead time to incorporate those kinds of changes?

MR. JONES: First of all, those changes still do not meet our internal taraget of less than a gram, closer to zero grams. We could not, with the limited number of tests that we perform, with any kind of confidence, say that if we were able to attain a 1.1 gram on all of our cars, that that would be good enough for us to make a two gram standard.

MR. LIEFERMAN: Because of variability? Why would that be? Because of test variability?

MR. JONES: It would be, first of all, because of our limited resources. Our risk is very high on our cars because of the fact that we have a limited number of tests that we perform. So we want to have a less than one gram,

preferably between zero and a half a gram, engineering target to assure us of reasonable success in certifying. Certainly I cannot expound any more than the two people that have gone ahead of me today on the variability question. That variability question is so huge and has so many -- at least four different aspects that I am aware of -- that we, quite honestly, cannot afford the time to break it down into its logical components and attack each one of these. We will therefore dial down our internal target. That is why I say 1.1 is not good enough for us. We will therefore dial down our internal target before we say that we have a vehicle that is certifiable.

MR. GRAY: With the additional year or so left before you have to commit to a particular configuration, I guess, for a 1980 model year vehicle, do you think at this point, in order to be responsive to such a need, that you would follow upon this particular approach?

MR. JONES: Oh, sure. We are going to work very hard. And I would hope that my presentation today would convince you that we are on the right track. But even being as candid as I can, it is a very large mountain, and I think it would be naive to expect us to be able to climb that mountain from where we sit today.

CHAIRMAN JACKSON: Do you see it as a lead time argument then as opposed to technological feasiability argument?

MR. JONES: I would put the emphasis on lead time. The statement, I believe, is technological feasibility in the

lead time remaining. And my emphasis is "in the lead time remaining," yes.

MR. GRAY: But if you are able to successfully employ these three basic changes to your current '78 system, and you were reasonably successful, as you were at least on this one vehicle, is there any reason why that kind of technology, if it was sufficient, could not be employed for 1978 -- excuse me, for the 1980 model year?

MR. JONES: We would probably use this technology if the standard were four grams, which we are proposing, if the lower standard is required for 1980. It is a matter of going very fast -- In '78 you have a six gram standard. We are 90 percent of the way home on that. You are coming back with an order of technology that is saying two grams. We are going to use -- even if the standard were three grams or four grams, we would use exactly the same knowledge, because it is the best we have. I cannot push this point any further.

We are not holding back on this technology. This will be implemented with a lower standard, hopefully not two grams, by the 1980 model year. The two gram looks like more than this technology can support. And that is our position.

MR. GRAY: As far as this kind of technology, there is not a lead time set with respect to 1980, it is more a question of whether or not this technology will give you the control you need to reduce your risk for your full product line. I mean, you just said, as I understood it, that your plan in any case would be to have these kinds of technology changes incorporated on your 1980 model year vehicles.

MR. JONES: I must have misrepresented my position here. Sorry if I gave you that impression. What I am saying is that if there was a different standard -- not the two gram -- but, say, a four gram -- I took a hypothetical case, and I should not have done that. I recognize now that I just confused the issue, and I did not mean to do that. I said if there was a four gram standard or a three gram standard or a two gram standard with a one gram background for all -- whether it be durability or 4,000 miles -- we would employ the same technology, because it the best we have available to us.

We have a lead time problem at the two gram level. The technology does not support nor does the lead time remaining support the two gram between now and 1980, and we have no plans right now to put that technology in if the standard were to remain at six grams.

MR. GRAY: Fair enough. Independent of the standard, then, is it feasible for you to introduce these three changes in your '78 system by 1980 model year, irrespective of what level --

MR. JONES: It is not even feasible. Because realistically looking at the conditions that we are working under today, with an undefined bench test and with --

MR. GRAY: I said independent, though, of the test procedure itself, could you make those changes -- change the carbon in the canister, put a seal on the choke shaft, and charcoal in the air cleaner?

MR. JONES: We certainly could put the charcoal --

I cannot commit to the improved seal -- I do not know what the exact lead time is for 1980 on the choke shaft seal without consultation with the carburetor suppliers.

There are more than one carburetor suppliers if you are talking all of our vehicles here. But the charcoal is, we have potential capability of getting that in by 1980.

But as far as the sealed carburetor, where the choke shaft is the primary problem, I cannot answer that question today. I do not know the exact lead time. It is a critical issue, and I will not treat it glibly here.

MR. LIEFERMAN: On this one vehicle that did show this 1.1 gram average level, you said three or four tests, to your knowledge, were run on that vehicle. Do you know if any of the tests run on that vehicle exceeded two grams?

MR. JONES: I am not conversant with the individual data points on that. I am sorry, but I cannot answer that. I can supply that information to you if it was critical to the hearing, but I do not have it with me.

CHAIRMAN JACKSON: That, and all other data which you may have that has not been supplied to the agency or CARB which would relate to the two gram standard.

MR. JONES: We do not have much, but what we do have we will be glad to submit.

CHAIRMAN JACKSON: We appreciate that. Thank you very much.

MR. GRAY: I have one last question. Do you see any technological difference between the control of your light-duty trucks, medium-duty trucks -- put them in a category by

themselves -- and your light-duty vehicles? American Motors does have at least a medium-duty truck, don't they?

MR. JONES: Yes.

