UNITED STATES OF AMERICA
ENVIRONMENTAL PROTECTION AGENCY

IN THE MATTER OF: Volume II
Proposed Regulations for)
Revisions to the) EPA Air Docket
Federal Test Procedure for) Docket No. A-92-64
Emissions From Motor Vehicles)

Public Hearing of the Environmental Protection Agency in the above-entitled matter, held at Washtenaw Community College; Ann Arbor, Michigan; on Thursday, April 20, 1995.

APPEARANCES:

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I N D E X

PRESENTER PAGE

Ann Arbor, Michigan

Thursday, April 20, 1995

9:30 o'clock a.m.

MR. GERMAN: Good morning. I'm John German, with the Environmental Protection Agency. Going to try to get the show in the road here while these people are finishing up a last little bit.

Most of you were probably here yesterday, so I'm going to go over my housekeeping notes again, and you can just read or something while I go through this.

If anybody is here who has not signed in we would appreciate it if you could sign at the desk in the back. Also, is there anybody here who would like to give a presentation or make some comments, who has not let us know that, please let us know. Stand up?

All right, great.

If anyone is interested there are copies of the Notice of Proposed Rule Making that was published in the Federal Register, they're back at the sign-in desk.

What we're going to try to cover today is AAMA/AIM had finished making a presentation on intermediate soak issues and we broke before we started having questions from EPA, so we'll pick that up at that point here.

After that there'll be presentations on air

quality analyses from Tom Darlington, facilities and phase-in from Mike Russ and some miscellaneous issues. And all those presentations, to that point, will have been done by AAMA/AIM, in joint presentations.

There will be a wrap up from Michael Berube for AAMA/AIM, and we also have a presentation scheduled from Frank Bohanon from the Special Equipment Market Association, and he'll be the final presentation that we have scheduled.

We'll now proceed. I'll remind presenters to please state their name and affiliation, and to use the microphone, for the benefit of the court reporter; and we would like copies of any presentations for both ourselves on the panel and for the court reporter.

INTERMEDIATE SOAK, INDUSTRY PRESENTATION (Continued)

BY DOUG HOFFMAN

QUESTIONS AND ANSWERS

MR. HOFFMAN: This is Doug Hoffman from Chrysler.

Okay, it was suggest that I start off by reposing the summary page and reviewing it quickly. I think that's a good suggestion, I'll do that now.

To summarize, in the NPRM, you know, we see that the EPA did qualify the need for moving forward with the intermediate soak and we think the qualifications, with new data that we have now and so forth, we don't think one needs

to move forward at all with it. We maintain that even for Tier I vehicles intermediate soak is not cost effective.

We know that there will not be a significant number of Tier I vehicles in the time period when this rule making would take effect. The federal Tier II is very likely in that time period along with the California LEV, 49 state LEV in a large number of states; and that the options proposed for controlling intermediate soak emissions will either jeopardize the in-use emissions control in general or be not cost effective at all.

The other thing I should comment on is there was an oversight on our part, a confusion between the SCO1 and the STO1 cycle, that was brought to our attention; and we apologize for that. That will definitely change some of the absolute levels of the emissions. We don't think it changes the conclusion, however. And we will re-cut that data and give it to you.

(Voices out of microphone range)

MR. MAXWELL: Just on the summary, is it a fair point to say that another summary point of yours was --came out of the presentation, that's, as you emphasize here, there won't be many Tier I vehicles for that long that eventually as you move either to federal Tier II or to California LEV vehicles, was it not a point of the presentation here that

that was going to bring along a lot of the benefit anyway, the intermediate soak?

MR. HOFFMAN: Yes.

MR. MARKEY: Why don't I start with a very simple question, just for clarification?

One of the charts compares peak mid-bed catalyst temperatures during a cycle, referred to as R310. I think you said it was a Ford cycle. You had a delta in terms of change temperature 328 degrees. That was much higher than any change we've ever seen. And I'm not familiar with the R310 high speed cycle.

Can someone elaborate on the characteristics of that cycle?

MR. ROUSSEL: Yes, I can try to handle that one.

The R310 cycle referenced in that one overhead is -- is a development cycle that we used to get our product signed off for production. So it's a cycle that we typically run. It's a confidential cycle. Every manufacturer has something probably similar to it, but it's Ford's cut on what we use to sign off our vehicles for production, and that they'll meet the intended durability for the useful life of the vehicle.

MR. MARKEY: Can you comment on why, on that cycle, we saw such a higher delta than on any of the cycles,

including the HLO-7 cycle (phonetic)?

MR. ROUSSEL: We haven't done a micro analysis of the second by second data. We're planning on doing that to see where we saw the major temperature increases. I suspect R310 is a very severe cycle because of what its intended purpose is, and it's more severe than the USO6 cycle, than what you would normally expect to see out in in-use driving.

MR. MARKEY: So in terms of the type of control cycles that we're looking at, this delta isn't particularly relevant to those cycles?

MR. ROUSSEL: This delta is relevant for us as a manufacturer in that that's the cycle we use to determine the durability and the adequacy of durability of that product into the field.

MR. MARKEY: All right, thank you.

MR. GERMAN: As long as we're on that I actually have a question about the same graph.

And on that you showed that if you put a timer in to allow enrichment, that it really didn't seem to drop the temperatures that much, the maximum temperature -- excuse me.

But I was wondering whether it had an impact on the amount of time that was spent at the higher temperatures? There was -- well, it was the frequency of those temperatures, and was there a significant change there? So

if you could either comment on that or supply some analysis later on that?

MR. ROUSSEL: Yes, we'd like to supply some data, second by second data on that, later, because I have the exact same question. And we can get the data.

MR. MAXWELL: Okay.

MR. MC CARGAR: Also on that same topic. First, would you be willing to discuss that cycle with us separately, given that it's a confidential cycle, and give us more details on it?

MR. ROUSSEL: Yes, I don't believe that would be a problem. In fact it's our intent to discuss that cycle with you at some later time.

MR. MC CARGAR: Okay, is that a road cycle or a bench cycle, or can't you say?

MR. ROUSSEL: It is a road cycle.

MR. MC CARGAR: Okay, and is it designed to be any accelerated cycle, that is to achieve higher thermal degradation in a short period of time in order to simulate what would happen in longer periods of operation on road?

MR. ROUSSEL: Can't specifically comment on that issue and would like to defer that for when we have a meeting with you guys separately.

MR. MC CARGAR: Okay.

MR. WEHRLY: Could I ask another quick followup question on that too?

I notice that the temperatures, you measured all the temperatures, they were mid-bed temperatures. But traditionally for the test program -- and I think a lot of the test programs -- we typically measure about 1 and 1/2 inches back from the front of the catalyst. Can you comment on what impact that may have had, measuring at different locations within the catalyst?

MR. ROUSSEL: That temperature was 2 inches behind the front base, so that's the mid-bed temperature that we had. I'm sure that's what it is, but I'm sure that's what it is.

Harold wants to have a comment.

MR. HASKEW: Harold Haskew from GM. Just for general knowledge.

For years we've looked at, under FTP testing, the temperature about an inch from the front face, and found that to be the maximum position of temperature. And that has to do with where you've done most of the exotherm; from the incoming gas at a temperature and then the heat release or exothermic reaction. And under the FTP conditions we see most of that about an inch back.

As we've moved to study these higher speed, higher

load cycles, and looking at temperatures under these cycles, the exotherm occurs further and further and deeper into the catalytic converter. And I think you'll see mixed, in a lot of our data, mid-bed or towards the aft end. And I don't think we've publicly said that, but that is characteristic of where you find the maximum temperatures under these new kinds of test cycles.

MR. WEHRLY: For the first test series, which is where all the thermocouples were located? The first set of testing, that was out at Milford?

MR. HASKEW: The instructions to the manufacturers for the first set of tests were to put the thermocouple where they thought the maximum temperature was occurring.

GM put it all at one end, because were not yet sensitized to where the higher temperatures would be under the higher load cycles.

MR. WEHRLY: And, Harold, were these all 50K catalysts? I mean in this new set? I mean I know the old set was.

MR. HASKEW: In the new set of data primarily they're all 50K catalysts. I think as Kevin explained yesterday, some of the trucks have 100,000 mile, and we indicated on the graphs.

MR. WEHRLY: Wouldn't it also be true that

typically in a catalyst, that as it ages, obviously the active surface moves back? I mean it starts to move the length of the core? Isn't that typically true? I mean it's older, you have less activity at the front and it slowly moves back the length of the core. So wouldn't that also stand to reason that the exotherm would also tend to move farther back?

MR. HASKEW: Don't know that I've ever seen that quantified as the way you expressed it. I don't have any data to support or refute.

MR. WEHRLY: I guess the reason I just asked that is I just wonder if it's possible, from the first set, if we had the thermocouples located an inch back, but we had 50K catalysts, perhaps we were underestimating the temperatures. And how we start moving the thermocouple back 2 inches and we're getting more representative temperatures of what's really going on and that's one of the reasons why we're seeing higher temperatures.

MR. HASKEW: Kevin is pointing out that the vehicles in -- the GM vehicles in the second phase testing are still at 1 inch.

MR. WEHRLY: Okay, so the data --

MR. HASKEW: (Interposing) Some of the other manufacturers, as I recall, were located further back in the

bed.

MR. WEHRLY: For example like the Honda that you had data yesterday, was that 1 inch --?

MR. HASKEW: If you're suggesting that the catalyst bed temperatures might be even hotter than the data we're showing you, that may well be true.

(Simultaneous voices)

MR. WEHRLY: Okay, thanks.

MR. MC CARGAR: I have a question primarily for you, Doug -- I'm going to field John German's question here.

You presented two sets of data including a sample of 5 vehicles and then some catalyst temperature profile on a Chrysler LEV prototype. Would you be willing to provide the raw data on that to EPA, that generated the graphs of the temperature histogram and also the plot of the "N=5"?

MR. HOFFMAN: I don't think it's a problem.

MR. MC CARGAR: Okay, let me go to that first set. That's the sample of 5. Can you tell me what, just generally some vehicle identifying information on those 5? What emissions standards were they certified to? Were they prototype, production, aged? What?

MR. HOFFMAN: You're talking about the data set?

MR. MC CARGAR: Yes.

MR. HOFFMAN: Okay, then the graph would be the

data at low, middle and then higher miles.

MR. MC CARGAR: Right.

MR. HOFFMAN: Those were all production vehicles. They were '92 model year, I believe.

MR. MC CARGAR: if I understand correctly the part of the point of these graphs was even without insulation you have to pay attention to nature catalyst deterioration over a period of 50,000 miles, right?

MR. HOFFMAN: That's correct, without insulation. And those vehicles had the benefit of enrichment cooling.

MR. MC CARGAR: And were these -- the mileage accumulation this, was this actual road mileage or was this simulated mileage, or?

MR. HOFFMAN: This actual road miles.

MR. MC CARGAR: What type of mileage --

MR. HOFFMAN: (Interposing) It was driven --

MR. MC CARGAR: -- was it?

MR. HOFFMAN: It was driven by Chrysler employees.

MR. MC CARGAR: So you would consider it to be sort of -- to the extent that you can get some lead foot drivers there, it was representative on-road operation?

MR. HOFFMAN: There was no intent to get lead foot drivers. These were just regular lease vehicles. They were driven by them, their family, in a manner that one would

normally drive.

MR. MC CARGAR: With some --

MR. HOFFMAN: (Interposing) Jim, I should maybe qualify that. That is that we do tend to try to find drivers that drive more miles per year than the average, just to get the job done.

MR. MC CARGAR: Okay, just on the basis of some very rough pencil calculations, but I think they should be in the ballpark, it looks to me like the multiplicative "DS" (phonetic) in this group for NMHC are about 1.84; and for NOx somewhere around 2.5.

MR. HOFFMAN: Sounds about right.

MR. MC CARGAR: I can't remember the last time we saw certification data submittal with a NOx value that was above 1.0 or 1.1. Why do you think these are behaving differently than your certification vehicles?

MR. HOFFMAN: Well, first, I guess, it's my understanding that the certification process is under review, itself, I think, for just this kind of a reason, isn't it?

MR. MC CARGAR: Well, I guess I'm asking you to comment on why you think these would be different than your certification -- if it's in fact that there's something going on here that's different with these vehicles, the road cycle, or this is what you think is really representative --

MR. HOFFMAN: (Interposing) I don't think there's anything unique about these vehicles in terms of how field vehicles behave. They're pretty representative. They're not ringers.

MR. MC CARGAR: So you think the NOx "VF" (phonetic), for example, of 2.5 as an MVF on a 50,000 mile 1992 vehicle would be representative?

MR. HOFFMAN: I think certainly that's not out of the range of what one could see. And certainly when you start with a very high converter efficiency, up in the high 90s, I think you can see -- you work through the map -- it doesn't take much converter efficiency loss to have the throughput really affect the tailpipe emissions in a much greater fashion that we've seen in the past.

MR. MC CARGAR: Okay, and similarly if 1.84 MVF for non-methane, you would consider to be reasonably representative of what you might expect on those cars?

MR. HOFFMAN: Yes.

MR. MC CARGAR: Okay, let me pop over to the temperature histogram. Your presentation yesterday that the temperatures are from, quote, unquote, "real world driving." Again, can you characterize the driving, the type of driving that generated the histograms for these plots?

MR. HOFFMAN: Well, that's always hard to do.

It was a combination of highway and city driving and it was, I think, probably over a weekend, and normal driving as an individual might do. Probably at least 100 miles. Details beyond that, I'd be guessing, Jim.

We could get you -- if you had more specific questions we could probably get that information to you.

MR. GERMAN: I think you made the statement that those temperatures included the elimination of command enrichment?

MR. HOFFMAN: That's correct.

MR. GERMAN: Now was that actually done by calibration on the vehicle than monitoring which it was being driven? Or is that something that was added on to the profile, kind of analytically?

MR. HOFFMAN: No, that was actually in the calibration, was in the calibration when the vehicle was driven, correct.

MR. MC CARGAR: Okay, that plot shows greater than 250 hours at 1500 F or higher, which, itself, is 6 and 1/2 percent of the total operation represented had you shown the whole histogram. You've only got some 16 percent of the histogram shown, because it clips. So actually that's an awful lot of mileage accumulation on this car, 250 hours at 1500 or higher, you had the whole distribution. This is many

thousands of miles, right?

MR. HOFFMAN: Well, that would be projected. We'd take a small number of miles with the histogram. We then would project that --

MR. MC CARGAR: (Interposing) I see. Okay. So the histogram represents a projection from a small number of hours of operation and the 250 is a projection to full useful life or something like that?

MR. HOFFMAN: Correct, correct, full useful life.

MR. MC CARGAR: I see. It would definitely be useful to have the data indicate what really generated that, because that -- it's a little harder to interpret it the way it is right now.

MR. HOFFMAN: Sure, we can get you that.

MR. MC CARGAR: In the page right before that you -- actually it's a couple of pages before. You make the point which is one that EPA has acknowledged, including in the preamble, that there's an exponential relationship between loss in activity and temperature.

Would you agree that because of that there is a regime where the deterioration as a function of temperature is fairly flat and then there's a point at which the curve starts to increase very rapidly and gets into a pretty steep part of the curve, and it's the steep part of the curve that

is the real concern of the manufacturers?

MR. HOFFMAN: Yes, that's a fair characterization.

MR. MC CARGAR: Okay, when you commented yesterday on your concern about the temperatures in that plot, one of the points that you made was that Chrysler has an internal maximum temperature which is a bogey of sorts for where you begin to become concerned, if I remember that correctly.

Can you recall to me what that is, what temperature that is?

MR. HOFFMAN: Well, it's -- for one thing it's not one single temperature, because we have to look at the range of temperatures and so forth. So we don't really spec it out as a single temperature per se.

And the other thing is that is confidential information to Chrysler.

MR. MC CARGAR: Okay, well, we've had input from the catalyst manufacturers that have said to us that -- that would distinguish between temperatures where you get very very rapid catastrophic damage to a catalyst, which would be a peak temperature concern, as opposed to the increasing -- the time based deterioration as a function of temperature, which is a cumulative rather than a catastrophic issue.

In the peak temperature regime they've made

comments to us that with current formulations and with anticipated future formulations, that catalyst temperatures going well above 1600 or 1700 degrees as a peak temperature concern, are doable now and potentially higher in the future.

Would you agree with that statement or disagree with it?

MR. HOFFMAN: Well, that always becomes a tough issue. When it comes to catalyst longevity and the ability of the converter to perform in use, we need everything we can get.

MR. MC CARGAR: Okay.

MR. HOFFMAN: So we are -- we are not wanting to, you know, push the limits. The threat of recall is very real, and not knowing exactly how our cars get used by all of our customers we can't possibly know. We know they use them in surprising ways to us quite often.

We need to be very mindful of peak temperatures.

MR. MC CARGAR: Okay, so implying then that any increase in temperature is a concern to you?

MR. HOFFMAN: Yes.

MR. MC CARGAR: When you stated a couple of minutes ago that rather than a peak temperature there's a range of temperature bands where you're concerned, can you elaborate on that and where you encounter percentages or

absolute measures of accumulation at given temperature bands that become a concern to you?

MR. HOFFMAN: Well, I really can't because again, that gets into Chrysler's proprietary knowledge on max limits. Perhaps there's something we could do privately with the EPA.

MR. MC CARGAR: Okay, would Chrysler be willing then to approach us with some more specific information on what you provided here, on what you considered the flat part of the exponential degradation curve and what you consider the steep part of the degradation curve for some of your applications that would be typical?

MR. HOFFMAN: I think there's a good chance we could do that.

MR. MC CARGAR: Just to make sure I understand what you provided, correctly? I was just eyeballing the numbers off of this plot, and again, I'm on the LEV plot.

If you picked a cutoff of 1500, as you did, for temperatures above that being a concern, and you created the rest of the histogram, which is not shown here; am I somewhere in the ballpark of 1500 and above is about 6 percent of total operation, a little above that?

MR. HOFFMAN: Well, without reviewing the numbers it sounds about right, Jim.

MR. MC CARGAR: And above 1600 it's less than a percent?

A VOICE: If you'd like me to put the chart up and try to add it up here?

MR. MC CARGAR: Sure.

MR. HOFFMAN: What was your last question, please?,

MR. MC CARGAR: Above 1600 it's less than a percent of time for this vehicle, projected to useful life, would have been --

MR. HOFFMAN: (Interposing) That looks like that's a correct statement, yes.

MR. MC CARGAR: And I am correct, then, that there's a large block of this diagram that's not shown, to the left, with temperatures that --

MR. HOFFMAN: (Interposing) right, the blocks would all add up to 100 percent.

MR. MC CARGAR: Okay.

MR. HOFFMAN: And clearly that isn't shown here.

MR. MC CARGAR: Making that clear --

(Simultaneous voices)

MR. HOFFMAN: -- I thought I covered that, you know, we were focusing on the higher end. And maybe I didn't make that clear enough.

MR. MC CARGAR: Okay.

MR. HOFFMAN: But that's what we have to do.

MR. GERMAN: Just a clarifying point, are these temperature blocks, are those the mid range that's shown, or the top?

MR. HOFFMAN: It would be the range. For example the block at 1500 would be the range from -- well, I guess it would be the top, between 1475 and 1500.

MR. MC CARGAR: The 1500 represents the maximum temperature of the indicated band?

MR. HOFFMAN: I believe that's correct, although -- I guess that's a detail question. You really had better let me go back and check with the guys on that.

MR. MC CARGAR: That would be useful, to know that.

MR. HOFFMAN: We can get that to you.

MR. MC CARGAR: Okay. Would the other manufacturers be willing to comment on their willingness to supply us information, confidential or otherwise, on your perspective in the flat part as opposed to the steep part of the normal degradation curve, or catalyst formulations you would anticipate in the period of this rule?

MR. HASKEW: Would you repeat the question?

MR. MC CARGAR: Sure, Doug has offered, on a

confidential basis, to supply us information on the temperature bands where Chrysler begins to get concerned about thermal degradation as a function of temperature. I phrased the question to him in terms of the flat part versus the steep part of the exponential curves for some of the typical calibrations that they might anticipate. I guess I'm asking the same question of the other manufacturers?

A VOICE: Yes, Jim. We have, I think similar kind of metrics, maybe a little different in the way they're exactly characterized, but I suspect that we could share some of that information with you.

MR. ROUSSEL: And likewise at Ford, we have to see what's available and if we have something we can provide that on a confidential basis.

MR. HASKEW: Harold Haskew from General Motors.

I'd just like to add that your original question addressed new technology and you're talking to catalyst manufacturers and they say they have higher temperature resistant materials and watch coats and substrates in the cube. I believe the extra temperature tolerance has already been factored into our approaches towards the California LEV and new LEV program; and that our ability to meet those standards are predicated on being able to move the catalyst forward for faster warmup and take advantage of the materials

that the people may have been talking to you about.

I think we've used all the margin in our future plans towards releasing the LEV or meeting the LEV standards.

Now if, for the intermediate soak requirement, you're saying you would like to use that instead of the LEV, and EPA was willing to go back and review the LEV waiver and maybe use it for intermediate soak and rescind the LEV waiver, you know, we'd be interested in talking about that.

MR. MC CARGAR: Well, let me turn to that for just a second.

MR. HASKEW: I said that tongue in cheek.

MR. MC CARGAR: No kidding.

(Laughter)

MR. MC CARGAR: I'll say something not tongue in cheek. Do the manufacturers have any information, themselves, on the effect of external or internal insulation, that would bear on whether or not the temperatures increase at the lower or the higher regimes of the catalyst operation? That is do you see uniform increase across types of operation, or does -- more at high temperatures or more at low temperatures?

MR. HASKEW: Chrysler has some charts. I'm not aware -- well, go ahead.

That's not insulation.

MR. MC CARGAR: That's not insulation data, though.

MR. HOFFMAN: You asked, Jim, if we had data with insulation. I guess I'm not aware of any manufacturer that does.

MR. MC CARGAR: No.

MR. HOFFMAN: I belive we're looking at the data that EPA generated.

MR. MC CARGAR: Okay.

MR. HASKEW: And again, this is just one of those things that, given the technical showing we've made, and our concern for temperature, just the whole idea of adding to that doesn't seem an appropriate thing to do.

MR. MC CARGAR: Would it be fair if the data demonstrated that increases in temperature associated with catalyst insulation did not occur at the peak points, that that would be a consideration in judging, in evaluating your concerns about temperature degradation?

MR. HASKEW: But then you go back to the packaging costs and all of the other myriad of reason for not doing this.

MR. MC CARGAR: Well, I'm setting aside the cost for the moment. I'm just asking the question of whether or not, from your point of view technically it would make sense

to consider whether or not increases in temperature associated with insulation occur across the range of temperature operation or not at the peak points, or only at the peak points.

MR. CULLEN: Jim, your hypothetical, I doubt could be true. It may well be that the increases are more significant at more moderate temperatures, but I don't think there's any way we would get an increase in moderate temperatures and not increase in high temperatures. I think there may be a scale there. And given the increasing sensitivity to the higher temperatures, I think the concern remains.

I agree with you that that would factor into how large the concern is. It's very hard to see any insulation that's effective in doing what you seem to want to do, not having deleterious effects on the system and useful items.

MR. HOFFMAN: And, Jim, you commented, you know you wanted the -- this exponential relationship, and you commented on the so-called flat part.

There may be a flatter part there, but it's not zero. In other words there is still degradation of the catalyst, given time at that temperature.

The degradation -- the marginal increases in degradation, given the same time at temperature, goes up

exponentially. So even the flat part does have degradation that will occur. So increases there are a concern as well. I think that kind of gets at what you're talking about.

A VOICE: It's obviously degrees of concern and I agree with you.

MR. HOFFMAN: Yes.

MR. GERMAN: Now I think we acknowledged, in the Notice, that we have concerns about the potential effects on deterioration. And we, you know we've been trying and are still working on modeling and quantifying what those impacts would be.

In your comments I think you suggested, though, that modeling was not the appropriate way to do it and that instead we should be looking at ageing catalysts incrementally for the increased temperature and then doing -- testing actual emissions impact.

