

1 MEETING

2 CALIFORNIA AIR RESOURCES BOARD

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9 CALIFORNIA AIR RESOURCES BOARD

10 BOARD HEARING ROOM

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12 SACRAMENTO, CALIFORNIA

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17 THURSDAY, JANUARY 14, 1993

18 9:40 A.M.

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25 Nadine J. Parks
Shorthand Reporter

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1 AFTERNOON SESSION

2 --oOo--

3 CHAIRWOMAN SHARPLESS: Okay. I'll call the
4 Board back to order and ask the audience to please take
5 their seats.

6 Again, I'd like to remind those of you in the
7 audience who perhaps might not have been here this morning
8 to, first of all, if you plan on testifying before the
9 Board today, to please sign up with the Board Secretary,
10 so we'll know who you are and how many there are; and,
11 secondly, that we have a Board policy that testimony be
12 confined to ten minutes. In the event that more time might
13 be required, the Board will grant that based on their
14 consideration of the time.

15 The item we have before us this afternoon is
16 consideration of amendments to the certification,
17 requirements and procedures for the low-emission passenger
18 cars, light-duty trucks, and medium-duty vehicles.

19 This item is an update of the low-emission
20 vehicle and clean-fuel program, which was adopted by this
21 Board in 1990. The item was originally scheduled for
22 November, but was continued to today to provide industry
23 with more time to review the data used in establishing
24 the reactivity adjustment factors. The low-emission
25 vehicle and clean fuel program established very stringent

1 standards which will substantially reduce the emission
2 contribution of new vehicles sold in California. By the
3 year 2003, the average new car will be 75 percent cleaner
4 for hydrocarbons, 50 percent cleaner for carbon monoxide and
5 nitrogen oxides compared to cars sold in 1993.

6 Now, while the emission reductions attributable
7 to the program will go a long way toward achieving healthful
8 air quality in California, the Board did recognize
9 that compliance with the new requirements will pose a
10 significant challenge to the auto and fuel industries.

11 Accordingly, staff was directed to periodically
12 review and report back to the Board on the status of the
13 implementation of the regulations and to propose any
14 appropriate regulatory modifications.

15 In June of last year, staff presented a progress
16 update on the technological feasibility of the various
17 amendments that will further improve implementation of the
18 regulations and proposed reactivity adjustment factors
19 for Phase 2 gasoline. So, Mr. Boyd, why don't you and our
20 staff begin the presentation.

21 MR. BOYD: Thank you, Madam Chair, members of the
22 Board. Well, certainly, the adoption of the low-emission
23 vehicle and clean fuels program was indeed a significant
24 event in the history of motor vehicle regulation in this
25 State, if not in the U.S. As Chairwoman Sharpless indicated,

1 in June of last year, we gave an update on the subject of
2 technical feasibility; in effect, reaffirming our original
3 findings and projections.

4 Building on that, I'm pleased -- no, frankly,
5 I guess I'd say I'm delighted with the action taken by
6 the EPA Administrator earlier this month to approve of the
7 ARB program, in effect, by approving the so-called
8 waiver -- low-emission vehicle program waiver request,
9 thereby clearing the last regulatory hurdle to
10 implementation of our program.

11 So, as I see it, our program's been reaffirmed
12 and is definitely on track.

13 Since the inception of the LEV/clean fuels
14 program over two years ago, tremendous progress has been
15 made towards developing the technology needed to reduce
16 motor vehicle emissions as provided under this program.
17 As the technology has developed and the program has evolved,
18 however, it's become apparent to all of us involved that
19 further modifications are occasionally necessary to fine-
20 tune these revolutionary regulations. Today, we will
21 present and provide reactivity adjustment factors for
22 TLEVs and LEVs operating on so-called Phase 2 gasoline.
23 We will have some clarification -- some work on the
24 certification test procedures for hybrid electric
25 vehicles and other clarifying amendments to your original
regulations.

1 We have continued to work with the affected
2 industry, as the Chairwoman indicated, in that we twice
3 postponed this hearing. We continue to work with the
4 industry and other interested parties on concerns and
5 issues raised about our proposals, and, frankly, right up
6 to this meeting. Primarily, if not principally, that
7 means the oil and auto industries.

8 In light of concerns raised and, as a result of
9 these continuous and fairly open efforts to work together
10 with all of the parties, we have a modified proposal
11 to present to you today that we believe mitigates the
12 major concerns of these parties. That's our feelings.
13 While many of these people continue to have technical
14 concerns, we believe we have done all that could reasonably
15 and equitably be done to meet the concerns, and we believe
16 we have a scientifically sound and extremely defensible
17 proposal to put forth before you today.