MR. GRAY: The answer is, yes, you do have a medium-duty truck, or, yes, you see a difference in technology?

MR. JONES: Yes, we see a difference in technology.

MR. GRAY: Could you elaborate on why?

MR. JONES: Not very well. All of our medium-duty vehicles are Wagoneers and Cherokees and trucks are Jeep products. They employ a different enough fuel system that the technology we have and we tend to bolt on to these vehicles do not achieve the same level of control. We are not smart enough today to say that it isn't just due to our inexperience with testing. But there seems to be an order of magnitude of difficulty, and I do not know if that is directly transferrable into technology. It may be that the more tests you run and the longer you develop the system, you will find out some of its idiosyncrasies. Because of the lead time constraints we are under right now this is a factor -- we are not able to look at this to the degree that we look at our passenger cars. Everything has its order of priority. It's a very tight situation.

We wished that when we worked out something for, let's say, our V-8 Matador we could just run to the Cherokee and say, "Okay, guys, bolt it on, it's going to work." But it does not happen that way. And I just wish we were smart enough to know why.

MR. LIEFERMAN: Do your light-duty trucks for '78

have essentially this basic system that your passenger cars have for '78?

MR. JONES: Yes. Our Jeep C-J's, yes.

CHAIRMAN JACKSON: What kind of emission levels are you getting from them relative to the --

MR. JONES: I knew you were going to ask that. I don't know the answer. I will supply that, though. That is a question, but I do not have the answer.

MR. LIEFERMAN: You did mention the non-fuel hydrocarbon background being a problem. Have you run any tests, background tests on vehicles?

MR. JONES: We ran a few early tests, and we came to the conclusion that we were wasting more time trying to isolate the background than we could afford to developing our '78 system. So we had to abandon that rather interesting but semi-nonproductive type of testing.

MR. LIEFERMAN: I guess I am a little surprised. You bring up the fact that it is an important thing to define, the magnitude of the non-fuel --

MR. JONES: It is important.

MR. LIEFERMAN: -- level.

MR. JONES: Yes. And when you are talking a two gram standard it is vital that you are as intelligent about that. And that is why I feel that some of the smaller manufacturers are not going to have a handle on that as quickly as maybe some of the larger manufacturers, and thus be able to use it to their advantage.

MR. LIEFERMAN: You see any reasons why your

particular vehicles might have different background characteristics than vehicles of other manufacturers?

MR. JONES: No. I do not think we are unique in the background area. In fact, I would venture to say we are probably very similar.

CHAIRMAN JACKSON: Mr. Jones, do you know that the application of these three control techniques that you have suggested above the '78 package would not result in your fleet meeting the two gram standard?

MR. JONES: I guess I can only answer that by saying that we have no data that would suggest that if we were to attempt to certify at a 1.1 engineering target level that we could not make the standard. I certainly think that that is an extremely risky situation, one in which we would not . .

CHAIRMAN JACKSON: It wouldn't be the most desirable situation?

MR. JONES: Yes.

CHAIRMAN JACKSON: If the waiver were granted, what would your company do?

MR. JONES: Basically, we would not be able to do anything more than we are doing right now, and that is getting '79 vehicles cleared out before the 1980 situation was addressed, getting the bench test defined, getting our '79 products moved out.

If some breakthrough in technology was achieved as a result of your passing the waiver and putting the heat on, I could only speculate that this technology would be available. We certainly would jeopardize any orderly fashion of

certification for 1980. It would be a very chaotic -- although we are learning to live with chaos -- it would certainly be a very chaotic series of events close to certification. We are right now, '78, going to be delayed in our certification in California for at least one engine family that I am aware of, and that is without the problems that you are talking about here today. So I could only be quite candid with you and say that if you pass the waiver, this one engine family is down a single configuration now, and we would probably lose that engine family, we would probably lose other vehicles from our other engine families, and it would probably hurt very bad.

CHAIRMAN JACKSON: But to say what you would do, is it fair to say that you would attempt to incorporate the three items of control technology on your cars to see whether you could certify or not?

MR. JONES: I guess we have not assessed that point. We are hoping that some other standard is available in 1981. At this point, to say what -- I do not think those three are enough.

I do not understand your question.

CHAIRMAN JACKSON: I think you understood it. Your response indicated that you did. Your point being that you are not sure that that is enough.

MR. JONES: We are pretty sure it is not enough, because if it was enough we would like to say that it is.

CHAIRMAN JACKSON: If your differentials are consistent with that which you showed us and your testimony,

in terms of '78 certification data, wouldn't that be a fairly strong indicator of your ability to do that? In other words, you have shown here a '78 package with these three additions to it, and you have a 1.1 gram per test result. And if you showed certification of the rest of your vehicles with the '78 package being somewhere in the neighborhood of three, wouldn't that be a fairly strong indication that you could get to below two with those vehicles?

MR. JONES: That might be an indication, but it certainly is not realistic when one looks at the calendar.

CHAIRMAN JACKSON: Thank you very much, Mr. Jones.

I would like to remind the witnesses for tomorrow that we will attempt to start at 9:00 a.m.

We will convene the hearing today and reconvene tomorrow morning at 9:00 a.m.

Thank you.

(Whereupon, the proceedings adjourned at the hour of 3:00 o'clock p.m., to be reconvened at the hour of 9:00 o'clock a.m.,Wednesday, May 18, 1977.)

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