And EPA does not have any facilities to age catalysts. Is that something the manufacturers would be willing to supply for testing? In other words if you're going to recommend a better method is there some way --

(Simultaneous voices)

MR. HOFFMAN: -- Yes, I understand that. I kind of expected that question, John.

MR. GERMAN: Yes.

MR. HOFFMAN: I believe that we have a manufacturer that is working on that.

MR. ROUSSEL: Right. We, at Ford Motor Company, took a cut at trying to determine what the effective temperature increase would be on catalyst deterioration.

We've run a catalyst over our alternative durability process for ageing the catalyst and we added a kicker in there for the higher temperature modes that we would anticipate to see for that application out in the field.

We would like to set up a meeting with you guys, again, to discuss the results of that data. The data did show significant deterioration and it's probably an important thing to consider in this rule making.

MR. GERMAN: How did you determine how much additional ageing to do?

MR. ROUSSEL: That's the part that was very difficult to do and I don't want to get into the details of that here and would like to discuss that with you guys on a one to one --.

MR. GERMAN: We certainly look forward to --

(Simultaneous voices)

MR. ROUSSEL: -- sure --

MR. GERMAN: -- that meeting.

I had one other question on the testing. In the beginning you showed some data on four LEV prototype. Is it possible to give any definition of what those vehicles were? Were they cars? Trucks? Big cars? Small cars?

MR. HOFFMAN: The first two were labeled as LDT 2s, and the last two are passenger cars. And beyond that -- they are LEV prototypes and I think there's concerns about proprietary information for each manufacturer. Perhaps you could approach the manufacturers individually.

I'm not sure there, John.

MR. GERMAN: Okay, thank you.

MR. KOUPAL: I just have a couple of questions which may actually overlap with questions that Jim and John asked, but just to clarify.

You mentioned that the temperature increases which would result from insulation would not be acceptable to you in terms of catalyst deterioration. Is that based on a quantified analysis, and if so is that data available to us?

MR. HOFFMAN: Well, it's base don our knowledge that temperature increases in the regimes that we would expect based on the EPA's data -- were harmless.

To quantify, like we said before, it's a very difficult thing to do. We do have a manufacturer, Ford, that has attempted that quantification, and they're going to

meet with the EPA. Okay?

MR. KOUPAL: And just to follow up on John's question. The data -- it's important to us for the vehicles you tested, to have a sense of more details particularly in terms of the catalyst system. And so you're suggesting that we'll need to go to the individual manufacturers to acquire that information? Or will that be provided for the MTP panel?

MR. HOFFMAN: I think one thing we can mention, we might have fed you this a few days ago.

You don't have extraordinary technology. Like, there's not electrically heated catalyst. I think I'm okay in saying that.

A VOICE: That's correct.

MR. KOUPAL: Okay, so that information will be available to the EPA, though, the specific catalyst configurations of these vehicles?

MR. HOFFMAN: I think you're going to have to approach each manufacturer as I read it today.

MR. BERUBE: You're talking about whether it's close coupled or under body? Is that the type of clarification you're looking for?

MR. KOUPAL: Well, actually I suppose we could talk about this later, but more specific information about

catalyst loading, catalyst location and type of catalyst system.

MR. BERUBE: I suspect -- get with each manufacturer and see what type of information they can provide.

MR. HOFFMAN: It starts to get pretty sensitive, John. You're talking pretty new technology being developed by different companies around the world. It's pretty sensitive.

MR. GERMAN: Thanks.

I just have a couple of questions on the page where you're talking about eliminating the new start cycle that we were talking about.

You made two statements on there. One is that the need for SCOX has not been demonstrated, and also the need for dither control beyond that which already exists in the current driving schedule has not been demonstrated.

We actually spent some time, in the support documents, trying to document the need for both of those.

Should I interpret your statements as saying that you don't believe that we succeeded in justifying it?

MR. ROUSSEL: Yes.

MR. GERMAN: Okay.

MR. BERUBE: I'll elaborate. Mike Berube from

Chrysler.

I think part of the metric that we always look at when we're looking at the need for anything is, you know, "What's the marginal benefit that's being provided by that relative to the marginal cost for it. And, you know, I think that in particular is something that would be more helpful in determining its need.

MR. GERMAN: Okay, I think we tried to establish that there was some marginal benefit then.

Just to follow up. When you said should we then interpret you saying is that the marginal costs for the cycle is significant and doesn't justify the benefits?

MR. BERUBE: I guess both. We haven't seen the demonstration that there is of what that is sufficiently. And we have enough concerns about the complexity to say that it needs to be demonstrated to be -- for us to be able to say that it's worthwhile doing.

MR. GERMAN: Okay, I think maybe we should meet here, and just -- I'd like to request you follow up on that in your written comments, because we felt we did demonstrate a need.

And so if you feel that the need isn't there or if there's significant cost I'd like to see that document.

MR. BERUBE: We'll do that.

MR. GERMAN: Thank you.

MR. ROUSSEL: I'd like to make a request from EPA. We had a discussion on compositing yesterday, and I'd like to go through very brief comments on industry's position regarding compositing, if that's acceptable to you guys?

MR. GERMAN: Sure.

MR. ROUSSEL: It'll just take a couple of minutes.

You've heard presentations on high speed, high acceleration, A/C operation and intermediate soaks.

And as we previously stated, we're not opposed to compositing. Our major objection to EPA's approach has been tieing the SFTP levels directly to the FTP levels.

We believe that EPA did this out of convenience, last August, to avoid tough issues such as headroom, setting a 100 case standard; setting standards for heavier light duty trucks.

In the process of doing that you used data gathered mostly on Tier 0 vehicles, and then applied that concept to Tier I and to Tier II vehicles, setting standards for those over the SFTP.

There was essentially no data at that time to support the levels at Tier I and especially Tier II and the heavier light duty trucks. That essentially prompted industry, AAMA and AIM to propose other methodology, looking

at each piece separately and then applying our methodology that we've gone through several times. That is test the vehicles over the intended control cycle. Determine feasible design targets and then add appropriate headroom.

We view compositing as a relatively easy thing to do once those appropriate levels and standards have been established and determined for each case.

End of comment.

MR. MAXWELL: Okay, I believe the next presentation is on air quality. Tom Darlington.

INTERMEDIATE SOAK REQUIREMENTS, COST EFFECTIVENESS

BY TOM DARLINGTON

MR. DARLINGTON: My name is Tom Darlington. I'm with the Air Improvement Resource. And, yes, I'm going to go through the intermediate soak cost effectiveness first.

I'm going to then go to air conditioning and then finally we'll look at USO6.

And so these are three separate presentations.

We have reviewed for industry the cost effectiveness analysis that was conducted in the NPRM and described there, and we have a few comments on it.

We think there's a little different way of looking at the data, the emission benefits. And I'd like to take this time now to just go through that.

So we'll start with intermediate soak.

Now on an overview I want to cover for a minute the need for emission reductions and then go and begin to talk a little bit about the geographical areas for analysis. In other words what parts of the country are we really trying to address with this rule?

I'm going to talk about the EPA emission benefits analysis, I'm going to look at a revised emissions benefit analysis and make some suggestions for improvements and then finally look at cost effectiveness.

I'm going to look at ozone and CO. Those are the pollutants, or the current problems in terms of air quality. And what I've shown here is the deadliness for attaining the ozone and CO standards. And you will notice that only this -- well, this FTP rule, this SFTP rule really come into play in about the 2000 year timeframe and thereafter.

It takes about 4, 5, 6 years for 50 percent of the VMT (phonetic) to be covered by vehicles affected by this rule. And so by looking at the chart you can tell the marginal, moderate and serious areas have got to attain by 1999, and so really all you're talking about is the severe and worse areas that have to attain by 2005.

The rule won't do much to help severe areas and so maybe it's only severe -- the 2007 severe and extreme areas

that are really -- could be aided by this rule.

Now when you look at CO, moderate areas have to attain by next year. And I think there's one serious area and that's LA, it has to attain by 2000. So clearly this rule is not going to help in that whole process and in fact NMIHC and NOx reductions from Intermediate Soak will only be relevant for severe and worse areas, and CO reductions from SFTP, which will occur after 2000, are not needed at all, since most areas have to attain by 1996. LA has till 2000.

And, if you take a look at the EPA trends report on CO, the monitoring data has show continued dramatic improvements in CO.

Now overlaying on top of that scenario, what are some of the expected reductions in mobile source emissions. We've looked at a sort of a MOBILE5 analysis here and the top table shows an analysis for enhanced volume areas with and without RFG for both Class C and Class B areas.

And the thing that you notice from this is that there are continued dramatic reductions for mobile source emissions even after 1999. From 1990 all the way out to 2010 you see a 50 -- you know, in the neighborhood of a 50 percent reduction of VOC emissions. This is actually VOC plus NOx.

And you do see some reduction, another 10 to 15 percent, even from 1999 to 2005, 2010 time frame. That does

incorporate a 1.4 percent linear growth factor.

If you move the slide up just a little bit you'll see that the situation for CO is even more dramatic. You get huge reductions up to 1996 and continued reductions all the way out to 2010.

With that being kind of the backdrop, if you leave the goal of emission reductions from this rule really should be addressed towards ozone compliance in nonattainment areas, and that the analysis of emission reductions and cost effectiveness should be for nonattainment areas.

I've just listed some past regulations here which focused on nonattainment in urban areas. The 1998 plus heavy diesel particulate standards, RVP control, reformulated gasoline, enhanced evaporative controls. Lots of these things, the cost effectiveness has been estimated on a nonattainment area basis.

Now moving to the geographical considerations, this is an area that's kind of a tough spot. California may, or will have its own SFTP rules, we heard yesterday. It appears as though California will wait to see what the federal SFTP is and then perhaps opt out of certain portions of it if their concerned that there could be a negative impact on LEVs. It's likely that the opt out will be granted. The OTR, the ozone transport region, has begun to

implement a California LEV program. The manufacturers have offered 49 state LEV alternative, and it's pretty clear that OTR will also have some kind of California vehicles.

I should back up and say that the manufacturers have offered a 49 state LEV. That is a true California LEV and would probably be subject to whatever California's SFTP rules are in that case.

So it is clear that OTR will also have come kind of California vehicles, probably with California SFTP controls. Thus, EPA's SFTP may only apply to non-California, non-OTR states, of which there are about 37.

Now if we look at the characterization of the population living in the nonattainment areas -- this is a little bit of a busy chart, but I've tried to sum up the -- it's kind of a cross plot of the population in different areas, extreme, severe, serious -- some of severe and worse.

And the important number to grab out of this is the other column, at the very top. It's about the 4th column over, and -- some of the severe and worse.

You notice that for the 37 states, 11.2 percent of the population, and therefore probably the vehicles, live in serious and worse nonattainment areas in the 37 states to which most of this rule may apply.

If you look at the bottom right hand number it's

34.8 percent of the U.S. population lives in entire OTR and serious and worse nonattainment areas outside of California and the OTR.

Now we turn now to an area where we look at the NOx waivers that have been requested. The Clean Air Act provided for NOx waivers if states could prove NOx controls or prove that NOx controls are counterproductive.

Now a number of states have requested NOx waivers from the EPA, and the EPA has granted some and appears to be in process of granting the remainder of the waivers.

And so I'm raising the point here perhaps the benefits of SFTP controls should not be counted in areas requesting NOx waivers. If the main benefit for SFTP is a NOx benefit and yet a nonattainment is requesting not to have additional NOx controls, why should the benefit be counted there?

And I've reproduced the earlier table and shown some of the severe and worse areas and it turns out that only 1.8 percent of the population lives in severe and worse areas in the 37 states, in areas that have not yet requested a NOx waiver.

So taking these factors into account we have done a cost effectiveness analysis for intermediate soak, kind of looking at these geographical considerations. And for the

lower end of the range, in terms of population, in which these controls might apply, we've assumed that it's 1.8 percent for NOx, and that includes the non-California OTR areas not requesting NOx waiver. And it's 11.2 percent for VOC. And that's all the California OTR nonattainment areas. And when you weight those averages together by sort of an emissions weighting it's about 5 percent.

For the upper end of the range we've assumed that the number of vehicles or population -- subject area, where you can count emission reductions, is 34.8 percent, which is basically all of the OTR. And that assumes the OTR does not get California type SFTP; plus all of the nonattainment areas outside of the California NOTR. So we feel like that's a pretty generous nonattainment area population for the upper end of the range.

Moving now to EPA's emissions benefit analysis the total benefits are shown at the bottom of this table. It's .022 grams per mile for NMHC, .021 for CO and .037 for NOx. There's two components to that. There's the reductions due to the controls for intermediate soak and then there's also the air conditioning effect. The A/C is required to be in the "on" position for test following intermediate soak.

EPA observed that HC did not increase with A/C on during the ST01, thus, no HC benefit for A/C here.

There's also no A/C benefit for CO, because basically EPA concluded that insulation was pretty ineffective at reducing CO emissions.

Now we have a number of concerns with the EPA analysis, which are detailed in the next few charts. The first is that the 60 minute soak requirement assumed to reduce emissions over soaks as long as 3 hours.

In examining the data there was no data past 2 hours. Only the averages, of all vehicles were reported. We now have the individual data, so we can go back and look at that. It has been provided by EPA but it wasn't done in time for this hearing. And we could analyze trends in individual vehicles.

We note that the emissions increase dramatically after catalyst drops below light-off temperatures, therefore we didn't feel it was appropriate to extend the benefits beyond the amount that you have data on, so we only counted the benefits for 2 hours.

Second point, intermediate soak emissions up through 60 minutes would be no greater than those of pre-control 1O minute soaks. In examining all of the data that EPA had on catalysts that were wrapped with 1 inch of insulation, the data shows that 1 inch is just not sufficient.

And then when you go -- if you were to add more, more is not necessarily better. Increasing insulation will not linerally increase the effectiveness of the insulation, since each additional inch that you add is not going to be as effective as the first one.

Third point is that engine out emissions are going to be higher after 1 hour than after 10 minutes. So in our analysis we estimated that the insulation provides the benefits indicated by the data.

Third point, there was some concern -- and this is somewhat of a minor point. There's a concern with the weighting of the Tier 1 vehicle results. Only the Escort was tested over full range of soaks with insulation. The Grand Prix was tested at 60 minutes, but the remainder of vehicles results were created basically from these profiles. The vehicles were weighted then by the projected technologies to create a point estimate. On this point we developed a range from the EPA data, with EPA control estimate as the upper limit. We did have a lower limit. We used a different technology weighting.

On the second point, air condition on requirement during STO1 will further reduce intermediate soak NOx emissions, there was no intermediate soak data with the insulation and air conditioning on. EPA assumed that the NOx

benefits would go beyond the 120 minutes of the test data, and there were some other little minor things that we found with that, that we think were errors.

And so we did correct the errors, assumed that the NOx benefit only lasted for 120 minutes instead of beyond 120 minutes, and assumed, again, that the insulation provided the benefits indicated by the data that EPA had.

Lastly, on EPA's LEV analysis, Low Emission Vehicle analysis, this was based on the Escort, which barely met a Tier II level for NMHC, with no compliance margin. And, you know, there was an analysis done there but it was without the benefit of having a true LEV prototype. So I think -- it was a good start.

For our analysis we used the new data recently published by the automobile industry. There were 4 vehicles tested, Ford and Chrysler; 2 LDT 2s, at 10 and 60 minute soaks; a Honda and Toyota were a full range of soaks to 120 minutes, and you've seen some of that data in the previous presentation.

We used the percentage reductions due to the control from our analysis of Tier 0 vehicles, to reduce the LEV emissions due to insulation. And we've determined that the VOC plus NOx benefit is 1/4, about 1/4 of EPA's estimate based on Escort.

John Koupal did raise a good point yesterday with respect to the difference in the cycles that were used. A 505 was used for this and the STO1 cycle was used for the Escort. So that 1/4 of the difference there, part of the difference could be the cycle difference. And so the rest of this analysis ignores the cycle difference, and that's something that we need to address further. However, I don't think that's going to change the results too much, but it does need to be taken into account.

Finally on our LEV analysis for the A/C effects, the Ford LDT2 was tested at 10 minute and 60 minute soaks with the A/C on. The effect of A/C on for NOx was, again, 1/4 of the Tier 1 data cited by EPA.

So putting all this together, I have a rather busy chart, which sort of compares and comes to a bottom line on cost effectiveness. I won't drag you through all of the details of this, but if we look at the very top we see the EPA emission reduction.

If you can see the Tier I column? There's three columns. There's an explanation, then there's a Tier I column, then a LEV.

If we just focus on Tier I for a minute. The EPA emission reduction was .044 grams per mile. Our estimate of that, after accounting for all the differences, was between

.038 and .043. So it's not a lot different -- well actually you should look at the total intermediate soak HC plus NOx benefit right in the middle. The EPA is .059 and our range is from .038 to .043.

When we then go to the bottom half of the chart and begin to look at how to apply it to the different ozone nonattainment areas, again we had a low end of the range and a high end of the range and if you'll move that slide up a little bit? The current best estimate of cost effectiveness on the low end for Tier I is about $7500 a ton. At the high end it's $60,000 a ton.

We used the EPA costs in this chart. We didn't change those costs. Manufacturer has some significant cost issues here and the cost could be higher than the $9.30, but we just used that directly, because we haven't done a cost analysis yet.

But the $7500 a ton assumes that emission reductions occur in -- in the entire OTR, and then also in the nonattainment areas of the 37 states, excluding California.

The $60,000 a ton assumes the lower benefit for Tier I and assumes that you can only claim the emission reductions in states not requesting a NOx waiver -- in the 37 states.

We went through a LEV analysis -- and that's shown in the far right column. EPA's benefit is .032, ours is .009. And when you go down to the very bottom, the low end cost effectiveness is $34,000 a ton and that high end is pretty high.

So to put this in perspective with a plot, the NPRM cost effectiveness -- what I've shown here is incrementally adjusting the cost effectiveness for different things, and the horizontal line across the bottom of the chart shows that -- was the $5000 a ton cost effectiveness limit used in the RFT rule.

The NPRM, as it currently is, is a little bit under that, but when we adjust for emissions for Tier I and LEV vehicles, the LEV vehicles are higher. And this is before we even start to look at which nonattainment area to apportion these benefits over.

When you go to adjust the emissions in nonattainment areas only, which is the third set of bars, both the Tier I and the LEV are significantly over $5000 a ton. And then when look at adjusting emissions in nonattainmnet areas outside of the OTC, in other words the 37 states, it's between $60,000 and lots of dollars per ton.

So in summary on intermediate soak, we really believe the intermediate soak emission benefits and cost

effectiveness needs to be revised. There's some new data that can be brought in, that the manufacturers have run. Admittedly there's a concern with looking at emissions over STO1 instead of 505.

We believe there's a questionable amount of benefit past 2 hours for the data that we already have. There are questionable control levels to Bag 3 levels, with 10 minute soak.

We think we need to look at possibly re-weighting the data, and very very importantly it needs to be done in the context of a nonattainment area analysis to compare with with other controls. And we think that EPA should consider excluding those areas in the 37 states requesting NOx waivers.

Finally we think the cost effectiveness of these controls with either Tier 1 vehicles or LEV type vehicles are poor.

At this point I think it would be good if -- and it's up to you, but if you want to ask questions on this before I move to air conditioning and USO6 -- while it's fresh in your mind, that's perhaps what I would suggest.

QUESTIONS AND ANSWERS:

MR. GERMAN: In some of your initial comments you made a point of showing what the attainment dates were. I

believe you made the statement that the rule wouldn't do any good. Does that mean that you don't consider the VMT growth to be a problem in the future, as there is to try to stay within attainment?

MR. DARLINGTON: I think VMT growth will continue to raise emissions in the future, but then you have to analyze how much it raises it. And you have to look at the cost effectiveness of intermediate soak controls versus other controls that you may have in order to, after the standards are attained, how they are maintained. And that's a different exercise.

MR. GERMAN: Why is it a different exercise?

MR. DARLINGTON: Because I think that it's one thing to propose controls to attain a standard, it's another thing to pose controls just to maintain a standard. And you have to -- you have to compare the cost effectiveness of controls with either attaining or maintaining the standard.

MR. GERMAN: Okay. On the -- I guess on your regional analysis? I don't want to get into whether we should or shouldn't do it. There's a lot of good reasons for doing regional analyses. It's not something we've traditionally done for a national rule. But I do have some questions about the one where you're excluding some of the areas, some of the nonattainment areas.

And I think that what you're trying to accomplish there is actually to only allocated the cost towards the people who are getting benefits from the rule?

MR. DARLINGTON: Right.

MR. GERMAN: But there seem to be some factors that I wonder if you considered or not.

For example on the national LEV program, one of the specific things that they're modeling is the amount of VMT that occurs in the OTC region for vehicles that are outside the region. Did you consider that in this analysis?

MR. DARLINGTON: No, I did not. I figure that, you know, when we get the major -- I think we got some work to do on the major cost effectiveness and then that's a sensitivity issue to cover somewhere down the road. I don't think that's going to affect -- migration is what you're referring to. I don't --

(Simultaneous voices)

MR. GERMAN: -- well -- also --

MR. DARLINGTON: -- I don't think migration is going to have much effect on changing the cost effectiveness of intermediate soaks, but it's something that you --

MR. GERMAN: -- I'm just talking in general -- I mean because you did present the numbers from that. And I was just wondering what kind of basis that's based upon?

MR. DARLINGTON: I'm not sure I understand the question. I heard you ask about migration, but then -- now you're asking about the numbers, so --?

MR. GERMAN: No, no, the methodology.

MR. DARLINGTON: Okay.

MR. GERMAN: The methodology, that if you're trying to target specific -- the people who will benefit, then did you try to consider all the ways in which the people will benefit or not?

MR. DARLINGTON: Well, my high end cost effectiveness was calculated assuming, really, there's a wall between the OTR and the 37 states, and that there isn't any migration, and that I allocated costs over that whole 37 states, but I divided by the emission benefits, at least for NOx, in those areas that requested -- that did not request a NOx waiver.

So that was the methodology used to calculate cost effectiveness and emission benefits in those areas.

MR. GERMAN: I'm just trying to get at what is it represent?

MR. DARLINGTON: It's trying to -- well, it's trying to represent spending an awful lot of money building cars for the 37 states when there's only 1 or 2 nonattainment areas that haven't requested NOx waivers.

That's all I'm saying. It's saying a pound worth of NOx out in South Dakota is not worth the same amount as a pound in Atlanta.

MR. GERMAN: Okay, but it seems to me that your methodology says that it's worth nothing anywhere else, that these vehicles are never driven --

MR. DARLINGTON: (Interposing) That's correct --

MR. GERMAN: -- in the OTC region, that there is no transport of emissions.

MR. DARLINGTON: Well, those are factors that, after deciding upon what kind of nonattainment area analysis to do, may be important to consider, but I kind of doubt it.

The primary mission benefits are going to be for those vehicles in the nonattainment areas. Sure, you have -- when we looked at migration into the OTR, for example, we found that tourism was 4.1 percent; and we found that permanent migration was somewhere on the order of 6 percent. So, 6 and 4, 10 percent. For 10 percent of the vehicles coming in from the outside into the OTR, I mean you really have to look at the 90 percent first and make your decision on cost effectiveness and see whether or not it's close and then start looking at migration.

MR. GERMAN: Okay, but the 10 percent of the 30 percent of driving in the OTC works out to 2 or 3 percent of

total driving, and your calculation's are saying that less than 2 percent of the population would benefit. So, you know, right there you're more than doubling the benefits just from that one factor.

MR. DARLINGTON: I'm not sure I follow you on that.

MR. GERMAN: Well, we probably shouldn't discuss it any more here.

Go ahead.

MR. MC CARGAR: I guess my question would be for the manufacturers, given that -- this was a contract study, correct?

MR. DARLINGTON: Well, yes. I'm not employed by any of these, I am a contractor and a consultant.

MR. MC CARGAR: Is it the manufacturers' conclusion that in this rule making EPA should be calculating its cost effectiveness at the first level on the presumption the national LEV goes through, and failing that, on the presumption that California LEV vehicles in the OTR will comply with California non-FTP conditions? Is that your conclusion?