18 With that, I would like to turn the presentation
19 of this item over to the staff. Ms. Annette Guerrero
20 of the Mobile Source Division will give you the detailed
21 presentation. Ms. Guerrero?

22 MS. GUERRERO: Thank you, Mr. Boyd. Good
23 afternoon, Chairwoman Sharpless and members of the Board.

24 Today, we are going to present proposed
25 modifications to the California low-emission vehicle and

1 clean fuel regulations.

2 When the low-emission vehicle regulations were
3 adopted in 1990, staff was directed to present to the
4 Board reactivity adjustment factors when they became
5 available and to conduct biennial reviews of progress
6 being made in implementing the regulations.

7 On November 14th, 1991, staff presented
8 an exhaust reactivity value for TLEVs operating on
9 conventional gasoline and a reactivity adjustment factor
10 for TLEVs operating on methanol, which were both adopted
11 by the Board.

12 On June 11, 1992, the staff presented an
13 update on progress by industry on complying with the
14 low-emission vehicle requirements. The Board found that
15 the standards continue to be technologically feasible
16 within the timeframe specified in the original regulations.

17 The purpose of today's hearing is to propose
18 technical amendments to the regulations that would
19 facilitate implementation of the low-emission vehicle
20 program and to propose reactivity adjustment factors for
21 vehicles operating on Phase 2 gasoline.

22 The cornerstone of the low-emission vehicle
23 program is the creation of four new categories of vehicles
24 transitional low-emission, TLEV; low-emission, LEV;
25 ultra low-emission, ULEV; and zero-emission, ZEV, vehicles.

1 These emission standards are progressively
2 more stringent, culminating in the zero-emission vehicle
3 category. These standards will be phased in starting in
4 1994.

5 In order to allow manufacturers flexibility
6 in phasing these vehicles, the program incorporates a
7 fleet averaging approach. Manufacturers can determine the
8 percentages of vehicles certified to any combination of
9 low-emission vehicle categories as long as the fleet
10 average requirement established for that year is met.

11 The percentages shown here are but one option
12 that can be used by manufacturers to introduce increasing
13 quantities of low-emission vehicles. The only mandated
14 category is zero-emission vehicles, which must be
15 introduced by large volume manufacturers beginning in 1998.

16 At that time, two percent of the manufacturer's
17 fleet must be zero-emission vehicles. That number
18 increases to five percent in 2001 and 10 percent in 2003.

19 In today's presentation, I will divide the
20 discussion into three parts. First, I will be discussing
21 proposed technical amendments, then the establishment of
22 new reactivity adjustment factors for Phase 2 gasoline;
23 and, finally, issues of controversy.

24 A complete list of the proposed technical
25 amendments can be found in Appendix A of the initial staff

1 report. These changes cover a broad spectrum of topics
2 as evidenced by these examples.

3 Many of the proposed amendments are nonsubstantive
4 and reflect consensus between staff and industry. These
5 amendments will not be described further in this
6 presentation. However, staff can address the specific
7 issues which may be raised in the course of this hearing
8 and are of interest to the Board.

9 The most prominent technical amendments noted
10 here pertain to two basic categories -- hybrid electric
11 vehicles and low-temperature test requirements for low-
12 emission vehicles.

13 The hybrid electric vehicle requirements have
14 been updated to better reflect our understanding of this
15 emerging technology and the cold temperature requirements
16 are being proposed to bring us in alignment with the
17 Federal regulations as well as to reflect additional data
18 received from industry.

19 Since each of these was discussed extensively
20 in three separate workshops with industry in arriving at
21 the final proposal, staff does not expect considerable
22 comment on that in today's hearing.

23 The next portion of the presentation concerns
24 reactivity adjustment factors, RAFs. Prior to the adoption
25 of California's low-emission vehicle program, vehicle

1 exhaust was regulated by gas-based emission standards.
2 The problem with this system is that alternative fueled
3 vehicles could not be appropriately credited for their
4 ability to potentially reduce ozone formation compared
5 to conventional gasoline cars.

6 In addition, the traditional standards do not
7 properly credit advanced vehicle technology which could
8 also reduce the reactivity or grams of ozone formed for
9 each gram of NMOG in the exhaust.