MR. BERUBE: What do you mean by in the first --?

MR. MC CARGAR: I'm trying to follow the framework that Tom laid out here. So I'm saying in the first instance

is it the manufacturers' conclusion that our cost/benefit calculations in this rule should presume that national LEV passes and national LEV includes California level non-FTP rule?

And failing that, then even in the absence of national LEV, that the OTC states will adopt California revised FTP, or the manufacturers will offer it as part of those vehicles?

MR. BERUBE: I would say that EPA needs to conduct the analysis both ways. Neither of us can say with certainty whether or not the LEV program will take place or not, but the analysis needs to be done looking at them both.

In the case of a national LEV program, which the voluntary 49 state program; manufacturers have stated that the definition of that 49 state LEV vehicle would be the California LEV vehicle with all of the standard and test procedures applied to those California LEV vehicles.

And we have said that we're willing to discuss, you know, reasonably standards that might not apply to the California vehicles, it might be national standards, things like altitude standards, certifications, short test, et cetera. But we have viewed, as manufacturers, that the SFTP would be -- for a 49 state LEV -- would be the California SFTP.

So that's "Scenario 1". I certainly would suggest that it needs to be modeled and looked at.

And "Scenario 2", the OTC states, I have already requested California LEV, and EPA's granted that California LEV. And by your suggesting whether manufacturers would offer something. Unfortunately manufacturers don't have the opportunity to offer what part of the standards or not they'd like to comply with. It's the California LEV, it's the California vehicle, period. And that's --

MR. MC CARGAR: (Interposing) California LEV vehicle right now does not include a non-FTP component. And the OTC agreement does not include that either.

MR. BERUBE: I'm talking now, not about OTC LEV. We already said that was Scenario 1. Scenario 2 is that we have the OTC states through Section 177 (phonetic), have opted into a California LEV program --

MR. MC CARGAR: (Interposing) That's what I'm referring to --

MR. BERUBE: -- and under that program, it's on a voluntary program, it's basically a California vehicle, no 3rd car. So whatever standards California would have would apply, including an SFTP -- standard.

If there's an opportunity for manufacturers to subdivide parts of the California standards that apply under

Section 177, and choose which California standards do or don't apply, I guess we could talk about that, but that's not our understanding.

MR. GERMAN: One specific question about just the intermediate soak. You said there weren't any benefits of insulation beyond 2 hours. I mean the data, I think, clearly shows that at 2 hours there is an emission benefit. And certainly it doesn't extend out indefinitely. But I was wondering what logic led you to cut it off at 1 minute after 2 hours?

MR. DARLINGTON: Because we were only looking at the average results. And there may have been individual vehicle results that were either higher or lower, and we didn't have those. And we didn't feel comfortable extending it beyond 2 hours. And that factor isn't a big factor in this, anyway. I mean it's one of the pieces of it, but it's not a huge factor, if you look at that chart.

MR. MC CARGAR: When you tested your own vehicles did you go beyond 2 hours?

MR. DARLINGTON: No -- I mean no, they did not. I mean I don't have the data beyond 120 minutes.

MR. MC CARGAR: But you were concerned about that, but in your own testing to verify what we did, you didn't test beyond 2 hours yourself, right?

MR. DARLINGTON: Correct.

MR. BERUBE: There were only -- of the 4 vehicles, some only went actually up to 60 minutes. It's hard enough getting the data that we did get.

MR. DARLINGTON: One of the things that happens in there is you get less and less bins to actually have emission reductions. So the marginal benefit of testing beyond, and claiming benefits beyond 2 hours, 120 minutes, gets smaller and smaller.

MR. GERMAN: We understand that. It doesn't necessarily mean it's zero.

MR. DARLINGTON: Right.

MR. GERMAN: John, do you have do you have a question?

MR. KOUPAL: I just want to ask some more detailed questions about your analysis.

And again, I'm not sure what data you had to use and what data you didn't, but our benefit analysis was performed on 3 Tier 1 vehicles and a surrogate Tier 1 that we used projections for the 1 vehicle.

We had insulation testing on 1 of those Tier 1 vehicles. You said that you used the actual insulation results for the control levels on Tier 1 vehicles. What did you use for the vehicles that we didn't have insulation data

on?

MR. DARLINGTON: We adjusted the average level, I think, to the level -- the profile of that 1 vehicle.

MR. KOUPAL: Okay, then that was -- 1 vehicle was the Ford Escort, which actually, I believe, showed HC plus NOx results at 60 minutes, actually below 10 minute levels uninsulated; and at 120 minutes showed 60 percent of the emissions from the uninsulated case.

So just to follow up on John's point. I think it's very appropriate to assume benefit beyond 2 hours based on that data point, using your methodology.

MR. DARLINGTON: I think the benefit really -- you know, I think the benefit has to be proven. We're talking about significant cost, significant impacts on catalyst durability.

If that benefit beyond 2 hours is so important to this analysis, then somebody ought to get some more test data, but I don't think it is.

MR. KOUPAL: Well, I guess what I'm implying is if that's what the data's showing, then that should at least be used for this analysis.

Another question I had is can you explain in more detail how you assumed away AC benefit over intermediate soaks for your analysis? Or if you didn't assume it away,

explain in more detail what you did with that?

MR. DARLINGTON: Yes, let me refresh. The NOx benefit? Let's see. We did assume -- oh. Yes, the only thing we did there is we still had, for Tier 1 vehicles we still had a NOx benefit. We just assumed that it didn't go beyond 120 minutes.

MR. KOUPAL: For A/C?

MR. DARLINGTON: Yes.

MR. KOUPAL: Okay, so you assumed the same level of NOx --

MR. DARLINGTON: (Interposing) as well --

MR. KOUPAL: -- but you didn't assume that the A/C benefit went beyond 2 hours?

MR. DARLINGTON: Right.

MR. KOUPAL: Okay.

MR. DARLINGTON: And we used the data to help us predict that, rather than assuming it would be at --

MR. KOUPAL: (Interposing) okay --

MR. DARLINGTON: -- at Bag 3 levels.

MR. BERUBE: Tom, do you want to comment on the other errors that -- of the change that was made, that was a much larger number?

MR. DARLINGTON: I don't want to comment on it because I don't remember all of them.

MR. BERUBE: The two basic ones, as I remember reading the draft report -- and we can check back -- was the frequency of A/C use and the frequency of intermediate soak that were quoted during the intermediate soak report were different than those used in other parts of the NPRM and appear to just have been misapplied. Maybe they were done at different time periods. So we just corrected using the actual numbers as quoted in the A/C paper.

MR. KOUPAL: We will certainly look into that and make the correction if needed.

MR. DARLINGTON: There is a technical report written on this, that the industry has. I don't know whether they've provided that to you. We haven't quite finalized that.

MR. BERUBE: It's still a draft and we hope to finalize it very soon, I would say in the next few weeks, and provide that to you.

MR. KOUPAL: Okay, I think I have just one more question. How did you weight the -- this may be a multi-part question.

How did you weight the soak period occurrences using your -- I assumed you used the -- well actually was the 60 minute soak the only soak point you used to represent the range of intermediate soak operations? And if so, how did

you weight that?

MR. DARLINGTON: Do you mean for the LEV data or for your renewing your Tier 1 analysis?

MR. KOUPAL: In your analysis -- for the LEV data. In your analysis you tested 10 minutes, you tested 60 minutes and you tested --

MR. DARLINGTON: (Interposing) Oh, there were other cars. There were 2 cars that were tested over the full range of soak. So, like 10, 20, 30, 45, 60, 120.

MR. KOUPAL: Okay.

MR. DARLINGTON: So we used the actual data there.

MR. KOUPAL: Okay, for the vehicles that you didn't do that level of testing on, what did you use for weighting factors, or did you -- did you try to project out?

MR. DARLINGTON: For the different technologies, or for the profile of what their emissions would look like.

MR. KOUPAL: For the profile.

MR. DARLINGTON: I think we -- we took the 10 and 60 degree levels and corrected them to where these other ones were at the intermediate soak levels.

MR. KOUPAL: Okay, and just as a clarification, you used the in-use start driving proportion of 24 percent, but that was applied to the 505, correct?

MR. DARLINGTON: No, we used the 505 results

directly. And that's why I'm saying we need to go back and look at the difference between the 505 cycle and the STO1.

MR. KOUPAL: Right, so the 505 was weighted --

MR. DARLINGTON: (Interposing) Have the -- running -- hot running, driving in it.

MR. KOUPAL: It was weight with the 24 percent in-use start driving occurrence?

MR. DARLINGTON: Yes, yes.

MR. KOUPAL: Okay, thanks.

MR. GERMAN: Okay.

MR. ROUSSEL: I'd like to add one comment. Tom touched upon it, but in the analysis that have been presented here today we used EPA costs. And in our final comments, and hopefully before our final comments, we have an issue with the cost that EPA has projected for intermediate soaks A/C operation and USO6. Just wanted to emphasize that point again.

MR. DARLINGTON: All right, now we'll move on to the air conditioning emission benefits and cost effectiveness.

AIR CONDITIONING EMISSION BENEFITS AND COST EFFECTIVENESS

BY MR. DARLINGTON

MR. DARLINGTON: We'll look at the EPA methodology. We'll look at the areas where revisions appear

appropriate, and finally we'll look at revised emission benefits and cost effectiveness.

EPA Methodology was to use testing from ACR, AC Rochester testing program, with full simulation of climatic conditions using cold and hot FTPs, early Tier 1 vehicles. And this is a key point here, worse case ozone conditions, 95 degrees ambient, 40 percent relative humidity, 870 watts per meter square of solar load; and 135 degree pavement.

Is a straight average of all test results with and without A/C on, including repeat tests; sometimes an average of each vehicle's average emissions.

Now we have a number of areas for improvement here, first of all. And this first one is really kind of minor and I think some of it was taken care of. But basically we would recommend average repeat test for each vehicle prior to averaging vehicle results.

There were 3 tests on Grand Prix with A/C on, due to change in driver, relative to other A/C on/off tests. And we belive that those -- each of the vehicles should be averaged first and then all of the vehicles should be averaged.

The second point here is probably the most important one. The concern here is that what is used as an average high ozone day conditions instead of worse case. We

think we a daily high temperature and solar loading. We think you ought to model the benefits that occurs over driving in the entire range of temperatures, and we believe some modifications are needed to the A/C usage factor.

Finally, similar to the previous presentation, we think you should consider ozone nonattainment area VMT. It should be don on post-1998 Tier 1 emission levels; and we also ought to evaluate a LEV scenario in addition to post '98 Tier 1 vehicles.

Use of worse case versus average climatic conditions. EPA used same worse case climatic conditions for proposed test procedure and the emission benefits. Some situations warrant a worse case test procedure, for example when emissions increase dramatically after a threshold is exceeded. However there's currently no evidence that air conditioning emissions, controlled or uncontrolled, increase dramatically after exceeding a climatic threshold.

And I guess the comparison here is evaporative emissions. Evaporative emissions at high RVPs or after the canister fills up, there is a threshold and emissions go up quite a bit. But there currently is no evidence that that happens with the air conditioning and NOx emissions.

Third point: Emission benefits should be estimated using the conditions which will exist in

the relevant geographic areas. Use of a more average high ozone test procedure might be considered here.

Example, again, enhanced evap test procedure and in-use emissions. There's a steep increase in emissions after the canister capacity is exceeded, used to justify the 3-day diurnal at 72 to 96 degrees F. However MOBILE5 only uses a 3-day diurnal emissions for small fraction of actual soaks, using temperature range appropriate for that area.

In terms of the ozone nonattainment areas and the climate, EPA evaluated 44 areas' average daily high temperature on ozone violation days from 1988 to '92, and found that the 90th percentile high temperature was 95 degrees F.

Nearly all of the 44 areas are in California or the OTR, which may be (unaffected by this rule, or will be in attainment prior to, or by 1996, per the Clean Air Act.

Only 7 serious and severe ozone areas exist outside California and ozone transport region; and we've shown their average maximum daily temperatures for high ozone days right here. The population weighted average is 88.8 degrees.

So a final point, the average high temperature of 88 degrees still considers temperatures existing on high ozone days, but eliminates those areas not needing the rule's

emission reductions. I'll leave that up there for just a minute.

In as much as this part of the requirement may apply also to California, if they opt into this -- or keep it, don't opt out; and the OTR has it; we re-did this analysis for the average maximum daily temperatures including California and OTR, and the change in temperature here was only a couple of 10ths. It was 88.6 instead of 88.8.

Now in relative humidity EPA based the 40 percent relative humidity for the ACR program on regression analysis of high ozone day humidities and temperatures.

Figure 2 of A/C tech report shows relative humidity equals about 29 percent at 95 degrees F, and not 37 percent. And I think I have a chart on that here. Here's the chart of relative humidity on the Y axis maximum daily temperature on the X axis, and at 95 degrees you see the data is about 29 percent instead of 40 percent.

At 89 degrees F Figure 2 shows relative humidity maybe equals around 45, 47, 48 percent, and that the population weighted relative humidity for serious and severe ozone areas outside CA/OTR is 47 percent.

Relative humidity for ACR test program was too high for 95 degrees test program, and slightly low for a more reasonable 88 to 89 degrees.

Now on the use of daily high temperature and peak solar loads, EPA assumed that all VMT would occur at the daily high temperature and at the peak solar load, high noon. Emission benefits should be determined using a VMT weighted average temperature and solar load.

Using a typical diurnal range of 22 degrees F, a VMT weighted temperature is roughly 80 to 82 degrees -- average for solar load around 500 watts per meter square. And I think I also have a chart on that solar load.

Now what was used was the very peak solar load to represent driving over the entire range of conditions. Clearly in the morning you're not going to have that kind of solar load, nor are you in the later afternoon.

Now to turn to A/C use on high ozone days. EPA performed survey of A/C usage during 90 to 100 F days in Phoenix. The result was it appears as though there was 77 percent usage with the air conditioning compressor on 79 percent of time when the A/C switch was on.

Now we haven't gotten the data on this, so it's unclear to us whether the 77 percent usage was based on time, mileage or trips. There's no details of survey procedures, nor raw data yet published, so we haven't been able to analyze that, and it's a fairly important factor. Air conditioning usage is likely linked to daily high

temperatures, also likely higher at mid-day than during early day or late evening. A lack of the study documentation prevents any technical evaluation of results and interpolation to lower temperatures.

We have a crude estimate of A/C usage of 53 percent, for a daily high of 88.8; assuming zero A/C usage at 75 degrees F, and a linear relationship with temperature.

Now you might argue that people, you know, 20 percent use it at 75 degrees F, or something of that nature, and get a different result; but as I said, this is a crude estimate.

When used with ACR-like data, both ambient and temperature and A/C usage should be adjusted, since effect of temperature on A/C compressor load is accurately simulated during the test. And viewing this from a practical perspective, lower peak temperatures mean that the A/C compressor is operating less frequently while the A/C switch is on, and the A/C switch is on less because a greater percentage of driving occurs at ambient temperatures below those when drivers use A/C.

So on an adjustment for average high ozone conditions, ACR-like emission data only available at one very worse case set of climatic conditions. Data over proposed EPA test is

available at 75 and 95 degrees.

However there are problems with using proposed EPA test data to interpolate the effect of average versus worse case climatic conditions for three reasons: Ambient temperature is only parameter changing. Humidity is constant and the solar load and pavement temperature implied at best in EPA tests.

The tests with driver window down unlikely to accurately simulate effect of ambient temperature; thirdly the correlation between EPA 95 degree data and ACR data was poor. EPA's comparison concluding otherwise, included vehicles not tested at both facilities, and ignored large differences in emission measurements with both the A/C on and off.

Our most technically sound conclusion is that in-use effect of A/C usage cannot currently be estimated. In-use emissions are only known at the single set of ambient conditions, simulated in the ACR test program.

If such an estimate must be made, we could interpolate 75 and 95 degree A/C effect using EPA data to determine an 81 degree F effect relative to 95 degree effect; and apply the percent to ACR test results.

Reviewing the EPA comparison of proposed test procedure to ACR -- the EPA comparison presented in Table 11

of A/C tech report.

Two points: The EPA finding of equivalency based on the average of the absolute differences between A/C off and on emissions for 7 vehicles. The averages include two very different Astro vans, one in ACR and the other in the EPA program, with A/C off emissions; almost a factor of 3 apart.

Without the Astro, emissions with A/C off were 50 percent higher with the EPA test than during ACR. One vehicle's emissions differed by a factor of 3. EPA measured A/C on emissions were 30 percent higher than ACR, A/C on, emissions.

Given very poor correlation between either A/C off or A/C on -- emissions between the ACR and EPA -- it's technically inappropriate to compare average difference between A/C off and A/C on emissions.

Turning to NOx, from the EPA 75-95 degree test program, A/C related NOx increase at 75 degree F is only 1/3 that at 95 degrees. And interpolating to 81 degrees, the effect is 53 percent that at 95 degrees. The total ACR NOx effect is .182 grams per mile from the EPA -- the average of 8 vehicles. EPA shows this figure to be .185 in its A/C technical report, but used .2 grams per mile in its cost effectiveness analysis. Exclusion of Astro van with central

fuel injection would reduce the .182 gram per mile NOx A/C effect to .148.

Now when you apply both of the 53 percent factors to this it would yields an in-use uncontrolled A/C effect of .051 grams per mile NOx.

EPA assumed that 75 percent of the NOx increase was controllable without any hardware changes. Using the same figure here produces a net NOx reduction of .038 grams per mile. And this is a 74 percent reduction from EPA's estimate of .15.

Now on non-methane hydrocarbons and the temperature adjustment the RIA shows an A/C NMHC benefit of .012. Technical report states that the A/C non-methane hydrocarbon effect was .011 over Bags 2 and 3; and that this is the best measure of the in-use emissions impact.

Appendix III of the report shows that the difference is only .01, indicating that round off on A/C off and A/C on levels led to an increase of .011. Appendix III includes the third test of the Grand Prix with the A/C on, which used a different driver. Excluding this data yields an A/C NMHC effect of .01, with or without round off.

Averaging EPA 75 and 95 degree test data contained in the appendix yielded the following results: Applying the same methodology to NMHC as NOx, the A/C NMHC effect at 81

degrees F is zero. Thus, until ACR-like data are available at more representative test conditions, no NMHC benefit should be claimed for A/C control.

As EPA included the A/C related non-methane hydrocarbon and carbon monoxide benefits in its US06 cost effectiveness calculation, this has no effect on EPA's A/C cost effectiveness analysis, but does impact the US06 analysis.

Turning now to the CO Benefits, EPA claimed a .30 gram per mile benefit related to A/C control. While the need for additional CO control in the winter is highly questionable, there is little or no need for CO control in the summer when A/C is used. Therefore no A/C related CO benefit should be used in either the US06 or A/C cost effectiveness analysis.

On VMT in ozone nonattainment areas, analysis presented as part of the intermediate soak comments showed that serious and severe ozone nonattainment areas VMT represented only 11 percent of VMT outside of California and the OTR. All but one of these areas had requested a NOx waiver from EPA, exempting them from the Clean Air Act mandated NOx requirements associated with enhanced I/M transportation or conformity, new source review and RACT. Excluding these areas, as we saw earlier, reduces the VMT in

serious and severe areas to 1.8 percent.

If the OTC adopts the 49 state LEV program and EPA and CARB agree on a single A/C requirement, then non-attainment VMT would be 30 percent including areas requesting a NOx waiver, and 24 percent without these areas.

As I mentioned earlier, the population weighted average temperature and relative humidity do not change substantially. However, except for a fraction of vehicles producing over a year or two, all vehicles affected by the A/C requirement would be LEVs, which could have dramatically smaller A/C effects due to their need for very tight fuel control.

Turning now to the technical feasibility and emission benefit, EPA's cost of control is based entirely on recalibration. There is no new hardware. The feasibility analysis partially dependent on complete changeover to sequential PFI, absent this rule, and elimination of power enrichment due to the US06 standard. Sequential PFI allows tighter air/fuel control, enhancing ability to maintain catalyst efficiency over varying loads and speeds. Elimination of the enrichment increases engine out significantly.

Absent revised FTP rule, sequential PFI should substantially reduce the A/C related NOx increase.

On the third point, while 8 vehicles used to estimate A/C emission effects met Tier 1 standards, only one had sequential PFI; 2 vehicles had simultaneous double-fire systems, which attain a part of the sequential PFI benefits, but relying on just on 3 vehicles to base the benefits of an emission standards is unsound.

EPA performed no testing of vehicles with these or other control techniques which would aid in assessing impact of technologies already being applied for other purposes. Thus we believe it's currently impossible to project emission benefits for 1999, and later, in Tier 1 technology.

Looking at the cost of A/C emissions control, EPA estimated the cost to be $1.23 per vehicle. The EPA cost estimate includes a one time 10 million cost for A/C test facilities, and a one time 112 million cost for A/C standard's share of recertification, redesign and new facilities for all three aspects of revised FTP rule.

The technical feasibility analysis mentions improved air/fuel ratio control, increased EGR, or retarded spark timing at high load; shifting A/C compressor usage to lower load points, higher catalyst noble metal loading, but included no hardware cost or fuel economy penalty.

EPA found a 12 percent reduction in the A/C NOx impact by substituting second by second emissions with A/C

off, for A/C on emissions, at high load points to simulate impact of shifting an A/C compressor load. Concern with that is the EPA never added back the compressor load at lower load points, thus compressor was not shifted, but was reduced. That assumes no transient emissions impact of rapidly shifting compressor on and off.

Now looking at revised cost effectiveness of air conditioning control. We used the following assumptions: We assumed the EPA's $1.23 per vehicle cost. We used that directly, and manufacturers have issues with this cost. The conversion of the Tier 1 fleet to sequential fuel injection will not reduce the uncontrolled A/C NOx emissions, and that's likely to happen with sequential fuel injection.

Looking at the cost effectiveness, EPA's cost effectiveness for all areas is $144 a ton. Our analysis, including or excluding the Astro, which was tested -- two different Astros tested at ACR and EPA (phonetic), was somewhere between $3300 and $4000 a ton. In areas of the 37 states that include the population in those areas -- requesting NOx waivers -- if you exclude those areas requesting NOx waivers, then the cost effectiveness is over $20,000 a ton.

Costs only have to only increase to $1.86 per vehicle for even the lowest figure to exceed $5000 per ton

NOx, which EPA used to limit its RFG NOx standard. Any reduction associated with sequential PFI only reduces this cost limit a little further. Exclusion of Astro van with central fuel injection reduces the .182 to .148. And the Intrepid with sequential PFI showed an A/C effect of only .075 -- and that's at 95 degrees. So if you take that down to something more reasonable, EMT weighted, then it'd be lower.

In summary we believe, again, like the intermediate soak, benefits should be revised. I don't believe there's an HC -- or an HC or CO benefit has been demonstrated.

The NOx benefit should not be extrapolated from test data at the most extreme conditions. Use more realistic temperatures in VMT weighting. A problem in doing this is there are very little test data at lower temperatures to make good adjustments.

We believe you should do a nonattainment analysis in the post 2000 timeframe. And then finally, like the intermediate soak, we all ought to do a 1999 Tier I/LEV/Tier 2 type analysis.

Now the cost effectiveness of A/C controls is currently marginal compared to other strategies, even with EPA's current cost estimate. With slightly higher costs

these could exceed the cost effectiveness of other strategies which EPA has rejected in the past because of cost effectiveness.

QUESTIONS AND ANSWERS

MR. GERMAN: A couple of questions.

Starting on Page 10 and afterwards, you started using an 81 degree Fahrenheit figure. I was wondering where that came from, because your earlier analysis, I think, was 88.

MR. DARLINGTON: The 88 was an average of all the maximums on ozone days. It wasn't a 90th percentile, which you used, it was an average of the maximums.

MR. GERMAN: Right.

MR. DARLINGTON: The 81 degrees is kind of a VMT weighted -- what temperature. Not all cars travel at the maximum temperature of the day. So if you kind of VMT weight -- and this is a rough estimate. If you look at cars that go out in the morning, for example, they're not going out at 88 degrees, they're going out at some lower temperature. And you look at a VMT weighting of it, that's where the 81 degrees comes from.

MR. GERMAN: Okay, so I assume you got, like, hourly VMT data?

MR. DARLINGTON: Right. I mean it's available

from two sources. One would be obviously the Balitmore/Spokane data. Another one would be there's a distribution of VMT that's used to select an exhaust temperature correction factor from daily low and daily high data in MOBILE5a. So there's a VMT distribution in MOBILE5a that does the same thing basically.

MR. MARKEY: Which one did you use?

MR. DARLINGTON: Pardon me?

MR. MARKEY: You said there's two possibilities?

MR. DARLINGTON: Right.

MR. MARKEY: Which one did you use?

MR. DARLINGTON: I'm kind of pulling out of the air from experience. I know that the daily high -- the BMT weighted temperature for a low and a high is about two-thirds of the way up. And so I just use a factor of two-thirds. It could be 80, it could be 79, it could be 83. I don't know. It's somewhere in there.

MR. MARKEY: And that's based on the MOBILE5?

MR. DARLINGTON: Yes.

MR. GERMAN: Now on Page 12 you applied two 53 percent weighting factors to the emission results. Why did you apply two different ones?

MR. DARLINGTON: Because -- do we have the same Page 12?

MR. GERMAN: The top says, "AC NOx Effect Temperature Adjustment.

MR. MARKEY: Third bullet down.

MR. DARLINGTON: Okay, I've got the page. Yes, go back to Page 9, if you would? Because at the bottom of that, (Reading) "We believe both ambient temperature and A/C usage should be adjusted." And it comes about here.

In one sense you've got a temperature adjustment, in another sense you've got -- you know, you've got a A/C usage adjustment when the air conditioner is on in the vehicle all the time. And then at lower temperatures there's less likelihood for a lot of vehicles for the A/C even to be on. So the compressor can't be on when the A/C's not on. And so the 53 percent is both of those factors. It incorporates the lower temperatures, the 95 degrees and the fact that at lower temperatures many people don't even turn the air conditioner on. Some portion of them.

MR. GERMAN: I guess it's -- I think that they're interrelated, I guess, is my concern, is that the lower temperatures are also going to affect the usage right off the bat. So it seems to me there's some double counting involved there.

MR. DARLINGTON: I think the key here is to go back to your -- wherever your A/C -- whatever your A/C data

is. And if we had that we could analyze, we could look at the Phoenix data and determine what the usage is at 95 degrees. But still, beyond that, when you start cranking down to 85 degrees you have to incorporate two factors.

One, the A/C compressor's going to be on less even if every vehicle in the fleet had the A/C on. But the second factor is that a lot of those vehicles won't even have the A/C on. So both of those factors have to be taken into account.

MR. GERMAN: Yes, but basically it says, is that on average the compressor is actually only on -- what does it work out to be, 25 percent of the time, which -- it seems awfully low.

The other thing I wanted to ask you about is, on Page 12, after you apply your adjustments and come out to .038 grams per mile, you say this is a 74 percent reduction from EPA's estimate of 0.15 gram per mile?

MR. DARLINGTON: Yes.

MR. GERMAN: If I recall correctly we estimated .091 grams per mile, because we applied a 61 percent adjustment of our own to that .15 figure.

MR. DARLINGTON: I don't have Appendix A here with me. If I did I could verify that, but I'll take that on faith.

MR. GERMAN: I guess my concern is that if you were actually "ratioing" your number to our number when you did your cost benefit?

MR. DARLINGTON: No, no. We're just using the .038 directly.

MR. GERMAN: Okay.

MR. DARLINGTON: But I'll look at that. I will.

MR. MARKEY: Given the cooperative efforts that we've had in the past, and particularly limited facilities for the testing in a full environmental chamber, Harold, you didn't happen to do any testing at 88 degrees of an A/C? And do you have any plans?

MR. HASKEW: No, we don't have any of that data.

MR. MARKEY: Do you have any plans, or do you think it's worth pursuing and looking at that to try to do a better quantification of the in-use benefits?

MR. HASKEW: Well, I still haven't recovered from all the chits I had to burn to get that original test time. I am still held in great disfavor. And while we're talking about that, I took a lot of abuse from knowledgeable people on air conditioning, that a 40 percent relative humidity at 95 degrees was an inappropriate number.

And I told them that that came from honest, solid data from EPA, which was my understanding. And then in the

technical document I believe that was the graph you showed Tom -- I believed, if I'm reading that right, it would say that 30 degrees relative humidity at 95 is a more appropriate choice. Is that true? That's a large issue in air conditioning load.

Is 30 percent relative and 95 the more appropriate value from EPA's own data?

MR. FRENCH: Well, I think I'll address that just briefly. That is an issue that Tom had raised with us earlier, and that is something that we will need to go back and look at.

But at the time when we were working together to establish those conditions I think we did end up agreeing on those. And we may need to revisit that, but let's just leave it at that for now.

MR. HASKEW: Well, again, this data, Tom, is from the -- from EPA's A/C's technical report. I mean this is your data, if I'm reading it right. Is that so? And it looks like we just kind of misread the 90 and the 95 degree data.

MR. MARKEY: I guess -- in terms of saying the parameters for the test program, it was clearly a cooperative effort. We were working hand in hand with the same data to determine that. And like Rob said, you know, maybe we need

to reevaluate this, but it's clearly good faith on both sides when we determine what the test schedule should be.

Could you answer the original question about the possibilities of additional testing at the lower temperature and potentially revised humidity?

MR. HASKEW: I think especially if the 95 degrees at 30 were part of the reconsideration I could certainly use that as a wedge to try and get facilities.

MR. GERMAN: For our court reporter, this is Elbert Bontekoe from EPA. He did a lot of the work on the air conditioning.

MR. BONTEKOE: The chart that was put up there has a small technical error in it. The data was not averaged by city first, but was put in with unequal ratings for the cities. When it's averaged by cities first the numbers that we had reported at the ad hoc panel are right. That's 40 percent.

MR. DARLINGTON: Well, okay, It would be good to see that analysis in the tech report or in the docket or somewhere -- it may be good for the docket, I don't know.

MR. BONTEKOE: We'll perform the analysis again and put the information correctly in the docket.

MR. HASKEW: Jim, I tried to qualify, but I think I would certainly feel justified in going back and trying to

get resources available to do additional testing. This is a bad time of year because this is when we are using that facility the most. But it's certainly worth talking about.

MR. CULLEN: On that same issue, you've raised the lack of data in the LEV realm, and that may be a hole -- the A/C effect in the LEV area -- may be a hole you want to think about trying to fill somehow.

MR. GERMAN: Can you repeat that for the court reporter, Kevin?

MR. HASKEW: Well, in addition, we brought in data on 5 Tier 1 vehicles, Kevin? That's the new test program? So we've got data that we presented yesterday that we will share with you soonest, that is on Tier 1, with appropriately aged hardware.

A VOICE: I think -- in the -- I don't know where -- this LEV data, but I think we're going to try to at least make some attempt when we put together the technical report backing this up, to look at what the effect of the type of analysis would be in a Tier 2 type LEV world, making some assumptions just to try to shed some light in that area.

MR. FRENCH: I have another question here about the correlation between the EPA data and the A/C Rochester data. On Page 10 you state that that correlation was poor, and I assume you're speaking about an emissions result

correlation.

My recollection at the time was -- and maybe you can address this -- was that we did additionally look at the loads experienced by the vehicles and found a fairly high degree of correlation there.

MR. DARLINGTON: Yes, let me put this chart up. I haven't reviewed the loads. Did you also look at fuel economy? I can't remember. There were a number of things.

This chart shows the comparison, the ACR data and the EPA data. And if you look at the very bottom, where it says "average", on minus off, you notice that for ACR data it looked like it's .185 grams per mile. And on versus off for the EPA data is .201.

So you say, "oh, that looks pretty good." But then you go up and look at the Astro van and the Astro van tested at ACR and it was a different van than tested at EPA. The reason those two numbers at the bottom look so good is because these were two -- well, there were two different vans and the one tested at ACR was almost a factor of 3 higher than the one tested at EPA.

And so it's just fortuitous that this worked out on the averages to have the same effect at 95 degrees. If you take that -- if you say, "okay, let's take the Astro out because these were two different vehicles and they had

obviously different emission levels," then you come to a different conclusion about whether or not the correlation is there at 95 degrees.

And, no, I did not look at the loads, but, you know what we're basing these emission benefits on are the emissions, not the loads. And I don't -- you know, without that Astro there isn't a lot there to correlate, there just isn't enough.

MR. GERMAN: I think we were looking at the correlation just based upon the increase --

MR. DARLINGTON: (Interposing) Right --

MR. GERMAN: -- where you turn the air conditioning on --

(Simultaneous voices)

MR. DARLINGTON: -- that's what I said --

MR. GERMAN: -- that correlates pretty well on most of the vehicles --

MR. DARLINGTON: -- pardon me?

MR. GERMAN: That correlates pretty well on most of the vehicles, if you just look at what the increase was and not worry about the base line.

MR. DARLINGTON: Right, but the average increase. That's what I'm saying is let's -- all right, if that's the case, let's take the Astro out and compute those averages

then with the other vehicles.

MR. GERMAN: I mean the average increase is going to be almost identical.

MR. DARLINGTON: Okay, fine.

MR. MC CARGAR: Tom, are you saying it that isn't? I mean I guess it isn't clear to me that if you take out one vehicle that's got a --?

MR. DARLINGTON: It changes the .185 on minus off for the ACR data and makes it a lower number.

MR. GERMAN: By removing it from the EPA data set also makes --

(Simultaneous voices)

MR. MC CARGAR: -- the same thing --

MR. GERMAN: -- the .201 lower.

MR. DARLINGTON: Right.

MR. MC CARGAR: So let's -- does it differ?

MR. GERMAN: Okay. Any more questions?

(No response)

MR. GERMAN: Okay, we've reached another logistic point. We can either take a 15 minute break and then take a lunch break later, or just try to push on to the end, or perhaps another possibility just to continue until noon and take a lunch break at noon.

(Voices out of microphone range)

MR. GERMAN: Continue on?

MR. DARLINGTON: Okay, we'll move on to USO6 and the emission benefits and cost affecting it.

AGGRESSIVE DRIVING (USO6) REQUIREMENTS

BY TOM DARLINGTON

MR. DARLINGTON: The first chart, I want to review the EPA methodology for direct US06 benefits, review of EPA A/C related US06 benefits -- we've already kind of touched on this; look at the relationship between EPA's technical feasibility analysis and projected emission benefits; look at some revised emission benefits and cost effectiveness; and finally look at the composite standard and US06 weighting factors.

Now on US06 benefits EPA combined the emission reductions related to control over the US06 cycle and NMHC and CO reductions from the A/C test to estimate the benefits associated with the US06 standard.

A/C related NMHC and CO benefits were combined with the direct US06 benefits because EPA believed that eliminating enrichment over the US06 cycle would eliminate the A/C related NMHC and CO effects, as well.

And we'll look at the derivation of these two sets of emission benefits separately. For the direct USO6 benefits EPA based the direct benefits on hot stabilized

testing of 8 Tier 0 vehicles over ST01, start cycle; REM, which was the remnant cycle; REP05 and FTP. And I've shown these different emission benefits.

Here the first line shows hot FTP, the second line shows the in-use cycles, ST, REM and REP, all kind of weighted together with EPA's weighting factors. And then you have the difference in USO6 benefits and then the control's assumed.

EPA derived its proposed composite standard assuming that NMHC over US06 would be held to Bag 2 levels, while US06 CO and NOx emissions would be held to full FTP levels. No explanation could be found in the NPRM or the RIA or the technical support document, or the technical report on aggressive driving, on how the US06 benefits were derived from the emission test results.

The EPA methodology for direct US06 benefits, EPA assumed that basing the US06 NMHC on Bag 2 would eliminate all of the excess emissions of the representative in-use cycles relative to the hot FTP. Since US06 CO and NOx emissions were only controlled to full FTP levels, EPA reduced the benefits to 75 percent of the excess.

We believe a more complete analysis is needed to reasonably estimate the in-use emissions benefits of controlling US06 emissions. You must establish relationship

between US06 and REP05, both with a baseline, and with full set of controls, ST01 and REM01, which is not used in the SFTP.

A key factor here is the demonstration that any emission reductions over ST01 and REM must occur with the US06 reductions. We think this is to be done for post 98 Tier 1, LEV, Tier 2 type vehicles.

While EPA often eliminates older Tier 0 or 1 technology in their technical feasibility evaluations, this does not appear to have been done in calculating baseline emissions. When advanced technologies such as sequential fuel injection are assumed by EPA to be present on all future vehicles in order to facilitate their feasibility, their impact must also be included in the baseline.

Now a preliminary evaluation of EPA's NMHC benefits, EPA's estimates for NMHC benefits appear to be the most reasonable of the 3 pollutants. The US06 emissions appear to be roughly a factor of 2 higher than REP05 emissions, and Bag 2 levels are generally only slightly higher than hot FTP levels, thus reducing US06 emissions to Bag 2 levels should reduce REP05 levels to hot FTP levels, which is implicitly assumed in EPA's benefit estimate.

In fact, this level of control appears to go beyond that needed to reduce REP05 emissions to baseline hot

FTP levels. And the reason here is because the USO6 is such a more severe cycle tan REPO5.

More questionable is EPA's assumption that US06 controls will eliminate the difference between ST01 and REM emissions relative to the hot FTP.

Per the proposal, ST01 emissions must be reduced to Bag 3 levels. However there's no analysis that ST01 emissions, with A/C on, could meet Bag 3 levels. Thus EPA's REP05-related NMHC benefits appear sound, but the ST01 and REM-related benefits are more questionable.

Now on US06 NOx and CO we could find no basis for the 75 percent reductions in excess emissions. Preliminary estimate of US06 NOx benefits was made using both the AAMA and EPA databases on aggressive driving. The relationship between US06 and REP05 was developed from the AAMA data. US06 NOx levels were found to be about 10 percent greater than those over REP05. Applying this to the EPA REP05 NOx level yields a US06 baseline of .311 grams per mile, which is reduced to the full FTP level of .278.

We're using the standards technique that you have proposed to develop the emissions benefit here. The .033 grams per mile US06 reduction translates into a .03 reduction over REP05, or 11 percent.

Applying that 11 percent to the EPA in-use NOx

level of .273 yields a reduction of .029 grams per mile, assuming all three in-use cycles' emissions are reduced.

Other methodologies may yield different results, but the bottom line remains that the data are insufficient to accurately estimate the in-use benefit of US06 based emission control.

No rough CO benefit was derived, as no environmental need for post-1998 CO reductions appears to exist, as we discussed earlier.

On NMHC and CO these projected emission benefits were reviewed in detail in the presentation on A/C control.

It appears doubtful that any NMHC emission increases are associated with A/C use at temperatures typical of high ozone days in those areas likely to still need these emission reductions. No CO emission credit should be taken, as ambient CO is not a problem in the summer, when A/C is used, but in the winter. Thus it appears that no A/C related emission benefits should be incorporated into the US06 analysis.

Looking at the projected technology in US06 NMHC and CO, EPA's costs assume that elimination of commanded enrichment, use of sequential PFI, and recalibration will enable compliance with US06 standards for non-methanes, hydrocarbons, CO and NOx.

Regarding NMHC, US06 emissions with stoich chips are less than Bag 2 emissions with production chips on all but one vehicle in the AAMA test program. Thus, assuming the ability to completely eliminate commanded enrichment, the NMHC reductions assumed appear feasible.

One problem apparently not addressed by EPA in deriving the composite standard, is the fact that variability is very high on the US06 cycle and a larger margin of safety is needed to maintain confidence in certification and in-use compliance.

The situation is similar for CO in that all but three vehicles showed stoichiometric US06 NOx emissions below their full FTP levels.

Thus, ignoring other issues surrounding the complete elimination of commanded enrichment, the US06 HC and CO emission reductions associated with the assumed technologies, appear reasonable.

Turning to NOx, the US06 technical feasibility analysis for NOx is more complex, since eliminating enrichment increases engine out and tailpipe NOx emissions substantially. Only one vehicle -- and I'm making my comments here based on what was in the data, not what we saw yesterday. I mean some of this might, you know, we need to take into account what Harold presented yesterday, and Kevin.

Only one vehicle had stoich US06 NOx emissions below its full FTP levels, and this vehicle had extremely high US06 NMHC emissions; and EPA excluded it from its NMHC analysis due to its older technology.

EPA assumed that the US06 NOx emissions could be reduced through tighter air/fuel ratio control and recalibration. However, no data is presented demonstrating this ability.

One vehicle showed very high catalytic NOx conversion over US06 relative to Bag 2, and EPA postulated that all vehicles could be made to do this with no additional hardware. EPA did not compare the control technology of this vehicle to the others in the test program or the remainder of the fleet. Absent a clear comparison that this vehicle's control are no more advanced or costly than the rest of the fleet's, and that conversion of the fleet to its technology is simple and inexpensive, the projection that US06 NOx levels can be reduced to full FTP levels has little basis at this point.

Future projections of US06 related NOx benefits must be consistent with the capabilities of demonstrated control technologies.

Now what are the effects of complete elimination of commanded enrichment? The NPRM appears to have a primary

goal of eliminating commanded enrichment. I might note that some enrichment would be allowed at conditions outside of US06 to protect catalysts. Commanded enrichment does have a large impact on CO emissions, however, ambient CO levels appear to be a far less problem than ambient ozone.

Based on the AAMA data, eliminating enrichment increases US06 NOx emissions far more than it reduces NMHC emissions. That raises the question as to why controls are required, which raise NMHC plus NOx emissions, when the next step is to mitigate the increase just caused.

It would appear far more efficient to set US06 standards at levels which encourage the reduction of enrichment to the point where HC reductions are balanced by NOx increases.

In terms of environmental need, the need for NMHC and NOx reductions will continue for quite some time, but the geographical extent of this need will greatly diminish with time, particularly outside OTR and California. The need for CO emission reductions appears to be diminishing very quickly, and was addressed earlier. Well, I'm going to talk about it for a minute. I'll go into a little more detail here.

All CO nonattainment areas except LA, must be in attainment by end of '96. The 1993 monitoring data show

continued dramatic improvement in ambient CO levels, the 95th percentile ambient CO level was 8 ppm, well below the NAAQS of 9 ppm -- that was in 1993; and the estimated number of "exceedances" per site was less than one.

MOBILE5a shows dramatic improvements will continue beyond 1996. And these are somewhat the same emission reductions that I showed earlier. MOBILE5a does not include enrichment emissions. However, enrichment emissions would increase emissions in all calendar years, and is already in measured in the ambient levels.

Improvement in air/fuel ratio control and catalyst efficiency -- that's already based in to on 1975 through 2000 vehicles -- should reduce the enrichment emissions from 1990 calendar year levels forward.

Now on the composite standard, EPA's derivation of the REP05 cycle indicated that it represented 28 percent of Baltimore driving. EPA proposed that US06 be given the same in-use VMT weight in the derivation of the composite standard. An analysis shows that a FTP to US06 weighting, of 93 percent and 7 percent, best fits the distribution of power from in-use driving.

The 28 percent weighting factor will give manufacturers an inappropriate incentive to trade off US06 emissions reductions for emissions over other portions of the

test procedure. There's a number of points here:

With correct US06 weighting factor, decreased cold start NMHC emissions could be traded off for increased US06 NMHC emissions, with no net increase on environment. However, since weighting factor on US06 is so high relative to the frequency of occurrence of US06 driving, there is little incentive to do this or to trade off with other portions of the cycle.

The in-use benefits estimated for a given standard here will depend on the particular compliance strategy taken by each manufacturer. The same holds true for the different weighting factors used for NMHC and CO/NOx. The EPA is concluding that the in-use VMT weighting of the various cycles is pollutant dependent, which it can't be.

We recommend letting in-use driving surveys set the VMT weighting, and let the emission, technological and economic data set the appropriate standards.

And in this next chart I've got sort of this, how we derived the 93 percent for FTP 7 percent for USO6. Basically we took all three cycles, USO6, FTP, and we took the in-use Baltimore distribution of power, which is the middle column from EPA's technical report; and in the columns we took the in-use distribution and subtract the weighted average -- different weighted averages of the FTP and USO6.

And what's seen in the various bins on the right hand side are those differences. And with the right weighting factors the large blocks, you should get mostly zeros in there for the weighting factor to equal the distribution of powers in use.

And you notice that somewhere between 93 percent for the FTP, and 7 percent for the USO6, and 95 percent for the FTP and 5 percent. So somewhere between 5 and 7 percent the USO6 -- this distribution of power analysis seems to indicate that the weighting factor of 28 percent is way too high for USO6. It should be on the order of 5 to 7 percent.

Now we did a revised cost effectiveness of USO6 control, it will come as no surprise. EPA's cost estimate -- we made a number of assumptions here, one was EPA cost estimate of $1.12 is correct. That is an assumption. Only the effect of US06 reductions on REP05 are proven. We really found no evidence, or no analysis, really -- and this kind of goes to your earlier question, John, about REM and REP05 and everything else.

We found no evidence or analysis that showed that those emission reductions, when you got the USO6 reductions you'd also the get those emission reductions on REM and on STO1.

And so only the effect of USO6 reductions on

REP05, we feel are proven somewhat. There's no need for further CO reductions has been demonstrated. Outside CA and OTR, VMT in serious and severe ozone areas between 1.8 and 11 percent, depending on whether NOx waiver areas are included. Including California OTR, the analogous range is 25 to 30 percent.

And we've assumed here -- and I should have struck that out, I have "benefits for LEVs are proportional to their half life certification standards." We really haven't done a LEV kind of analysis yet. We've done a preliminary analysis, but we're not prepared to show it today. I think it will be in the manufacturers' comments to EPA.

But in our cost effectiveness comparison here we've calculated the tons of emission reductions for NMHC, CO, NOx, both EPA and air.

We've looked at the ozone nonattainment VMT for actions, and these are values that we've gone over before. The EPA's cost effectiveness is between $65 and $74 a ton. Our cost effectiveness is between $5000 and $8000 a ton, depending on whether or not you're including or excluding those areas with NOx waivers.

And so in summary, we believe the benefits, again, should be revised. Should be an ozone nonattainment area analysis. Should look at NMHC and NOx only.

We need to go forward and look at 1999 Tier 1, LEV and Tier 2 kind of analysis, because that's what this rule will affect.

We believe that EPA should demonstrate that the USO6 reductions will result in reduced REMO, 01 and SCO1 emissions to utilize the benefits. The cost effectiveness is poorer than other strategies rejected by EPA, and unless benefits on other cycles can be demonstrated.

Again, if the true costs are higher and/or benefits on other cycles can't be demonstrated, then the cost effectiveness would be even higher here.

QUESTIONS AND ANSWERS

MR. GERMAN: I guess I have a couple of questions, directed more at the manufacturers on this, because -- just some of the implications here.

And we did a lot of work together to develop the USO6 cycle. And I think one of the assumptions that we made was that the cycle would be sufficient to insure that we got control of the excess emissions over all in-use driving.

If I'm interpreting this presentation correctly it's saying that we can't assume that.

Does that mean that we should be going back and looking at creating or adding additional cycles to our test procedures to make sure we get that control?

MR. HASKEW: John, I don't agree with that characterization. I think that USO6 cycle will force elimination of commanded enrichment for up to 6 to 8 seconds, and that's going to result in a whole bunch of good things that happen, and that the standard should be set at what we can technically do there with a margin of headroom.

Now at -- since USO6 is an extreme cycle, proportional control will occur, or control, will occur at lesser driving modes as well. But I don't think you can take -- and I believe what Tom's saying is you can't take the differences or the control differences on USO6 and apply them to all of that driving.

That for inventory, you would have to take a vehicle that was developed to the USO6 cycles, or meets whatever the, you know, USO6 requirements are; and then run it on an inventory based cycle to see what ought to be factored in the inventory.

MR. GERMAN: I guess -- I mean I'm really concerned about this. I mean we've gone down a path which we thought we had cycles which would give us control over a wide variety of in-use driving. And if you folks are saying that you don't think that's going to occur, then -- I mean I think we need to re-look at what we're proposing here.

MR. ROUSSEL: Let me try to tackle that question,

John.

What we were working on for the last several years was to try to identify problems outside the current FTP and develop technically appropriate solutions with standards to those driving areas outside the FTP, where we found significant emissions events.

What we haven't done until now, until the very end, is to do a cost effectiveness analysis. And any rule that we do, we need to take a look at the cost effectiveness approach of that. And we're just getting into that at this stage, right now.

So we need to reevaluate what we're doing based upon the cost effectiveness of that particular rule. That's what this analysis suggests.

MR. ROUSSEL: Okay, I mean I'm sorry to spend so much time on this, but --

(Simultaneous voices)

MR. DARLINGTON: -- it's okay --

MR. GERMAN: -- but it's something that I'm really really concerned about. I mean if you go back, like two or three years -- a couple of years, I guess; one of the things that really surprised us when we ran our own test program is that on a weighted basis the emissions increases on the STO1 and the REM cycles were larger for hydrocarbon and NOx than

they were in the high speed acceleration cycle.

And through this entire process we thought that we were developing procedures that would control the entire range of emissions. And admittedly we didn't want to promulgate lots of different cycles and make things really complicated.

But we have been going on the assumption that what we were doing would control the entire range of emission increases that we saw during that initial test program.

And so, I mean if the insinuation here is that we're not actually doing that, I think that's a really, really serious implication.

MR. DARLINGTON: Well, I think, again, from reading the "RIA" (phonetic) and other parts of aggressive driving, there's the assumption that somebody went back and looked at REM05 and the STO1 and saw enrichment events, and determined if you took out enrichment there would be some attendant reduction -- to the extent that enrichment is in those other cycles, and that you took that out without USO6, there would be some emission reduction.

And the key here is that you don't know how much enrichment is in those cycles and you don't know how much you're taking out. You're probably taking it all out with USO6 control, but you don't know how much is left afterwards.

And --

A VOICE: (Interposing) Well, you said you took it all out?

MR. DARLINGTON: Pardon me? No, I didn't take it all out. I just said I didn't count the benefits because I don't know what's in REM. I don't know what's causing REM to be higher than FTP. I don't know whether it's enrichment events, or I don't know whether it's perhaps transient enrichment, or throttle dither that could be taken care of and maybe -- maybe with sequential ported fuel injection vehicles, would be zero, there'd be zero difference between those cycles.

So I'm saying you're counting the benefits of that in USO6 when those benefits could be covered by existing technology because those tests were all based on Tier 0 kind of vehicles.

MR. GERMAN: The other thing that confused me is that earlier, when we've talked about the STO1 cycle you were saying that there were not benefits that would accrue from actually using that cycle. But now you're saying is that we're not going to get any benefits on that kind of driving from USO6.

MR. DARLINGTON: You know, I'm not saying there are absolutely no benefits. I'm saying you don't know what

they are. You haven't told us. You're just assuming all of them go away, and you can't make that assumption because you have no tests with stoich chips on those cycles before and after -- you know --

(Simultaneous voices)

MR. BERUBE: -- a key point in doing any cost effectiveness analysis, in doing any rule, is what's the incremental benefit that will exist as a result of this regulation going into effect. And then looking, what will the incremental cost of that be?

I think that's what Tom's saying, is that there will certainly be some emission reductions outside of just USO6, but what are they? What are the -- incremental benefit that will occur as a result of this rule that would not already occur otherwise? And that's what we need to quantify.

(Simultaneous voices)

MR. MAXWELL: Wait a minute, I'm confused at this point.

So are you suggesting then that because we haven't quantified what those benefits are you can't assume that there are any benefits, or in the extreme then -- that has not caused us to assume that we're not accomplishing anything there, therefore we need a more complex test cycle to test

across a whole range?

And I'm going to add, you know, early on I think we all kind of agreed that rather than chase after the very difficult issue of grade effects and all that, that again, the kind of the worse case nature of USO6 would cause you to implement designs that now, when vehicles experienced all the other kind of worst case things that can happen -- maybe it's not accelerating quite as much, but it's going up a grade or whatever, that the same kind of technology fixes would cure those situations.

But this is kind of approach seems to say that, "well, unless you tested for grade, you tested for all the other circumstances and actually verified that this assumption technology is getting a benefit you can't count the benefits, then?

MR. BERUBE: I think maybe more than a more complex test cycle, what you need is a more complex or in-depth cost effectiveness analysis.

MR. GERMAN: I think we're just looking at a different side of the same coin. I mean if you're saying that we cannot assume that these benefits will actually accrue from what we've proposed, then that means we've missed the boat, that we have missed a significant chunk of in-use emissions, that we may need to go back and take another look

at.

MR. CULLEN: John -- Kevin Cullen from GM. I think that the point of difference here is not that the benefits are unlikely to occur, the question is: Are they still sitting in the field waiting to be harvested, and they'll be harvested by USO6?

I think the uncertainty is that because the data on those cycles is based on older technology it's unclear whether those benefits may have already occurred and therefore and therefore they're no longer left to harvest as part of this rule.

MR. MAXWELL: And maybe there's no cost then, either, except the cost of running the test, then?

MR. CULLEN: There's no benefit and therefore the cost effectiveness of the USO6 test and its associated standards are whatever it accomplishes, not other things that have happened in parallel.

MR. BERUBE: The cost will exist to meet a compliance standard, USO6. That cost will be there.

MR. MAXWELL: But if there's all these other -- if other things that are coming because of other reasons, then, and they get you the same benefit, then the only incremental cost of USO6 is the cost of actually going through the certification procedure, running the tests --

(Simultaneous voices)

A VOICE: -- no, no, no --

MR. BERUBE: -- no, that's not correct --

MR. CULLEN: -- that's going to depend on the standards you set on USO6.

MR. BERUBE: We're saying the increments -- some of the incremental benefit on non-USO6 type driving may already occur without a USO6 standard.

The fact is, though, you're proposing a standard over the USO6 cycle that will likely cause significant hardware and significant vehicle costs to meet the compliance over that cycle.

If that standard existed and there was never a single person that ever drove USO6 type driving out in the real world, no benefit occurred, there would still be all the real costs if we have to meet that compliance cycle and put the hardware on the vehicles to meet that compliance cycle.

MR. CULLEN: I agree that there are two pieces, the cost of compliance, and that will be isolated to the USO6 cycle and the standards you establish there. And that's the only place the cost picture will be impacted.

The debate here is about what benefits you pile on that cost and how many of them are still able to be captured by this rule making.

And I don't think we disagree that when we're all done we will have controlled most of the relevant emissions across most of the cycles we're talking about. The question is which ones are gotten by this rule making and which ones have already started to be gotten or are accruing because of other technology changes? We just don't know. Not that we disagree that you have mis-identified benefits, it's just not clear that we know what they are.

MR. GERMAN: And if your point is that the baseline emissions that we're working with might be wrong, then that's a valid point.

MR. CULLEN: I think that probably the best way to state it simply is we're hanging this on a baseline that may or may not be obsolete in the time frame the rule would go in.

MR. GERMAN: Okay, does this mean the manufacturers would help us try to gather an updated baseline?

MR. CULLEN: Within the context of our limited resources, yes, we will help do the things that are important to do to get the right outcome here.

MR. MAXWELL: Is that -- I guess I'd ask you to make a kind of a cost effectiveness judgement of just gathering that kind of data. Is at least, for the last

theory we're talking about, do you see this as, is that kind of data likely to change the ultimate conclusion of what kind of --

(Simultaneous voices)

MR. CULLEN: -- I tend to --

MR. MAXWELL: -- fix and cost of that fix --

MR. CULLEN: -- I tend to expect, to a significant degree, it is. And I think as you change the frame from Tier 1 to a post-2000, probably LEV/Tier 2 world; I think it's more certain that a lot of the benefits will come along regardless of this rule making.

MR. BERUBE: I think a key point to look at when we're talking about cost effectiveness, is that -- and I think Tom's alluded to it a few times, is the concept of sensitivity analysis. There's a lot of work that can be done, especially given our very short time we have here, short time before final comments are due, how much extra data can be gathered is uncertain.

But when looking at cost effectiveness there's a great ability to be able to look at a range of different assumptions and look at what the ultimate effect will be.

Ultimately none of us will now be able to predict with extreme accuracy what exactly the cost will be. However I think what Tom has really shown us, that with some

reasonable changes in assumptions here the costs have gone from $10, $20 into the thousand of dollars. And that gives us a great level of concern.

I think there's work we can do together to look at some of those assumptions, to modify them. And a lot of work needs to be done, from our point of view, in looking at the cost. Because all the work we've put into it so far has not changed the costs --

MR. CULLEN: (Interposing) right --

MR. BERUBE: -- that were assumed by EPA, and we all feel quite strongly that the costs were significantly understated. So I think we're going to put a lot of our effort on trying to further look at the sensitivity on the cost side. And we'd like to work with you to look at the sensitivity on the benefits side, and some of that might be able to be done by just, you know, looking at fundamental underlying assumptions, without running tons of extra test data.

But we'll try to work with you to the degree we can, and certainly in whatever time we have left to run data that's needed.

MR. CULLEN: I think if you could find a particularly sensitive relationship that might justify doing a rifle shot kind of a test program to understand what that

particular driver may be doing on the real vehicles.

MR. MARKEY: I think that's a good suggestion. You certainly took a wholesale different approach to the benefit calculations, and I think it's helpful for you guys to do that type of rigorous analysis of our assumptions, and I think we need to take a closer look at those and the underlying sensitivities to those assumptions.

MR. BERUBE: Absolutely.

MR. GERMAN: My other question had to do with the weighting of the USO6 cycle.

If you weight it by speed distribution instead of power distribution, what weighting does that come up with?

MR. DARLINGTON: I don't remember. We did both -- speed and accel, and I forget to bring that data with me, but we've already done that. It didn't show -- I know it didn't show these kinds of results. I mean I can't remember what the weighting factors were, but we did that analysis and we can provide that.

MR. GERMAN: Because I have the same concerns that you raised about manufacturers trading off emissions on high power events with cold starts and so on. I would have the same concerns wit how you balance off the high speed emissions if the weighting drops to 7 percent, which is clearly unrealistic for the high speeds. And I guess what

we'd be looking for in the future is suggestions as to how we balance this.

(Voices out of microphone range)

MR. GERMAN: Okay, I think we'd better take a lunch break here, then and we'll meet back here at 1:00 o'clock. Is that okay?

(Luncheon recess)

1:09 o'clock p.m.

AFTER RECESS

MR. GERMAN: Okay, we're going to change the order of presentations here. Frank Bohanan from SEMA will do the next presentation and then we'll go back and pick up the discussion we were having before with AAMA and AIAM.

SEMA COMMENTS ON REVISIONS TO FTP

BY FRANK J. BOHANAN JR.

MR. BOHANAN: First of all, I would like to thank the EPA and the vehicle manufacturer representatives for allowing us to make the order.

Good afternoon. My name is Frank Bohanan. I am here representing the Specialty Equipment Market Association, also known as SEMA. SEMA is a trade association of over 2800 members companies who design, develop, manufacture, market and distribute a broad variety of specialty aftermarket products.

As many of these products may be affected by todays proceedings, SEMA appreciates the opportunity to provide its comments on the proposed rule. We also intend to submit detailed written comments which will elaborate on the points being made today as well as addressing legal issues and matters concerning legislative authority, which I will not discuss.

SEMA believes that the most cost-effective method of emission reduction is a strengthened I/M program which promotes the repair and/or retrofit of gross emitting vehicles, regardless of model year. Furthermore we do acknowledge that some benefit may be derived from revision of the FTP, if such revisions represent in-use driving behavior, as is required by the Act.

Our review of the current proposal, however, suggests that EPA has failed to accurately represent in-use driving and has generated test procedures which go far beyond what is necessary or cost effective to achieve a significant benefit.

In addition we feel EPA has demonstrated considerable bias against the high performance segment of the market despite the fact that its contribution to the overall emission inventory is a de minimus amount relative to that of the total fleet.

In the following examples, I will attempt to briefly provide some highlights of the concerns which we have. Each of these issues, as well as several others, will be covered in greater detail in our written comments.

In each case, I will state our concern and then give some supporting information relating to it.

The first issue of concern is that EPA's

representation of the frequency and severity of aggressive driving is grossly exaggerated. Based on its observations, EPA is proposing a maximum test speed during the USO6 of 80 miles per hour. This is 15 miles per hour above the legal speed limit. EPA's own data states that only 2.6 percent of all observed driving was above 65 miles per hour.

We do not feel that it's justified to promulgate a rule based on 2.6 percent of the population committing an illegal act.

Another example is that 13 percent of the vehicle operation time occurs at combinations of speed and acceleration that fall outside the matrix found on the LA4. The phrasing of the statement allows for conditions of both higher speed/acceleration or lower. Any condition not covered by the LA4 is included. EPA, however, uses this figure as if it only includes higher speeds and accelerations, thus implying the need for more stringent control.

A review of the Baltimore 3-parameter vehicle data shows that in-use driving speeds and accelerations only exceed those of the LA4 less than 6.3 percent of the time and less than 1.3 percent of the time, respectively. That's speeds and accelerations. This also somewhat similar to the 5 to 7 percent number we heard earlier.

Another concern is that the agency believes that the 28 percent weighting factor is still appropriate for the US06. Except for the highest accelerations and the highest speeds, the speed and acceleration distribution is still representative of actual distributions.

As was shown previously, the frequency of aggressive driving observed in-use has been grossly overstated. As such, assigning a weighting factor of 28 percent to this portion of the SFTP is not justifiable. At a minimum, this figure should be based on the speed and acceleration data provided previously.

As if to agree, EPA also states: "the US06 cycle includes operation in all high speed and acceleration conditions that would be included in a longer, completely representative cycle, but with the highest load over-represented by a factor of about three on a time weighted basis." This reinforces EPA's admission in the above claim that the highest observed speeds and accelerations are clearly exceptions, i.e. outlying data points.

By proposing a cycle with such high speeds and accelerations, EPA is clearly not being representative. In fact, such high points will only serve to increase the likelihood of experiencing commanded fuel enrichment in the test lab, even though such occurrences are actually very rare

in actual on-road driving.

EPA has no stated authority to make the cycle over represent in-use driving. The USO6 cycle should be revised to include realistic/representative speeds and accelerations.

As an example we would suggest that the speed be limited to 65 miles per hour, which, again, is the legal limit. The acceleration number should be limited to about 7, again based on the frequencies; and the power number should be limited to about 300.

We feel that those numbers would, first of all, be much representative of in-using driving, and I would imagine the vehicle manufacturers probably wouldn't mind the reduced task in terms of vehicle durability that would arise from the expected lower exhaust temperatures.

Another issue: The maximum observed in-use speed was 95.5 miles per hour. Of all observed driving in the Baltimore data, only 0.00033 percent of the driving observed as was above 90 miles per hour. Only 0.011 percent was above the 80 miles per hour maximum speed EPA is proposing for the US06.

It is completely inappropriate to include data regarding such speeds in the calculations, on the grounds that they are so infrequent and that they are also illegal.

Common practice would clearly disregard these data points as outliers. EPA's inclusion of such data in their calculations only serves to skew the average in-use speed higher, thus justifying more stringent control based on a greater difference versus that of the LA4.

Measures of power also indicated that in-use driving behavior was more aggressive than reflected in the LA4. The maximum power for the LA4 has a value of 192, yet Baltimore data shows that power only exceeded the value of 200 0.7 percent of the time; hardly enough to warrant revision of the FTP.

Many of the vehicles observed were older technology vehicles. We've heard quite a bit out this, so I won't get too much into it. Most of these will not longer be in the fleet when the proposed rule would be implemented, thus reducing the needed stringency of the proposal.

Furthermore, any new technologies, some already in production, will further reduce the contribution to emissions of aggressive driving. And this this I'm referring to things like air assisted injectors and more elaborate control strategies and so on.

EPA failed to consider the emission reduction due to such technology, even though they considered mandating it in the proposal. Such technology will inevitably come

anyway, as we've heard. Whatever consideration or statement there was of it, from what we've heard this morning, was not judged to be appropriate.

The second major topic is high performance vehicles have been unnecessarily burdened with additional and more stringent requirements while lo performance vehicles have bee helped.

EPA has failed to quantify the actual in-use emission impact attributable to each class or type of vehicle. While they've supplied considerable data about how they believe different vehicles are driven, they have not shown a direct link to emission levels. They wrongly assume that a given level of aggressive driving will have the same effect regardless of vehicle type. This is an oversimplification which results in a dramatic bias against performance vehicles since their engines tend to be loaded less during aggressive driving. They tend to go into commanded enrichment less often.

EPA claims that high performance, manual transmission vehicles were driven in a more aggressive manner than the broad, mid-performance category. This statement is, even though only one car out of 294 in the Baltimore/Spokane data was of this type. They acknowledge the risk in stating this by noting, "EPA considers the conclusions on vehicle

performance to be preliminary."

A review of the Baltimore data shows that, as a group, high performance vehicles had the lowest maximum observed speed. The luxury sedan, station wagon group had the highest.

Only the performance group is required to implement a timer for stoichiometric operation. This is in spite of the fact that EPA recognizes that these vehicles are the least likely to experience commanded enrichment. EPA states the testing of several high performance, automatic transmission vehicles indicated that the US06 may not be sufficiently aggressive to force these vehicles to WOT operation. EPA believes it is necessary to ensure some WOT emission control for all vehicles, including high performance vehicles.

EPA's own data confirms that reducing commanded enrichment will increase the frequency of WOT events. EPA further states only about 0. percent of the total fuel control operation over the FTP is in commanded enrichment.

The frequency of commanded enrichment over the FTP was extremely low. In fact, the vast majority of vehicles never went into commanded enrichment over the FTP. Even during the unrealistically severe US06, the figure only rises to 3.5 percent.

Clearly, high performance vehicles are the lowest/least likely contributors to these figures, both based on volume and the aforementioned tendency to be less likely to go into enrichment.

These facts, along with the greater potential risk for catalyst damage and unsafe operation in high performance cars due to the timer, both of which will be discussed a little later, makes EPA's requirement for a stoichiometric timer only in such vehicles appear particularly biased and inappropriate.

The US06 cycle is so severe that a significant number of underpowered cars and heavy trucks cannot follow it. EPA acknowledges this by stating the in-use driving survey results suggest it would be unrepresentative and inappropriate to require low performance vehicles to drive portions of the US06 without adjustments.

Such adjustments, EPA claims, are to reduce the cycle's severity where it seems overly severe. As a result, EPA has proposed that certain vehicle's test weights and/or aerodynamic drag factors can be reduced by up to a total of 50 percent. effectively reducing the load an the engine by the same amount. There is no real-world driving condition which would correspond to such actions, particularly since the load is removed intermittently, or is proposed to be

removed intermittently.

EPA has created a driving cycle that is beyond the capability of certain vehicles. As a result, EPA has had to resort to handicapping such vehicles, so that they could maintain the severity of the cycle.

The third issue which has gotten a considerable amount of discussion is that the safety, durability and driveability issues related to the NPRM have not been adequately considered by EPA.

EPA acknowledges that there may be a 3 to 10 percent loss in horsepower due to the elimination of commanded enrichment. They even go so far as to site the case of the Dodge Viper, a 400 horsepower vehicle, and note that it may lose up to 40 horsepower. Under many circumstances an increase of 40 hoursepower, even a vehicle such as a Viper, can have dramatic effects on vehicle stability and thus safety.

Even if commanded enrichment is brought in gradually, the increase in power would still require a correction by the driver. Inevitably, some drivers are less likely to be able to compensate for such a power increase than others. The ramifications of this can be particularly serious in terms of liability. I don't think anybody has to question the litigation happy society that we're in today.

By contrast, the elimination of commanded enrichment from low powered vehicles could result in a different safety issue, they could be underpowered and thus less safe when merging onto highways, climbing hills, et cetera. This would also be a concern for vehicles pulling trailers.

EPA acknowledges the OEM's concerns on this by stating: "They have even expressed concerns that any loss in power, especially from smaller vehicles with high weight to power ratios, would result in unsatisfactory and even dangerous vehicle performance and may require the replacement of small displacement, fuel efficient engines with larger displacement four and six cylinder engines that could have poorer fuel economy.

"Because of these concerns, EPA feels that the issue of power loss due to the reduction or elimination of commanded enrichment, is a very important issue for the feasibility of technological control of the proposed emission levels over the US06 cycle."

I would also think that decreased fuel economy could have some emissions impact as well.

If the argument that the USO6 cycle is not representative and is overly is not enough, the fact that it forces vehicles to be designed in an unsafe manner should

certainly help the case against it.

While the issue of increased catalyst temperatures associated with the reduction or elimination of commanded enrichment is a concern for all vehicles, it is a unique concern for high performance vehicles, since only they are required to have a timer.

Furthermore, as a group, high performance vehicles tend to have higher than average catalyst temperatures by nature, due to their higher exhaust flows resulting from their higher outputs. This tends to make them more susceptible to experiencing excessive catalyst temperatures.

EPA has not sufficiently addressed the potential dissatisfaction which consumers may experience due to the loss of performance and/or driveability resulting from this rule.

EPA states no vehicles were operated on the road and evaluated for driveability issues. As a result, the safety issues previously expressed have not been evaluated, nor has any deterioration in performance and/or driveability, which may arise from the reduction or elimination of commanded enrichment. Only speculation has been forwarded.

At a minimum, there are significant concerns over perceived smoothness by the consumer when a vehicle transitions from stoichiometric operation to commanded

enrichment.

The forth issue, modifying the language on defeat devices to include proportional control is unjustifiable and would cause unnecessary and unreasonable harm to the aftermarket.

This requirement, in whatever form it would take, could have the potential to essentially extend emission control compliance liability to all operating conditions, essentially eliminating any window of opportunity for the aftermarket. This is not economically feasible for our manufacturers, even if they were able to develop products which met the new language. There'll be considerably more on that in our written comments.

The last issue is that the emission reductions projected by the EPA are overstated while their actual cost is understated. We just heard about a whole morning of that.

EPA has failed to quantify any of the potential costs for the concerns mentioned previously. In addition, their skewing of the averages higher through the inclusion of invalid and outlying data results in the overstatement of the projected emissions reductions which may be attributable to this proposal.

The potential for emission increases as a result of this NPRM were not even considered in the economic

calculations. Consequently the cost for the removal of a given amount of emissions is significantly higher than EPA's projections. EPA only briefly discusses the economic impact on the consumer.

The potential for higher insurance premiums or other costs relating to safety issues is not even addressed. While EPA does allow for the potentially lower resale value of vehicles meeting these requirements due to lower horsepower, they do not consider the potentially more significant factor of poor driveability. With regards to the former, EPA states, "however, the agency believes that this cost should be roughly negated by the associated savings in fuel expenses,"

Since EPA estimates a lifetime fuel economy savings of $16.56, this statement is insupportable when the potential loss in resale value could easily reach into the hundreds, or even thousands of dollars, depending upon the vehicle.

Furthermore, the cost to the consumer from higher vehicle and component prices was not adequately defined.

Lastly the issue of choice, relating the potential elimination of specialty products was not discussed. The potential cost for the aftermarket in general, and the specialty aftermarket in particular, could be devastating.

If all aspects of this NPRM are accepted, there will be a dramatic increase in the cost to demonstrate emission compliance for all concerned. The facilities and equipment needed to perform the proposed test procedures are not readily available, or affordable, for the aftermarket.

As this rule would apply in-use as well as at certification, there is the potential for it's requirements to be a liability for the vehicle's full useful life.

At a minimum, this makes both the aftermarket, and for that matter, the OEM manufacturer's task dramatically more difficult due to the significant durability impact of the proposed test procedure and the higher exhaust temperatures, et cetera, which it will result in.

Manufacturers may have to switch to alternate, more costly, materials to achieve acceptable durability and obviously there will be costs associated with that.

The pretty much ought to handle it for now. Again, a lot of it is repetition of some of the things you already heard. I apologize for not having any overheads, but we didn't plan on initially making any comments.

QUESTIONS AND ANSWERS

MR. GERMAN: Okay, a couple of the safety concerns there, on being the switch from stoichiometric to enrichment after a certain period of time during a timer?

MR. BOHANAN: Yes?

MR. GERMAN: And the other being possible poorer driveability at stoichiometric. It seems to me that the manufacturers, at least, should have some experience with some of that. And I guess I'm just offering the suggestion that it may be possible for you to work with them, and perhaps us as well, to try to find out what their experience has been?

MR. BOHANAN: We have had some communication on that and the problem seems to be that it's mostly on fairly large vehicles or low performance vehicles. It hasn't really been done on very high performance vehicles.

Again, you know the issue of a Viper or something like that, again, obviously could prove me wrong. I haven't talked to everybody, but, you know, a big truck or a heavy truck getting a little extra power is a lot different than a light sportscar getting 40 horsepower.

MR. GERMAN: Okay, but at least -- I think perhaps the opportunity exists to maybe look at whether the driveability is satisfactory at stoichiometry.

MR. BOHANAN: Again, part of the issue not so much how any of the people that are likely to be here perceive it, but how a potentially a hungry lawyer looks at it down the road, so that's something. We've been sued over a lot less,

let's put it that way. You know, somebody trying to find deep pockets and looking, "Oh, you mean all of a sudden, 40 hoursepower?" You know, they'll say all of a sudden, whether it's 2 hours for the enrichment, they'll say all of a sudden. These things can have some liability effects that I don't think are being considered.

MR. GERMAN: And my point here is I think that probably would like to consider them. We're just looking for ways to try to get some data on it.

MR. BOHANAN: Yes.

MR. GERMAN: Because that's really the only way I think we could realistically evaluate them.

MR. BOHANAN: And again, we forward it more as a thought starter. We don't really have any ability to generate that data. The OEMs obviously do.

It just seemed kind of odd to us that that issue wasn't more of a concern considering everything from the various well known, publicized cases that hit the papers recently; and appeals being overturned on awards and so on.

I mean these things end up costing a lot and I don't know how much the fuel tank issue or the latch issue net cost will be, but something like this, with the right type of person pursuing a class action could certainly get a lot more expensive than just, you know, a couple of bucks a

car. And, you know that's not so much our issue as much as it is something that we just through was kind of odd that other people didn't consider it more of an issue.

MR. MAXWELL: I have a question also on the safety, because I'm still a little confused. Apparently you have the one issue that, somehow as to the timer times off, there will be this sudden surge of power that will surprise the drive. That's one safety issue?

And then there's -- is there additional safety issues beyond that?

MR. BOHANAN: Well, obviously the other one was that on the other side of the scales you get into a situation where an already slow vehicle is made slower.

You know, I mean I've driven some cars that I thought were borderline safety hazards, because getting on the highway was such a premeditated act. And this can only aggravate that kind of situation. I mean that was a concern that was expressed by the vehicle manufacturers as well, that certain vehicles are already marginal. And the ability to give them more power may be limited because of CAFE or other concerns.

MR. MAXWELL: Okay, on the high performance end, where then the issue seems to be this surprising power. I guess I'm surprised by the point of it. Would any calibrator

or aftermarked or before, actually design a system that, at the end of that 2 seconds suddenly surprised? I mean wouldn't there just be a logical ramp up in -- you know, isn't that something that can be designed into the vehicle? I mean is there a real technology limitation that this enrichment either just suddenly turns on or off?

MR. BOHANAN: Oh, no. The software task is not that big a deal. It's -- again, the main issue with the ramp in, is in the first place the potential liability that a hungry could choose to seize upon.

And the second issue is that to some extent it aggravates the catalyst temperatures and exhaust valve temperatures and so on.

And particularly when you start looking at modifying vehicles with aftermarket parts, those concerns could be brought to the point that it's no longer feasible to do anything. And obviously our manufacturers have a concern. Were it not for the fact that it's an artificial requirement in our opinion, that if you just had a reasonable cycle and you tested the vehicle on that cycle you wouldn't even go into power enrichment anyway.

It's kind of an artificial restriction only against a certain class of cars.

MR. GERMAN: The other question I wanted to ask

you about was you had a lot of problems with the 2 second requirement for stoichiometric control on high performance vehicles?

MR. BOHANAN: Yes.

MR. GERMAN: And I think there's two issues there and one is are high performance vehicles driven more aggressively? And you're correct in that we have limited data. Although if you look at the surveys from Spokane and Atlanta I think we came up with 5 or 6 high performance vehicles and almost all of them were driven much more aggressively than the norm. So that's one issue.

Then the other issue is if you are going to make adjustments to the cycle for high performance vehicles, how do you do it? We laid out a couple of options and one of them was the one we proposed -- the 2 second.

We also had an option to make adjustments to the inertia weight on the high performance vehicles.

MR. BOHANAN: Yes.

MR. GERMAN: Would that be something which would be at least an improvement over the 2 second, or?

MR. BOHANAN: Well, you know, that's -- would you rather be hung or put in the electric chair, you know?

I mean I guess I would say that no timer and increased inertia weights are probably preferable, but in our

opinion neither is justified -- that high performance vehicles are such a small percentage of the total fleet, their average vehicle miles traveled is generally less. The data said that they didn't even have the highest average speed and so forth, or acceleration for that matter.

They are less likely to go into commanded enrichment because of just the dynamics of the vehicles being, you know, less -- you need less throttle angle for a given acceleration generally in high performance cars, due to gear ratios and lower weight and so forth.

Really, they're not contributing to the problem enough to warrant this kind of attention is our opinion. And to put a timer specifically on them because you recognize that they're less likely to go into commanded enrichment, seems like an unnecessary step in our opinion.

Again, the point that I made very early on was while there may be a demonstration of how different vehicle types are driven, again, as you just said, the data is extremely limited when it comes to high performance vehicles. That link wasn't carried to the necessary step of saying for a given type of aggressive driving, a given type of vehicle is more or less likely to go into commanded enrichment and therefore pollute more.

You take -- you know, I don't want to single out

anybody's vehicles, but if you take a high performance car and a very low performance car and drive them over the USO6 cycle, the low performance car is going to spend a heck of a lot more time in commanded enrichment and WOT than the high performance car is (phonetic).

And what we're saying is, that if you made the USO6 cycle truly representative using 65 miles an hour, 7 miles per hour per second and a power figure of 300; that a lot of the high performance cars probably would not even go into commanded enrichment. And you'd be duplicating what people really do out there on the road, or at least are legally required to do in the case of speed; and you wouldn't need all the extra requirements such as a timer.

And I guess our feeling is that the charge that was mandated by the Clean Air Act is, "make it more representative." And those three numbers, while we still think they're on the high side, are certainly a lot more in touch with reality than the 80 miles and hour and so forth that are currently in the proposal.

MR. MARKEY: So you think speeds above 65 miles an hour are unrepresentative?

MR. BOHANAN: I would say your data suggests that 2.6 percent of people drive above that speed. So 2.6 percent doesn't seem like a very representative number to me.

And people may drive above that speed, but I don't think they do it nearly as often as would be implied. And I also don't think that just because somebody's going 65 miles an hour, that that means they're in commanded enrichment and they're doing it in the same way that your cycle implies.

I mean when people are driving 65, 70 miles an hour, they're doing it at a steady state. And 65, 70 miles an hour in the USO6 cycle is under a much different situation. It's the end of an acceleration, it's not a steady state.

MR. MARKEY: You have to get there somehow, I mean, up to that speed.

MR. BOHANAN: Yes, but I guess what I would say is you try it too often, you're going to be taking a different trip. And most people are aware of that.

And again, you know, your power levels bear that out. I mean if those high accelerations are so common, then your Baltimore data wouldn't have -- I think it was, what -- .01 percent, .02 percent has an acceleration above 7, and the same kind of acceleration above 300?

I mean .01, .02? I mean I really have a difficult time believing that a rule can be promulgated as being cost effective based on those kind of percentages, especially when it's illegal. I mean those kinds of accelerations, I cannot

say conclusively, but my feeling would be that if you engaged in those kind of accelerations on a regular basis, somebody with a red and blue light on the top of the car is probably going to discourage you from doing it much more.

So even though it's not implicitly illegal as the speed limit is, those kinds of accelerations, I would say, mostly likely will be thought as illegal by anybody in law enforcement.

So you really get into a situation where you're mandating requirements based on behavior that your own data suggests is uncommon and that most people in law enforcement would say is illegal, and in the case of speed limits is illegal.

MR. GERMAN: Okay, thank you.

MR. MARKEY: Thank you.

MR. MAXWELL: Thank you.

MR. GERMAN: Okay, we will now go back and pick up with AAMA and AIM. I believe the next presentation is by Mike Russ on facilities and phase-in.

FACILITIES IMPACT and PHASE-IN

BY MIKE RUSS

MR. RUSS: Good afternoon. My name is Mike Russ and I'm with Mazda Development, and I'll be representing the FTP panel today, talking about two issues. The first one is

facilities impact and the second one is the phase-in.

Under facility impact we'll be talking about the additional test time that comes from this rule, and also we'll be talking about the extra facilities and the cost of those facilities that incur from this rule.

Secondly we'll be talking about the phase-in in three main areas. We'll be talking about the lead time, meaning the number of years before the implementation of this rule.

The phase-in schedule, meaning the number of years and the percentages during those years, and finally will conclude with our comments on the 48 inch electric dynamometer phase-in.

And just a point of note, that you'll be seeing this outline several times throughout our comments.

Before discussing all the details it may be helpful to explain where we're going to end up with our comments on this issue, and that is with a recommendation for phase-in.

We're going to be recommending a 6 year phase-in for LDV, LDT1 and 2, we'll be recommending a lead time for implementation of the 2000 model year. And you see the percentages there of 10, 30, 50, 65, 80 and 100.

To provide additional flexibility, especially for

those manufacturers with a small number of LDT1 and 2 families, we're recommending to combine those for the phase-in.

For LDT3 and 4 we're recommending a 2 year delay in implementation, to the 2002 model year, with the same phase-in schedule.

And finally we're recommending that the phase-in of the 48 inch electric dynamometer with the same schedule as the SFTP.

We have a brief introduction. It's useful to talk about a number of other rules that have gone into effect in just the last few years, which impact facilities.

At the bottom of the page you can see the federal test procedure with the evap and the highway test. Beginning with the '94 model year the cold CO test procedure went into effect, which of course had an impact on our facilities.

With the 1996 model year, certification short test and of course the enhanced evaporative emission, which had a big impact on our facilities.

And for '98 model year, the ORVR requirement (phonetic); and also, as the NPRM states, the SFTP.

So as you can see, in just the last few years there's been several new rules that have impacted our facilities.

Okay, as promised, here's the outline. We'll start with the facilities impact. This slide shows a comparison of the test time between the FTP and SFTP.

At first glance it appears that the total test time does not appear to be that significant, going from 22 and 1/2 hours up to 25 and 1/2 hours.

However, upon closer inspection, if you look at the dynamometer time, which is more important from a facilities perspective, the total time goes from about 1 hour in the FTP to over 3 hours when you combine it with the SFTP; so that increase of more than three times is a significant impact to us in terms of our facilities.

So how does that additional time impact testing on a typical day? This chart shows, for the USO6 -- and at the top is the development testing, at the bottom is the certification testing in terms of number of tests expected per day.

You can see, at the very top, with the twin roll and the current FTP, we can expect about 6 FTP test. However going to the single roll with the SFTP requirement, in this case we're just looking at just USO6; the number of tests expected per day goes from 6 to 4. And this figure of 4 is based on the same level of expertise with the new cycles and the new dynamometer that we have currently, with the twin

roll.

In the early years, as I'm sure you can imagine, when we were gaining experience with these cycles and these dynamometers, the testing per day will be less.

Similarly, for certification, at the bottom of the chart; a current situation is approximately 3 tests per day with the highway test.

Going to the single roll with the SFTP requirement of just USO6 reduced that capacity from 3 to 2.

So if you look at this number of tests per day in a different way, meaning how many tests we can -- keeping the same volume of tests and the same number of tests, what this means is that in order to perform the same amount of testing we need 50 percent increase in the number of single roll sites compared to twin roll sites.

Okay, we just looked at the USO6 impact, let's look at the air conditioning test capacity, and intermediate soak.

Since there's no current test specifically tailored for air conditioning or intermediate soak, each of these tests represents an incremental or an additional test.

The chart shows two scenarios. At the top is a 60 minute intermediate soak condition. At the bottom is a 10 minute intermediate soak. And what this shows is that going

from a 10 minute soak to a 60 minute soak reduces our number of tests from 4 tests per day to 3 tests per day. So you can see, on a per day basis, that is a significant impact to us.

Okay, the second part of our facility impact is the facility requirements and the cost for those facilities to meet this rule.

Let's first consider the facility requirements and costs for USO6. Basically the requirement here is for a new 48 inch electric dynamometer site. Because of the severe accelerations in the USO6 cycle -- which require a large roll dynamometer, and also EPA's desire to more accurately represent the road load force, a single roll 48 inch electric dynamometer will be required for both certification and development.

Manufacturers need to change over our existing sites from twin rolls to single rolls. And also, in addition, because of the extra time that we've just discussed, additional sites will be needed to handle the increased testing burden. Both of these have costs to manufacturers.

The additional sites cost about $3 million in our estimation. Changeover sites cost less, about 1.3 million; however these sites need to be taken out of service for about 3 to 4 months while they are changed over. Obviously this

reduces our test capacity. And changing over too many of these twin roll sites to single roll sites at one time may cause a problem in us performing the required number of tests.

This chart shows the facility requirements and costs for the air conditioning test site options which have been discussed in great detail earlier. However I just wanted to point them out again here. The high temperature cell, which is the 95 degree Fahrenheit.

The high temperature cell, which is the 95 degree, Fahrenheit with the large fixed speed fan is the primary proposal in the NPRM.

As you've heard, manufacturers have significant concerns about this facility's ability to properly direct airflow to and around the vehicle. Therefore to us there are two potential options out there for an air conditioning test site, a full environmental cell and a standard 48 inch electric dynamometer cell to perform our manufacturers simulation or the Nissan 2 simulation.

The cost for these two options are provided here. Again the $3 million estimate for a standard 48 inch electric dynamometer site. The full environmental cell is much higher, and we're estimating here about $5.7 million due to the extra air handling and other support equipment such as

the solar load capacity.

I must pointing out here that this estimate that we're using for the following analysis that will come in these comments is a very conservative estimate. You've heard earlier estimates up to $10 million.

In addition, because of the large footprint, or the large site requirements for this type of a facility, in places where land is more expensive than it is in this area, the cost for this particular site may be much higher.

So you can see the bottom line, the incremental cost that we're using for this analysis is about $2.7 million per site.

And just to refresh everybody's memory, this is what we're talking about on a full environmental cell. You can see, based on the size of the vehicle, the large size of this facility.

The following few graphs will present analysis based on the impact on one major manufacturer. Obviously the cost to the entire industry will be much higher than those numbers presented here.

This first graph shows the impact of going from a 10 minute to a 60 minute soak. In this case we're looking at an air condition on case, and the dark gray bar represents the cost of a standard 48 inch electric dynamometer cell.

The light gray bars represent a full environmental cell.

And again, just to recap how this was put together, we took the number of sites required, times the costs that we just discussed, to come up with the overall cost in this chart.

Basically what this graph shows is that going from a 10 minute soak to a 60 minute soak for this one manufacturer is about a $29 million increase in the facility cost, about 28 percent.

This next graph, again, shows the cost impact going from a 10 minute to a 60 minute soak, but in this case using an air conditioning simulation. Again, the increase is still large, about a 19 percent increase in this scenario, about $15 million.

This next slide shows a slightly different comparison. In this slide we're looking at cost impact of the air conditioning simulation compared to the air conditioning on case in a full environmental cell. And as you can see the cost -- the light gray section is for the full environmental cells, which is a considerable increase.

Here the cost increase going from a simulation to an A/C on case is about $34 million, or 36 percent. And again I must stress, this is just the cost impact to one manufacture.

And finally this last graph shows the impact from an A/C simulation to an air conditioning on case with a 10 minute soak. And I must point out here that we're showing a comparison between a 10 minute intermediate soak and a 60 minute intermediate soak. But as you heard yesterday, our recommendation for the air conditioning test includes no soak. We're looking at what we're calling hot LA4, but for illustrative purposes we're showing the cost of the packages between the 10 minute and 60 minute soak. Again, here, a 26 percent increase, or about $21 million.

To wrap up the facility impact, then, as we've shown the SFTP will greatly increase the test time for both certification and development. Therefore elimination of a very costly, lengthy and what we believe is an unnecessary -- as you've heard this morning and yesterday afternoon -- and unnecessary test such as the intermediate soak is very important.

Secondly the cost of this rule, in terms of our facility requirements, is truly substantial. Therefore the use of a cost effective and appropriate air conditioning simulation in a standard dynamometer cell is very important.

The bottom line, then, is due to the increased test time for certification and development, and the increased cost of these facilities an appropriate lead time

and phase-in is necessary.

And that brings us to the second half of our comments on the phase-in. Again, just to recap, were' going to be talking about lead time, phase-in schedule and the electric dynamometer phase-in.

This chart shows EPA's proposed schedule for implementing the SFTP including the 48 inch electric dynamometer, along with other rules, notably the enhanced evaporative and the ORVR.

As you can see, immediately noticeable on this chart is the incredible burden that comes with the 1998 model year. Going from '97 to '98 for the evaporative emission rule results in a 40 percent to a 90 percent increase in the phase-in. Also the ORVR rule begins in the '98 model year, at 40 percent. And again, as we'll talk about later, the 48 inch electric dynamometer phased in, as currently proposed at 100 percent; making 1998 a very burdensome year.

For comparison purposes it's useful to look at the lead time for this SFTP rule along with other recently promulgated rules. Again we're looking at the enhanced evaporative and the ORVR rule.

The length of the arrow in this chart represents the amount of lead time provided for these rules.

As you can see, the length of the arrow, or the

lead time for the SFTP is considerably less than for the other rules. And if you compare this rule with the ORVR rule the SFTP certainly needs more lead time because of the impact to facilities of this rule compared to ORVR.

And comparing it with the enhanced evaporative rule, the SFTP has similar facility and at least as much, if not more, vehicle development and certification testing requirements than the enhanced -- compared with the enhanced evaporative rule. Therefore a lead time similar evap, the enhanced evaporative is necessary.

And basically what we're talking about with a similar lead time is if you look at the evaporative rule starting at the end of 1990, with the '95 model year implementation, similarly if this rule is implemented -- issued in late 1995, a 2000 model year seems appropriate.

Although our comments in this part of the presentation are dealing with facilities, I think it's important to discuss that in terms of lead time both facilities and new vehicle technologies will be required and will impact the amount of lead time necessary.

These new technologies have been discussed previously, but it's important to mention them again here in the context of lead time. And I'll mention just a couple, briefly.

One of them up there is the elimination of commanded enrichment, as we've talked about quite a bit.

Secondly new EGR systems will be needed to handle the increased flow capacity from the higher speed cycles; and also changes in engine design will be necessary to tolerate the higher temperatures in both the combustion and the exhaust system.

From a vehicle development standpoint 1998 model year is clearly unworkable. The 1998 model year designs are already fixed, and in most cases, if not all cases, development vehicles have already begun their mileage accumulation.

In addition the 1999 model year is also extremely difficult. By the time this rule is finalized in late 1995, most 1999 model year designs will already be complete without taking into account the impact of the SFTP rule.

There are a couple of other key lead time issues which need to be mentioned here.

First is the fuel economy test procedure adjustment. And this will be discussed a little bit more later on, but I want to mention here that EPA has mentioned on several occasions that they do not plan to address the fuel economy test procedure adjustment until after this rule making. Requiring manufacturers to development and design

work without being able to set a fuel economy design target is unreasonable.

Secondly, on heavy light duty trucks there is very limited data on these vehicles and a delay in the implementation of this rule is needed to evaluate the impact o these vehicles. Other rules, most notably and most recently the ORVR rule, have recognized the need to delay the implementation of heavy light duty trucks.

Finally the issue of equipment availability is very important concern to manufacturers in terms of ordering, installing and proving out the necessary number of dynamometers and the associated equipment that is necessary to meet this rule.

This chart shows a time line of the facility and vehicle requirements. Ordering and installing and proving out a facility takes about 2 years. Development and certification takes about 3 years. Ideally manufacturers would like to not have any overlap in these tasks. However, as you can see from this chart, even with the considerable amount of overlap in the facility installation and check and the vehicle development and certification, at least a 2000 model year is required.

That leads us to the AAMA and AIAM recommendation for lead time. For LDVs, LDT1 and LDT2, we're recommending a

2000 model year implementation date. For LDT3 and 4 we're recommending a 2 year delay for the 2002 model year.

The second item under the phase-in is the phase-in schedule. That is the number of years for the phase-in and the percentages during those years.

In order to determine a reasonable phase-in it's valuable to look at another major rule that was just recently issued, the enhanced evaporative rule. Just to refresh everyone's memory, the enhanced evaporative emission rule has a 4 year phase-in, at 20 percent, 40 percent, 90 percent and 100 percent.

There are key similarities between these 2 rules, but there are also distinct differences. The similarities, both of them require significant facility changes and have a big impact. Also both require vehicle hardware changes.

However, these 2 rules differ in a couple of key areas. First, the evaporative emission rule of course impacted the evaporative families, whereas the SFTP rule impacts engine families. And there are approximately 2 and 1/2 times the number of engine families as compared to evaporative families, which has a direct impact on the number of certification, and the burden on certification, and also development.

Secondly evap system modifications tend to be more

generic, which can be applied across several evaporative families, whereas exhaust emission modifications tend to be more application specific, which require additional time to work on each of the individual engine families. Both of these differences require that the SFTP phase-in be longer than the evap phase-in.

And we believe that EPA recognized the burden of this rule, when, prior to the NPRM it first suggested a 6 year phase-in. And that suggestion came in the form of two options. One was a 6 year phase-in directly to a final standard. The second suggestion or option was a 3 year phase-in to an interim, followed by a 3 year phase-in to a final standard.

At that time AAMA and AIAM provided EPA with feedback regarding these two options and we preferred the 6 year phase-in directly to a final standard.

We preferred the 6 year phase-in directly to the final standard then and we still do. Therefore we are recommending a 10 percent, 30 percent, 50 percent, 65, 80, 100 percent phase-in for LDV, LDT1 and 2 beginning in the 2000 model year.

To provide flexibility we are recommending that these three categories be combined during the phase-in period.

For LDT3 and 4 we are recommending the same phase-in schedule, however, as we've just mentioned, beginning in the 2002 model year.

That brings us to the final section of these comments, the 48 inch electric dynamometer phase-in. Before we move on to that, let me just comment that the NPRM currently states 100 percent of vehicles will be required to be certified on the 48 inch electric dynamometer in the 1998 model year, and that includes those vehicles that are not originally scheduled to be phased in to the SFTP until later years. And that, to us, is a big concern.

One of the big reasons for our concern is the issue of carryover. This chart shows the average emission and fuel economy difference of switching from the twin roll dynamometer, in the light gray bars; to the single roll dynamometer, in the dark gray bars; for the 9 vehicle EPA/industry test program that was recently completed.

These charts show that on average the emission of all three constituents increased going from the twin roll to the single roll. And the fuel economy decreases going from the twin roll to the single roll. However, more important than the averages is the vehicle, the vehicle variability that comes from moving from the twin roll to the single roll. Because of this variability there is not the ability for a

constant correction factor between the twin roll and the single roll.

The net result of this is, due to the emission increase and the fuel economy decrease, a carryover of this emission data will not be allowed. And this is a tremendous burden to us.

This chart shows a case study of the impact of 100 phase-in in one year, which is Case 1; compared with a phase-in schedule identical to the SFTP, in Case 2.

What you can see here is -- and let me go through this chart slowly. This is actually the number of tests that are performed, and in the current case this is -- assuming a 40 percent carryover. So in this condition there are 60 tests and 40 of the tests will be carried over.

As you can see in Case 1, those 40 tests would not be able to be carried over, which adds to the test total; whereas in Case 2 those 40 tests would be allowed to be carried over, which keeps our test total low. The difference between Case 1 and Case 2 is about 1 and 1/2 times.

This case study just points out that those vehicles that are not scheduled to be phased in to the SFTP until later years would still be required to undergo development testing and perhaps even modifications to meet the requirements to comply with the FTP, just because of the

new dynamometer.

From a facility perspective installation of all the necessary dynamometers to meet a 100 percent first year phase-in requirement for the 1998 model year would require manufacturers to spend a significant amount of money. We've gone through the analysis previously in these comments, however as you saw with the base case, it's roughly $100 million for one manufacturer.

Secondly, to us it's impractical to order, install and prove out all the required number of dynamometers to meet the 100 percent phase-in of the '98 model year. And that's both from a manufacturer perspective as well as a supplier perspective.

In addition, as we mentioned at the beginning of these comments, a changeover site from a twin roll to a single roll, requires that that site be removed from service for about 3 to 4 months while the change is made. Requiring all the twin rolls to be switched over the single roll sites in such a short period of time would severely limit our ability and perhaps even prevent us from performing the required number of certification development tests.

There are a couple of other key issues regarding the phase-in of the 48 inch electric dynamometer. First, it's important to have a slow, gradual phase-in of the

dynamometer to allow us to gain valuable experience on the new equipment and the new cycles on a small percentage of our vehicles, which then could be applied to later model years.

I think all of the manufacturers are familiar with all of the problems and the pains associated with the early years of the evaporative emission phase-in because of the high number of "void" tests due to the new equipment.

Secondly, we mentioned this earlier, but again I'll mention it here. The fuel economy and emission differences between the twin roll and the single roll have not been quantified. And EPA has stated that they are not planning to address fuel economy until later.

That leads us to the final AAMA/AIAM recommendation: That is to phase in the 48 inch electric dynamometer with the same schedule as the SFTP.

And just to recap: That is a 6 year phase-in beginning in the 2000 model year for LDVs, LDT1 and 2; and 2002 model year for LDT3 and 4.

Thank you.

MR. MAXWELL: I'm going to start with a question on the dynamometer phase-in. I see kind of two components of lead time, one is the physical time, just to get the facilities in place; and then there's the other notion of kind of coordinating it with kind of other design changes to

the vehicle so that you don't have this denial of carryover.

On the -- just the physical time to get in, do you have an estimate of how long it will take you for all the dynos -- you have to convert to have the dynos in place? Even if we were denying -- we considered it cost effective to deny your carryover capabilities. Kind of what's the lead time just to get the dynos in place?

MR. RUSS: On a per site basis I think we're looking at about 2 years to order, install and put them in.

In order to change out all of the dynamometers, I think a 6 year changeover seems reasonable to us.

MR. MAXWELL: Okay.

MR. BERUBE: I guess maybe I'll elaborate on that, too. Realize the key part in there is that we need to have those dynos in place for development work significantly ahead of time of actual certification.

MR. CULLEN: There's a second aspect to that you need to be sensitive to. The changeover of a single site, just a dynamometer, is kind of a 3 month exercise.

From our standpoint one of the real constraints there is how much of your capacity can you afford to turn off for a 3 month interval while you change the dyno and then turn it back on?

And in large laboratory you might be able to

afford to do 2 sites at a time and forego maybe 15 percent of your capacity, That says that to get through all of those sites is going to take, you know, perhaps 2 and 1/2, 3 years, if that was the only constraint; let alone the development time aspect.

So that's a real hurdle to the whole thing, is getting the job done while you go through that changeover.

MR. WEHRLY: I've got a question real quick. Well, it's under lead time, but truly kind of more of a USO6 question.

But you talk about one of the new technologies that would be required that you'd need extra lead time, would be engine design changes to tolerate higher combustion and exhaust temperatures.

I was wondering -- well, first of all if you guys have any data other than what we saw that would indicate that you would actually need some engine design changes or exhaust changes? I mean my recollection was we didn't really monitor anything other than exhaust temperatures. We didn't measure valve temperature and combustion temperatures and this and that.

MR. RUSS: I can just make a brief comment on that. Because of the higher speeds of the cycles that we're looking at, and especially if we're looking at not having

enrichment which can be used to cool the combustion chambers, certainly the risk of spark knock or something like that is a real concern to us.

And so from that perspective engine design change may be necessary to limit that.

MR. WEHRLY: But at this point it's just speculation that this is a problem, and this is not based in any --

MR. RUSS: (Interposing) It's a concern, certainly. I mean speculation may be too soft.

MR. ROUSSEL: If I can add something there? What a manufacturer is going to have to do is they're going to have to look at their full vehicle lineup and determine what the temperature impact is going to be on that particular vehicle application.

Some vehicles are potentially right at the margin right now, with their exhaust temperatures and their design. With an incremental temperature increase that's going to most likely force some type of a hardware change on a certain number of applications.

Each manufacturer, I think, at this stage, is going through their product line and taking a look at it to see how their vehicles are going to be implicated. I don't think anybody has any more detailed information a this time,

but hopefully, by the time the final comments are due, some information will be there.

MR. WEHRLY: Do you know with, in the previous test program or the one you're working now, did any of the drivers ever comment that there was an noticeable spark knock occurring during any of the tests, the stoich tests?

MR. CULLEN: To be honest with you, with that speed on a dyno site the noise level is high enough that I'm not sure you could really hear the spark knock if it was happening, but I don't recall any comments to that effect.

MR. GERMAN: Are you done?

MR. CULLEN: Yes.

MR. GERMAN: I just have some questions about cost.

For a changeover, is this a 48 inch site, you had $300 thousand for analyzers?

MR. RUSS: Basically what that is, is because of the higher speed and the higher flows we need a new CVS and new venturi to handle the higher flow rates. And so it categorizes analyzers, because when purchasing a new site it all comes as a unit, so that's why we put it in this category.

MR. GERMAN: Okay, and the venturi, alone, costs $300 thousand?

MR. RUSS: Yes -- actually we're estimating about $350 thousand, so.

MR. GERMAN: Okay, and then you have an item called "support", what is that for, on a changeover?

MR. RUSS: For a changeover site? There's miscellaneous items in there. One of the key items is the electrical power control changeover, and also the construction of the new pit that's required to handle the larger dynamometer.

MR. GERMAN: So that includes all the construction costs and all that?

MR. RUSS: On this side, the changeover site, it includes part of that, yes.

MR. GERMAN: And on your cost estimates, where you've given the total cost in millions? I guess it would be helpful if we could have some sort of breakdown as to what the assumptions were behind that?

For example, at least at first glance it seems very strange that your standard -- you have $60 million, almost $70 million into standard footage in cells for A/C simulations, and only about $30 million for an A/C on. Maybe that's because you're intending to do a lot of your testing in a full environmental chamber, but you know how some of those things work out or are broken down would be helpful.

MR. RUSS: Certainly there was a detail analysis that went into these final numbers.

MR. GERMAN: Yes, and if you supply that to us I think it would answer a lot of questions, rather than trying to go through them here.

(Voice out of microphone range)

MR. GERMAN: I need to figure out my scribbling here.

MR. MAXWELL: While he's figuring out we'll go to a question on -- around your 4th or 5th chart? The summary chart on test time? One showed the basic FTPs an hour. By the time you added the supplemental FTP there was 2.2 hours, making it a total of 3.2. You later, in a couple of later charts you point out some of the sensitivity of how you cut down the number of tests per day by dropping from the 60 minute soak to the 10 minute soak. I was wondering how that computes back into this total? In other words, this total of 3.2, what does it reduce to if we were -- you know if we were dropping the 60 minute soak?

MR. RUSS: We haven't gone through the exact thing, but certainly it would increase. I don't know the exact numbers there.

MR. MAXWELL: Okay, there's not a simple proportion I could derive from this 3 test per day, 4 test

per day, how it would back calculate into --

MR. RUSS: (Interposing) Right. If you look at the bottom part of that chart on the A/C test capacity, going from 60 minutes to 10 certainly adds one test per day. Perhaps eliminating that all together would certainly add considerably more. We can get that exact number for you if you like.

MR. MAXWELL: Yes, I think that the way you laid out how the test would run is very helpful as far as understanding how it would affect tests per day and all that stuff -- so, just doing the same thing for a 10 minute soak would be -- well, maybe it's here. Okay.

MR. GERMAN: A couple of questions on lead time. I think you made the statement that the lead time clock is dependent on the fuel economy test procedure adjustment. And I was wondering why that would be the case?

MR. RUSS: Actually it's written, and what I said was it's unreasonable to expect us to design and begin development work on a vehicle until we know what our fuel economy target is. And we'll have more on the fuel economy later, so perhaps we could --?

MR. GERMAN: We'll save it until then. I'll put a little star by that and come back to it.

Why do the LDT3 and 4 classes need additional lead

time?

MR. RUSS: Well, I think we don't know much about them right now, as everything we've shown here in the last couple of days is on LDVs and LDT 1 and 2. We need to learn about them and find out how this rule impacts them. And I think all of the resources that we've spent, the considerable resources that we spent has been focused on the vast majority of the vehicle population, which is LDVs and LDT 1 and 2.

Additional time is needed to gain experience on LDT 3s and 4s.

MR. BERUBE: Maybe I'll add in that those vehicles -- exhibit -- especially because they use the heavy towing type of situations, we have particular concerns how they'll behave in high temperature operations, with any commanded enrichment, things like that. There's a lot more uncertainties that are just exasperated for those vehicles.

MR. GERMAN: I guess I'm not sure why that would be the case, because they wouldn't have to maintain stoich control any longer than any other vehicle. It's wide open throttle on any vehicle. And I think that for those category of trucks they also don't tend to have the close coupled catalyst like they do on cars, so a lot of your temperature concerns should be mitigated as well, I would think. It was just some things to think about as you address your comments.

Because right now I don't understand the need for additional lead time, so it's probably something you should try to pick up.

MR. ROUSSEL: John, I was going to comment on that as well. Of all the data that we've gathered, we've gathered the least on the 3 and 4 classifications of vehicles.

When you guys promulgate a rule it's going to most likely be based on certain assumptions that you make from the lower weight class vehicles, passenger cars and the light duty trucks in the first category.

There most likely are going to be some things that we didn't anticipate, you didn't anticipate nor did we anticipate. And I think it's very reasonable to look at a class of vehicles that we don't have a lot of test data for and get extra lead time for those particular classes of vehicles.

And we're starting to do some testing at Ford Motor Company on the heavier weight class vehicles right now and we are finding some problems with very high catalyst temperatures.

MR. GERMAN: You have one graph showing the differences between the platen and the 48 inch electric dynamometer. The fuel economy on those graphs? I assume that's the weighted city/highway average?

MR. RUSS: Yes, actually I believe that may be the highway fuel economy.

MR. GERMAN: I'm sorry?

MR. RUSS: It's the highway fuel economy.

MR. GERMAN: That's the highway fuel economy only. Okay. I thought the numbers were a little high.

And on the very next slide, is there an error on the Case 2 graph there? Because it appears to be identical to the Case 1, except for the total.

MR. RUSS: Is there an error? I think the thing we're trying to point out there is the carryover is the thing that changes, so.

MR. GERMAN: Okay, gotcha. Thank you. I didn't catch that. Okay.

MR. MARKEY: Just one question, in terms of those vehicles tested with the fuel economy compared to the two dynamometers, what test program is that from?

MR. RUSS: That's from the EPA/industry -- I think it's called the dynamometer correlation program?

MR. MARKEY: Okay.

MR. ROUSSEL: Nine vehicle.

MR. RUSS: It's the 9 vehicle program. I have the list of the 9 here.

QUESTIONER FROM FLOOR: This is Tom Chen from

Honda (phonetic); and those date from the 9 vehicles were obtained from the EPA handout from October 26th by Dick Nash (phonetic) on the 9 vehicles, twin roll and single roll dynamometer comparison study.

MR. MAXWELL: We know which program that is.

MR. GERMAN: Anything else?

(No response)

MR. GERMAN: Thank you.

We're now going to return to some miscellaneous issues on testing. The first one is weight to power, I believe?

MR. ROUSSEL: We're going to start with fuel economy, that's correct. The order is a little bit different than the list that you have on your table there.

MR. GERMAN: Why don't you just go through the order now so we don't have to do it in between each one.

MR. ROUSSEL: All right, the first item will be fuel economy, followed by electric dynamometers, followed by defeat device, followed by high altitude requirements, followed by low performance vehicles, followed by micro transient driving and concluded by power loss.

And we have a change in speaker on power loss from Harold Haskew to Kevin Cullen.

MR. BERUBE: You already have copies of the fuel

economy piece. I have extra ones.

(Voices out of microphone range)

FUEL ECONOMY IMPACTS

BY MICHAEL BERUBE

MR. BERUBE: For the record, Michael Berube from Chrysler.

I'd like to address the fuel economy impacts that we anticipate occurring as a result of this rule, but first let me highlight that passenger car and light truck fuel economy are critical issues for manufacturers. A lot of discussions here on emissions. Fuel economy is just as important and just as critical an issue for us. It affects our very core product plans, it affects the fundamental designs and size of vehicles that we can sell.

There are extremely long lead times, probably even longer lead times required for fuel economy related issues than are required for emission issues.

And currently market forces are running counter to legislation and regulations, which are requiring higher fuel economy. Market forces are driving us towards vehicles actually of lower fuel economy. And that's a constant battle manufacturers are trying to run just to maintain current ground.

FTP revisions may significantly lower fuel

economy of vehicles.

Three primary reasons for that.

First, and by far the major, is just the switch to the 48 inch dynamometer. Now this increased load from the dynamometers, that will decrease the fuel economy.

The second are calibration changes. Examples would include things like going to more EGR. We have to retard spark for NOx, as well as going to stoichiometry, which would reduce power loss, which will need to be made up.

And then third, potential weight impacts. Although it's not necessarily obvious at first, there could be weight impact from things such as increasing cabin insulation to minimize A/CU, some A/C load. Or, given the current proposal, things like electrically heated catalysts are required for getting quicker lightoff. Certainly that would have weight impacts as well.

Given these issues, AAMA and AIAM request that a fuel economy test procedure adjustment, TPA, is given in order to maintain comparable stringency to current test procedures. And really, the issue there is to the original test procedures.

Section 503(d) of EPCA, the Energy Policy and Conservation Act, recognizes the linkage between test

procedures and standards.

EPA established test procedure adjustments in 1985 rulemaking. They're currently in place for passenger automobiles.

We think that test procedure adjustments will be required as a result of this rule, both for passenger cars and for light duty trucks.

It's worth commenting there that currently test procedure adjustments are not given for light duty trucks through EPA, mostly due to a historical precedence, that NHTSA, that they've set, like, truck standards over every several years, have been able to take into account the effect of other motor vehicle laws as is required by the legislation.

However it's not necessary clear, in this rule making, that will happen. What we're stating here is that for trucks there needs to be a test procedure adjustment put into place. The issue of how that gets done between EPA and NHTSA needs to be resolved.

AAMA and AIAM are willing to entertain a cooperative test program with EPA to determine the appropriate adjustments. We think that really the only way to do this and to do it correctly will be with some actual test data. We'd like to work -- continue the model that

we've had with FTP revisions by working with the agency, be able to share resources and time.

We realize that there are some test data that's currently available. We think more data is needed over more vehicles, more passenger cars, more light trucks. We think we need to look at more variation among vehicles tested, models, powertrain, tires.

We also need to look at vehicles calibrated, stoich control, we need to look at A/C type effects. And there'll be a little more discussion later on -- no 48 inch dyno changeover issues and what happens with the current 10 percent A/C factor, and whatever happens there may in fact impact fuel economy and would need to be addressed.

And probably the most important point of the presentation is that we need to get these test procedure adjustments to be finalized as absolutely soon as possible in order to avoid product plan disruptions.

This picks up on your question earlier, John. There has been a widely recognized precedent of a 5 year lead time needed between changes in fuel economy standards on the effect of those changes in order for manufacturers to be able to appropriately plan their products.

All manufacturers are really right up against the wire right now in fuel economy. And we're currently, you

know, building new products, deciding on future products, trying to estimate what the fuel economy of those products will be.

There's no product action taken within a company, I can tell you, without a very careful look at what it will do with fuel economy. Every product planner has that right up there -- one of the top things, right after market demand for the vehicles, they're planning about talking about introducing, what it will do to the company's CAFE.

We need to be able to accurately predict what the fuel economy of our vehicles will be 3, 4, 5 years from now. In order to do that we need to know what type of test procedure adjustment there will be from this rule, what the effect of this rule will be, if any.

The bottom line comes in that if there is no test procedure adjustment in place and in time, when we maintain the current type of timing we're talking about where by '98 we'd have to be at 100 percent phase-in.

Manufacturers would potentially be in the position of trying to say that -- or having to say that fuel economy as necessity, and emissions testing over the current FTP would have to be maintained over the current twin rolls, and probably could not switch over to the 48 inch dynamometer, the emissions testing, the fuel economy

testing, we think need to be kept matched as they are. And the legislation -- recognizes that linkage. And that would need to occur until there's appropriate lead time from a TPA adjustment for product plans to be able to compensate.

So that's our concern with timing. And, you know, the comment that Mike Cross (phonetic) made earlier.

QUESTIONS AND ANSWERS

MR. MAXWELL: A bit of an off the wall comment. It's not really directly linked here, but -- we get into programs to evaluate fuel economy effects, would it be productive, at the same time, to consider factoring in the loaded canister, unloaded canister, to get away from the double testing that now occurs from the evap changes? Or would that be mucking it up so much it's just better to keep that as two separate tests?

It may be something you have to think about.

MR. BERUBE: I think it's something that we'd like to think about and take into consideration, you know, I think it's something worth thinking about -- looking into, and we'd like to, you know pursue the overall issue cooperating with the agency through a work rule.

MR. GERMAN: You definitely have to consider the new test procedure that takes into account a loaded canister for fuel economy testing. And that's something that has to

be considered up front when you're devising this test program.

MR. MAXWELL: I'll go back to my lead time question and all that. And this is a loaded question and has nothing to do with this particular rule making we're here today about. But I do a fair amount of work with -- on fuel economy, and I've had a number of people from the automobile manufacturers claim that CAFE is ineffective, does not influence manufacturers product design. But I seem to be hearing a different message here, that you folks are saying that these things definitely do affect your decisions and you need to know what it's going to be so you can make your product plans?

MR. BERUBE: I can tell you that is clearly a misunderstanding there. There's no one in the automobile industry that would tell you that CAFE standards, and essentially a increasing stringency of the standard -- which is what you have -- without a test procedure adjustment would not affect manufacturer -- or would not have the potential effect to manufacturers product plans.

What you may have been hearing is saying that there is very little market demand for fuel economy. That's not confusing CAFE and fuel economy -- fuel economy demand by the market; that fuel economy demand among consumers is

very weak and does not drive manufacturers product plans, but certainly increasing stringency of the standard does.

MR. MAXWELL: Well put.

Just one clarification. On the previous slide you talked about making adjustments, maintaining comparable stringency to current test procedures? That should be 1975 test procedures?

MR. BERUBE: And -- yes, that's -- what's basically being said there is, assuming we've done a perfect job so far, current set standards should be -- or current test procedures should be equivalent to 1975 test procedures. So you're absolutely right. The ultimate goal is that you need to have the procedures that are in place be the same as the '75, and hopefully we've done it right so far and they're there. That's what's embodied in that statement.

Essentially the metric that we're looking at is what we have today, unless we've not done a good job in the current procedure, unless our current test procedure adjustments are wrong -- what we have today should be the appropriate yardstick.

And I think EPA has recognized, if you look at the rule making record from 1985, and the language that was actually in the NPRM in '85, the agency had stated that,

you know, under 503(d) of the Energy Policy and Conservation Act, that the quote was -- the EPA should determine each manufacturer's CAFE value using the test procedures and practices that EPA has used for the '75 model year; or procedures which yield comparable results.

I think the whole issue is test procedures and practices. Basically what was it that was done -- I know that, you know, there was a lot of question about what were the actual specific test procedures in '75. And it's basically what were the test procedures and practices in place to yield fuel economy at that time in maintaining a comparable stringency across time.

MR. MAXWELL: But whether it's current or whether it's '75 actually introduces a potential legal issue which we would wind up having to address.

The other question I wanted ask was that clearly both the policy and legal issues and the actual quantification of the effect for the dyno changeover, we could start work on that right now. Clearly that's -- in both cases.

However, if you're asking for adjustments for calibration changes, I don't see how we can begin to take that up until after the stringency of whatever we're proposing here has been established and after you folks have

a chance to find out what kind of changes you have to make in response to that.

MR. BERUBE: It raises a good chicken and egg question. And we recognize that. And I think you're right. I think we need to -- part of what probably makes sense to do, what's prudent, is to begin work and begin taking some first guesses or estimations of some of those factors, and we're going to have to stick real close to what's going on with the FTP final rule and, you know, make revisions and changes to that.

But what ends up happening is -- what we'll have to do is down the road, to the degree that we misestimated early on, we'll have to evaluate if sufficient lead time exists at the end of the process in order to have those test procedure adjustments in place.

So, you're right, it's going to be difficult.

MR. MAXWELL: This is simply one of the reasons why we decided to put it off, because we have so much work to do that we couldn't see taking on some work that might wind up having to be redone anyways.

MR. BERUBE: To the degree that the phase-in for the overall FTP rule is made more flexible and more lead time is added in, that would help mitigate some of this issue.

MR. MARKEY: Just to kind of elaborate on that, the cooperative test program that you recommended, what would be your best guess on a time frame for that, or is that something that the manufacturers could handle?

MR. BERUBE: That's difficult. I think what we probably want -- it depends on how -- we haven't done a lot of thinking as to how extensive it needs to be, the balance across different manufacturers. Clearly the manufacturers are quite busy now with the FTP rule.

I think what we envision is as soon as possible getting our fuel economy people together with the agency, try to lay out the groundwork for exactly what that is. Probably all the resources are physically tied up with the currently testing going on. But it's going to take a little while just to lay it out.

But if we can get things laid out so that later this year we can get going with the actual testing, have everything in place, that's probably about the best we can do. But it's going to take a little while just to make sure we get everything laid out on what do we need to test and how? And that work can begin immediately because that's really somewhat different people than the people you have here in terms of within the companies, although the physical resources are probably -- down the road, are going to be the

same.

A little bit of a vague answer, but I think we need to, you know, get going as soon as possible in terms of laying it out and then we could actually probably or potentially start testing later in the year.

MR. MARKEY: Thanks.

MR. ROUSSEL: I've got one comment. The final rule somehow needs to capture that there's a fuel economy issue, and hopefully try to establish some type of timing as to when this issue can be resolved. That's the real critical element here that both parties need to get resolution on, is the timing of when we can resolve the fuel economy issue and do the appropriate job.

MR. BERUBE: To the degree that a test program is in place, we understand how that test program was run, we understand how the data will be used from that test program, and that we're comfortable with all that; that relieves a lot of manufacturers concerns, because then we know, down the road, the test procedure will be there and it will be accurate and correct.

It's the having absolutely nothing, and no indication that there's even a test procedure that's even being thought about, is what really causes a lot of concern.

MR. MAXWELL: Okay.

MR. GERMAN: If I managed to copy it down properly I think the next one is on electric dynamometers?

MR. ROUSSEL: Electric dynamometers, yes.

Jerry Roussel of Ford Motor Company.

I just have a written statement, I don't have any overheads.

ELECTRIC DYNAMOMETERS

BY JERRY ROUSSEL

MR. ROUSSEL: EPA has proposed requiring 48 inch electric single roll dynamometers or their equivalent. This would replace the current twin roll hydrokinetic dynamometer, and will allow for better representation of vehicle road load forces. In general industry agrees with this philosophy, however many issues need to be resolved prior to implementing this change.

A major concern is that significant emissions and fuel economy impacts are seen when comparing the effects of the electric single roll dynamometer to the twin roll dynamometer.

We strongly believe that an emissions adjustment over the current FTP is necessary and justified, and likewise, as previously stated, a fuel economy adjustment is also required. We recommend a test program be conducted to establish the appropriate correction factors. This will be

1 further commented on in our written comments.
2 We also have other dynamometer issues we'd like
3 to comment on, the first being related to equivalent test
4 weights. The NPRM proposed maintaining the current ETW
5 classifications, but with expanded ranges. At this time we
6 support the NPRM proposal of using the current system with
7 the expanded ETW ranges.
8 The next dynamometer issue that I'd like to
9 discuss deals with simulating twin roll dynamometers with a
10 single roll dynamometer.
11 EPA had requested, in the NPRM, using a 48 inch
12 single roll electric dynamometer to simulate the
13 conventional twin roll hydrokinetic dynamometer. Presumably
14 this simulation would be used to alleviate the need to
15 maintain twin roll dynamometers while phasing in single roll
16 dynamometers.
17 A joint EPA/industry ask force concluded that the
18 48 inch single roll electric dynamometer cannot adequately
19 simulate the twin roll dynamometer. They conducted a test
20 program and amongst the findings were the following:
21 Large variability in vehicle emissions resulted
22 with the simulation. For example in comparing techniques
23 the range in carbon monoxide results was 35 percent. The
24 results were also very vehicle dependent.

Based on the large variability the EPA/industry task force concluded that simulation did not accurately estimate the loading of the twin roll hydrokinetic dynamometer. Also the work required to develop a simulation for each vehicle would exceed the cost of maintaining both twin roll and electric roll dynamometers. Based on the findings of the EPA/industry task force, we do not recommend that 48 inch single dynamometer simulation of a twin roll dynamometer be pursued or developed further.

We have other dynamometer issues, such as air conditioning horsepower adjustment, dynamometer coefficients and dynamometer quick checks. We'd like to discuss these issues in further detail in our written comments.

Any questions?

(No response)

MR. ROUSSEL: Okay, and you guys should have a copy of the written words.

(Voices out of microphone range)

MR. ROUSSEL: Okay, thank you.

DEFEAT DEVICE LANGUAGE

BY GLEN HEISER

MR. HEISER: Again, I'm Glen Heiser, with Ford Motor Company, and the next issue we wanted to talk about was the defeat device language.

EPA had requested comments on whether it would be appropriate to require proportional emissions control under conditions not specifically included in the test procedures.

Our understanding of the objective would be to prohibit step changes in emission response under conditions not specifically included in the test procedures. And the only exception would be for vehicle component protection such as extended operation at wide open throttle without enrichment.

The existing EPA advisory circulars and multitude of certification tests with different fuels, test procedures, environmental conditions, and as augmented by the proposed SFTP, should reduce the concern of defeat devices. This is because the FTP and proposed SFTP testing requirements and emission standards will force powertrain engineers to develop and verify exhaust and evaporative emission systems that span most driving conditions at various environmental states. Based on this we recommend that no regulatory language changes be made.

More guidance, if required, could be given through advisory circulars.

That's all I have on defeat device. Next is altitude unless you have questions on the defeat device?

(No response)

SFTP REQUIREMENTS AT ALTITUDE

MR. HEISER: Issues Regarding Altitude, AAMA/AIAM have a major concern with implementing SFTP requirements at altitude, especially in light of EPA proposed levels of control for NOx.

Manufacturers will be forced to use more Exhaust Gas Recirculation in order to reduce engine out NOx for high speed, high acceleration driving and A/C operation.

Flowing high levels of EGR at altitude may be problematic. Also, testing at altitude will decrease power of the engine making it more difficult to follow the high speed, high acceleration, drive trace.

No test data exist at this time to determine the extent of the problem, however.

We would recommend that EPA exempt the SFTP from altitude requirements until, at least, more information could be gathered. We will comment further on this issue in our written comments, also.

If there's no questions regarding altitude, I think next up is load.

QUESTIONS AND ANSWERS

MR. MAXWELL: I guess my question is you state that you'd be forced to use more EGR at high altitude. Why is that?

MR. CULLEN: We're comparing it from what we're doing today to what we'll have to do tomorrow to comply with the SFTP. And with the NOx levels that you're talking about it's going to force manufacturers to try to control that and we're going to have to flow -- or, one of the techniques that we can use is to flow more EGR.

MR. MAXWELL: Okay, but you just meant compared to existing calibrations?

MR. CULLEN: That's correct.

MR. MAXWELL: Not compared to low altitude?

MR. CULLEN: That's correct.

MR. MAXWELL: Okay.

MR. ROUSSEL: And as Kevin just pointed out, at altitude you are less tolerant -- you're -- to flow more EGR. And it is a problem for us --.

MR. MAXWELL: I guess I'm back to my original question. Why is it less tolerant, then?

MR. CULLEN: Well, you already start out with a power deficit at altitude, you know, given the lower atmospheric pressure, you lose engine output. When you add EGR you take a compounded effect.

Whatever impact we expect to see at low altitude, we expect those to be more significant at high altitude.

MR. MAXWELL: Is it fair to characterize it as a

function that, because of the power loss, you need more throttle angle? I mean is that the primary concern, you're operating at higher throttle angles?

MR. CULLEN: You operate at higher throttle angles. I think your combustion tolerance to EGR will be poorer under those conditions than it is under comparable low altitude conditions.

MR. MAXWELL: Comparable in terms of the same throttle angle or the same power output?

MR. ROUSSEL: Same power.

MR. GERMAN: So you're in effect saying you want the ability at high altitude, to cut back on EGR?

MR. CULLEN: I think what we're saying is that the concerns we've raised about the USO6 standards, I guess, as a primary issue we expect to be sort of amplified at altitude. We expect all those concerns to present more significant challenges at altitude and we need to keep that in mind as we go through this process because there are likely to be special problems at altitude.

MR. ROUSSEL: Again, we don't have any test data at altitude with the A/C on and over USO6. So it's hard for us to sign up to a requirement where we have no idea as to how easy or how difficult it will be to comply at altitude. And without that test data available I don't know how we can

promulgate a high altitude requirement for the SFTP at this stage. So it's a problem.

MR. MAXWELL: Want to do a new test program?

(Laughter)

MR. MAXWELL: Just kidding.

One thing, if you could, if you could actually quantify what the power loss is at least, going to high altitude? That would be at least something to help us.

MR. ROUSSEL: We'll see what we can do.

MR. MAXWELL: Is there some simple way, without running a new test program, to at least get some handle on if there was not a high altitude requirement, but you were taking the low altitude design cars, then, to high altitude of what's likely -- which directionally going to happen at high altitude, how much higher emissions might be, to get a handle on kind of how bad the problem is? Is there some theoretical way to approach that?

MR. ROUSSEL: We can investigate internally within our company and ask the other manufacturers to do the same and see what we can comment back on. This is an issue that really hasn't been given any consideration up until a couple of days ago.

(Laughter)

MR. ROUSSEL: What are we going to do with these

altitude requirements?

MR. MAXWELL: It's an interesting question.

MR. ROUSSEL: Right.

MR. MAXWELL: Okay, weight to power?

WEIGHT TO POWER, LOWER PERFORMANCE VEHICLES

BY MIKE RUSS

MR. RUSS: My name is Mike Russ, with Mazda.

On the weight to power issue we'll focus our comments at this time on the lower performance vehicles.

We have several concerns with the weight to power issue and will offer some concepts about how to handle these lower performance vehicles.

First of all the concerns: Use of a criteria such as weight to power may not properly categorize all vehicles. It may also give manufacturers an incentive to design to the criteria with no real in-use benefit and possibly a detriment.

An effective performance criteria should be the true measure of a vehicle's need for adjustment. Vehicles with the same weight to power value may have significantly different wide open throttle durations and may experience wide open throttle at different regions of the cycle. With the weight to power approach, however, these vehicles are considered identical.

Some vehicles, even with the weight to power adjustment allowed by EPA, will still maintain wide open throttle for more than the wide open throttle time observed in the most extreme cases from the EPA/industry 4 city driving survey.

Requiring emission control for cycles with wide open throttle for this duration will force the redesign of some vehicles including LEVs, which employe close coupled catalysts to account for the increases in catalyst temperature.

Basing weight to power on a steady state peak horsepower may not be appropriate for a transient cycle such as USO6. Using only the peak horsepower value fails to account for the characteristics of the entire horsepower curve.

Other factors that the weight to power method fails to account for are the torque curve, gear ratio and axle ratio, dyno horsepower coefficients based on tire design and aerodynamics, as well as performance losses due to the possible use of stoich operation.

EPA makes no provisions for vehicles that are unable to follow the trace at wide open throttle even with the allowable weight to power adjustment.

Given these concerns, we are offering a few

concepts which we are still evaluating ourselves, but wish to offer here.

We recommend the use of a performance based criteria such as the ability to maintain the driving trace within the tolerance bands, or using wide open throttle duration, or wide open throttle acceleration times, compared to USO6 acceleration times, or a combination of these three.

We recommend the use of a road grade as a dynamometer adjustment method, with a dynamic reduction in the road grade and the ability to reduce road grade in increments until the vehicle meets the criteria.

Use of a 1 to 1 countdown timer will be used for wide open throttle duration. Manufacturers would determine the adjustment amount as a development task, and EPA may confirm the road grade adjustment at the time of certification.

That's it on weight to power.

QUESTIONS AND ANSWERS

MR. MARKEY: Just a couple of questions, Mike.

Some of your concerns are concerns that EPA also shared in the NPRM and outlining some of the options or possible approaches in terms of maybe a 0 to 60 timer or some measure of performance.

One thing that we didn't really consider is the

possible gaining that you mentioned that using a weight to power system could create. Can you comment on how you envision that it would be an incentive to design around the criteria?

MR. RUSS: Well, I think any time you have a criteria that is a design criteria for the most part, manufacturers will design to that criteria, rather than what we're recommending, is a performance criteria.

And so we think, just in general terms, that whenever there's something like that, that forces the manufacturers to focus on just weight to power and those weight to power values, then that is a concern.

MR. MARKEY: One other comment or clarification. In terms of provisions for vehicles unable to follow the trace at wide open throttle even with allowable weight to power adjustment. I think our fallback position on that would be what it is for the current FTP, which is just maximum available power, and you hit the trace when you catch up to the trace, in essence.

Clearly in terms of wide open throttle duration time that may not be desirable.

MR. RUSS: Right.

MR. MARKEY: But we did consider to use the same approach that has been used for the FTP on that specific

issue.

MR. RUSS: Okay, that concern you just mentioned is a big concern to us.

MR. GERMAN: You had a really cool graph in here you didn't share with the audience. And I guess it certainly illustrates some of our concerns.

I think it would be even more useful if you could separate out the manual transmission from the automatics in the graph -- because we noticed that that is one factor that counts for a big difference. But it's just a request.

MR. MARKEY: And that was Ford data. Is that something Ford could supply us -- a breakout between manual and automatic?

MR. ROUSSEL: I'll see what we can do and I don't think that should be too much of a problem. We'll do our best.

MR. MARKEY: Thank you.

MR. GERMAN: Thank you.

MR. RUSS: I'm also handling the micro transient driving.

TRANSIENT DRIVING

MR. RUSS: On this issue our comments are very brief and are confined to the DPWRSUM criteria. And

briefly AAMA and AIAM are still evaluating the DPWRSUM criteria, and the date from the industry program that is currently running is being examined based on this criteria.

At this point our comments are preliminary but the criteria appears to be cycle and we're also evaluating the impact of the upper limit of the 1.0 criteria in terms of void tests.

And we will have more comments on this later.

MR. MARKEY: That is one area that I hoped that, was we reconvene in the data analysis group, that we can focus on and work on that. Because as we've mentioned, the NPRM, in terms of setting the lower threshold as well, we are looking for some input there. So hopefully we can work together to resolve that issue and get your thoughts.

MR. MAXWELL: We've certainly seen some indications that it can be cycle dependent, which is part of the reason why we just proposed a very wide range.

MR. RUSS: Okay.

MR. MAXWELL: Power loss?

MR. CULLEN: Yes, the next issue is power loss.

POWER LOSS

BY KEVIN CULLEN

MR. CULLEN: Kevin Cullen, from GM.

The agency requested, as part of the NPRM, any

information on the degree to which constraining enrichment causes power loss. I think we've offered a rule of thumb that we would expect that to be a 3 to 5 percent reduction in power when you were constraining enrichment.

One of the ad hoc member companies, Suzuki, did some testing on 2 different vehicle models with production and stoichiometric calibration over a number of performance tests including quarter mile and 0 to 60 accelerations, 40 to 60 passing maneuvers and top speed.

And you can see that there's a pretty consistent reduction in performance, depending on which metric you're looking at. You see anything from a half second to as much as 1 and 1/2 second impact. And on top speed between 1/2 mile an hour and 1 and 1/2 miles an hour. We think this data's consistent with the 3 to 5 percent power impact that we have previously discussed. And in talking with our base engine people, who tend to have the best understanding of these, they continue to report that that would be their expectation of the effect.

That's it. Questions?

QUESTIONS AND ANSWERS

MR. MAXWELL: Yes, and I'll refer the question to the Suzuki rep if it has to do with the data. I mean -- just I would not expect to see any reduction in top speed,

because generally it takes you a long time to get there and your timer should kick in.

MR. CULLEN: I'm not certain whether or not the calibrations involved had a timer or were constrained enrichment all the time --

(Simultaneous voices)

MR. MAXWELL: -- so this would just be -- the constrained is just to demonstrate what the effects of the constraint would be, is that correct?

MR. CULLEN: Tokio? We'll have the answer in a moment.

MR. MATSUI: This is Matsui from Suzuki.

This time we didn't use a timer, so, open.

MR. CULLEN: So that's fulltime stoich?

MR. MATSUI: That's correct.

MR. CULLEN: Okay, thank you.

MR. GERMAN: I've got a technical question for you, Kevin, and you may not be able to answer it.

What -- I guess first of all you said at 1 and 1/2 second, and I see a second as being larger --

MR. CULLEN: (Interposing) I'm sorry. I misspoke. Yes, it's a second.

MR. GERMAN: How -- typically what kind of criteria does industry typically use to evaluate this kind

of change in performance? In other words --

MR. CULLEN: (Interposing) The only metric that's up there that I think is relatively commonly used broadly is 0 to 60 time. And no question that when you talk about 1 second, in 0 to 60 time that's considered to be a pretty significant loss of performance.

MR. GERMAN: I guess we'd be interested in seeing any kind of set guidelines that would -- I mean I understand, from a marketing perspective, that being a concern. But I guess as far as safety and things like that, you know, how would you look at that and say, "My gosh, we have a problem here, we're going to have to go to a different design or we're going to have major --

MR. CULLEN: (Interposing) I don't -- I don't think we're trying to present any implications beyond there is a power loss, we think it can be quantified and we're concerned that to the extent we have to compensate to get it back for the customer, there may be indirect fuel economy impacts.

I'm not in a position certainly to offer any comments on safety or any other aspects that would be of concern.

MR. CULLEN: End of questions.

MR. GERMAN: Thank you.

MR. ROUSSEL: I actually have one additional comment that's going to affect vehicle performance or power loss. And I hate to keep beating the same drumbeat all the time, but increased use of EGR at high load conditions, which we're going to be forced to do over USO6, again, with the NOx controls that you're looking at for control over USO6; that's going to have a major effect on vehicle power.

And we are trying to quantify what that effect is. And when we did our A/C piece we said that we would take you through an EGR study that we had done at Ford Motor Company, showing what increased EGR means to engine power. And hopefully when we get together we can discuss that.

MR. GERMAN: Yes, I would expect, though, that at wide open throttle you could probably calibrate so you don't have excess amounts of EGR. Even on the USO6 it doesn't occur that often. I think we're primarily concerned about EGR and more of the moderate acceleration ranges. Just something to think about.

MR. BERUBE: I don't know if we can agree with at this particular point in time. When we calibrate the vehicle obviously we're going to have to look for all potential reductions in engine out NOx that we can get.

And one of the issues that has been presented, at least at our company, is how do you flow EGR at wide open

throttle, and we're going through that analysis at this time.

So I know that we're definitely considering that as a possibility.

MR. GERMAN: I guess all I'm suggesting is that you -- I think it's actually likely that you'll find that you don't have to flow more at wide open throttle. You have to move the cut point up a little bit, but that doesn't mean you have to actually be able to flow throughout the entire range. If you follow the distinction?

MR. BERUBE: Yes, but today we don't flow any, essentially don't flow any at wide open throttle.

MR. GERMAN: I understand --

(Simultaneous voices)

MR. BERUBE: -- it's very problematic --

MR. GERMAN: -- but I think you can get some NOx reductions without actually having to add it through the whole range. You just have to get a little more under some conditions -- possibly. We can talk about that later.

MR. BERUBE: Yes.

MR. MAXWELL: When you made the comment you used the words at the level of NOx reduction we're talking about. Did that imply that at the level of NOx reduction you're talking about that you're in the safe zone there?

MR. BERUBE: I think with both levels of NOx reduction we're going to have to flow more EGR. Obviously with the proposal that we have we're going to have to flow less, because our standard is obviously higher than yours. But we do anticipate having to worry about that issue more than we do today, obviously, too.

MR. MAXWELL: Concluding remarks?

MR. BERUBE: Guarantee this will be short.

For the record, Michael Berube from Chrysler.

Given the large amount of testimony that you've heard over the last few days, I'd like to take just a few minutes to review the major issues that we've discussed and then offer a few concluding remarks on behalf of AAMA and AIAM.

On the major issues, I think first and foremost we've expressed a very consistent and strong methodology of setting standards based in actual test data gathered over the compliance cycles with appropriate compliance margin added, and then looking at the cost effectiveness of that standard and adjusting appropriately.

You've also heard that we are not opposed to compositing standards that have each been set with appropriate design targets and that are each cost effective.

You've also heard, based on the new data that's

been gathered in the industry test program on USO6, high speed, high acceleration cycle, data suggests that the NPRM standards are simply too stringent.

There is considerable concern over the A/C-NOx standard proposed in the NPRM, as well as with the standard that AAMA and AIAM originally proposed. In addition the test conditions for A/C operation are critical for obtaining appropriate results while not forcing excessive cost, which leads to our opposition to the NPRM's window down testing methodology and our support for a Nissan 2 type simulation.

We've heard a lot about intermediate soak. We think it has a very poor cost effectiveness and that there are very real concerns over increased catalyst deterioration.

The overall facility burden from FTP revisions will be very large, but can be mitigated by eliminating intermediate soak requirement by accepting the Nissan 2 A/C simulation and by allowing a flexible phase-in with more lead time.

As proposed in the NPRM, the requirements for high speed, high acceleration for A/C operation and for intermediate soak will require the use of very tight air/fuel control, larger catalyst volumes, increased use of EGR, rapid lightoff catalyst technology. Essentially these

technology changes are very similar for those that are required for LEV and new LEV type vehicles?

The cost to go from Tier 1 to LEV, we've heard, has been estimated at $576 per vehicle, which far exceeds the cost proposed by the NPRM. With these costs and the projected benefits, this rule, as proposed, will not be cost effective.

The tremendous amount of data an information that AAMA and AIM have shared today follows from 4 years of close work, as we talked about, and from the expenditure of substantial resources by industry and by EPA and CARB.

The amount of resources we've devoted to FTP revisions, as demonstrated at this hearing, indicates the seriousness and the depth of our concern with the NPRM. It's also worth noting the very unified position of all vehicle manufacturers at today's hearing, which further highlights the importance of this issue to the entire industry.

We view today as another step in the cooperative process that has gone on for the past 4 years and we will continue to share data with the EPA from our test programs when it comes available.

In addition, however, we will also continue to share our concerns and our recommend solutions with the

agency.

With the advent of Vice-President Gore's reinventing government initiative there's been a significant effort by EPA to look at how it does business and to listen to its customers. The auto industry welcomes this new effort. We believe that this rule making provides an opportunity to apply some of these new thoughts. Maybe they're not all new thoughts, maybe just some old thoughts have have been dusted off, which we view as including reasonable regulation, looking at the big picture; not pursuing every last percent of emission reduction regardless of large marginal cost and small marginal benefit; harmonizing regulations with CARB and ultimately basing decisions on sound science and technology.

We recognize the very tight timing that this rule making is under due to court ordered deadlines, but we should not be willing -- we, as industry, we, as government; we should not be willing to let this timing force us into poor decisions that are not consistent with this new say of doing business. Given this we are continuing to work with EPA in this rule making and to develop the necessary data.

As such, we're asking for an extension of the comment period to at least 90 days after the hearing. Cannot emphasize enough the need for this extension. This

rule is really more like 3 or 4 different rules, all very large, all very significant, wrapped into one with a tremendous amount of detail.

By granting an extension significantly more data can not only be made available, but also analyzed. In addition, much more accurate cost information -- which we've heard a lot about the cost effectiveness, can be submitted by industry.

Manufacturers would not feel comfortable with maintaining the current 30 day comment period by simply allowing data to be submitted later than that. This would essentially require us to transfer all of our resources from data gathering and data analysis, into preparing the final comments.

Given that final comment, we appreciate the long opportunity you've provided the industry. You've been very flexible in giving us an opportunity to provide all of our comments yesterday and today. We certainly look forward to working more with you on this rule.

MR. MAXWELL: On the subject of cost benefit, have you calculated yet, or do you intend to calculate what the cost benefits would be under your proposal?

MR. BERUBE: We have not. In fact the cost benefit analysis you saw today, we saw for the first time

the last few days -- based on the EPA rule. We think that it's very important for the industry to -- all to look at cost benefit related to what we're proposing and we're going to make an attempt to do that as part of our AAR contract analysis, although timing is getting tight. But we're going to try to make an attempt to do that. That's on our wish list of plans.

And part of -- I think, what that says is, as you heard today, we're just gathering new data. We made a formal proposal back in October. Based on the new data we're willing to look at what we proposed, and if necessary make revisions to that. You heard some preliminary comments on that during yesterday's presentation. But we need to get more of the data in and analyzed before we can finally say, based on the methodology we outlined, and based on the data, what the appropriate standards are. And then from there we'll do a cost benefit.

MR. MAXWELL: Okay, one other question: After hearing the testimony from the SEMA representative, and he emphasized his concerns over the safety issues of the high performance vehicles, just on that narrow issue -- I'm not asking about the cost benefit -- there's a whole other set. But just on the safety side, do you share that safety concern?

MR. BERUBE: Vehicle safety is a prime importance issue to vehicle manufacturers, and I think it's an issue that we have not looked at to any extent among manufacturers -- at least within Chrysler -- I don't think, as the industry, we've talked about it.

Given those comments today we're going to certainly, I think, have some discussion, but I don't think we have any comments to offer on it today.

MR. MAXWELL: Okay, I'll make one closing comment on the comment period, if there's no more questions. Let's make sure?

(No response)

MR. MAXWELL: Okay, on the comments, we understand the sensitivity of the question. We obviously need to -- since we're under a court deadline we've got to do some assessment of what we can do. And we also realize it's a kind of a chicken or egg thing here, and you guys need to know right away. So we'll try to get back some feedback as fast as we can. We're not totally under control of that ourselves. I'm not sure how fast we can do that. Obviously for the time being the comment period's in 30 days. I realize that you need to know pretty quickly. So we'll do the best we can.

I think we're relatively certain that even if

we're unable to flex further on the schedule, we would still be accepting or having a mechanism to accept data late. And we realize that doesn't serve your need. So we'll see what we can do.

Thanks everyone for coming and sticking it out to the bitter end. I appreciate all the comments and we'll take them under consideration.

(Concluded at 3:10 o'clock p.m.)

STATE OF MICHIGAN)

COUNTY OF WAYNE)

I, Philip Liburdi, court reporter, do hereby certify that this transcript, consisting of 206 pages, is a complete, true and correct record of the Public Hearing of the Environmental Protection Agency, in the Matter of: Proposed Regulations for Revisions to the EPA Air Docket Federal Test Procedure for Emissions From Motor Vehicles, EPA Docket No. A-92-64; held at Washtenaw Community College, Ann Arbor, Michigan; on Thursday, April 20, 1995.

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