10 For this reason, the low-emission vehicle/
11 clean fuels program includes standards which account for
12 the RAFs and the potency of the exhaust of a vehicle fuel
13 system. This was done in 1990 by setting an NMOG standards
14 and reactivity adjustment factors.

15 To calculate the reactivity adjustment factor
16 for low-emission vehicles operating on a clean fuel, the
17 reactivity of the exhaust from the low-emission vehicles
18 operating on a clean fuel is divided by the reactivity of
19 the exhaust of low-emission vehicles operating on
20 conventional gasoline.

21 Note that the numerator and denominator are
22 based on vehicles which meet the same emission standards.
23 ARB staff developed generic RAFs which allow -- which
24 manufacturers can use in certifying their vehicles or
25 manufacturers may develop their own engine families specific

1 RAFs if they are able to develop vehicle emission control
2 technology which achieves lower exhaust reactivity in the
3 technology present in vehicles used in setting the generic
4 RAF.

5 The lower half of the calculation of an
6 engine family specific RAF is still the reactivity of low-
7 emission vehicles operating on conventional gasoline
8 provided by the ARB.

9 The adopted protocol adjusts the mass emissions
10 of the vehicle fuel system by multiplying the tailpipe
11 nonmethane organic gas, or NMOG, by the reactivity
12 adjustment factor. This reactivity adjusted mass value
13 is then compared with the emission standard.

14 One feature of the reactivity adjustment process
15 is that it accounts for a reduction in the reactivity of the
16 exhaust due to the advanced vehicle technology.

17 Accordingly, in determining the reactivity values used
18 to calculate RAFs for the TLEV and the LEV emission
19 categories, only vehicles that were able to meet these
20 emission standards were selected for the ARB testing
21 program.

22 And the numerator of the RAF calculation, the
23 reactivity of the exhaust from the low-emission vehicles
24 operating on a clean fuel is calculated by analyzing
25 emissions from vehicles representative of production, and

1 the denominator of the RAF equation, the reactivity of
2 exhaust from low-emission vehicles operating on conventional
3 gasoline is established.

4 This latter term is the benchmark for
5 calculating RAFs in each emission category. Vehicles
6 used to establish this term incorporate technology
7 capable of meeting the emission standards when operating
8 on conventional gasoline.

9 DR. BOSTON: Can I ask a question right here,
10 Madam Chair?

11 CHAIRWOMAN SHARPLESS: Yes, Dr. Boston.

12 Staff, Dr. Boston has a question.

13 DR. BOSTON: I'd like to ask a question right
14 here. On your definition that you had on the Board for
15 reactivity adjustment factor, the one that's on the chart
16 there, you're using reactivity of the low-emission vehicle
17 as a numerator and the reactivity as the -- clean fuel
18 versus the denominator of conventional gasoline. Is that
19 the same as saying the emissions on the clean fuel as
20 the numerator and the emissions of the conventional
21 gasoline as the denominator as listed in the Board book
22 on page 168? It's easier to understand the definition
23 in the Board book. The Board book, it's listed as ozone
24 per gram of clean fuel versus per gram of conventional
25 gasoline.

1 MR. CACKETTE: Dr. Boston, the word that we're
2 using for reactivity is the same as ozone per gram. The
3 grams of ozone per gram of NMOG emissions. And it's not the
4 same as emissions, because emissions themselves are in
5 grams per mile.

6 So, this equation says that when it comes out to
7 be one, it says that the reactivity of a pound or a gram
8 of exhaust from a clean fueled vehicle produces the same
9 ozone as a gram per pound of a conventional fueled
10 vehicle.

11 However, those two vehicles may have radically
12 different masses of emissions.

13 DR. BOSTON: That implies that you already know
14 what the reactivity is when you're saying the reactivity
15 is the numerator versus the reactivity of the denominator
16 there. Here, where it's ozone per gram, it seems more
17 logical.

18 MR. CACKETTE: Well it's the same thing. It's
19 just a matter of terminology. Ozone per gram, in this
20 case, is called the reactivity.

21 DR. BOSTON: Okay.

22 DR. WORTMAN: This requires a photochemical
23 calculation, though.

24 MR. CACKETTE: No. To determine this, it
25 requires you to speciate the exhaust into roughly 100

1 different hydrocarbons and oxygenates.

2 DR. WORTMAN: Well, then you must calculate what
3 the ozone --

4 (Thereupon, a conversation by a Board
5 member eradicated Dr. Wortman's
6 complete question.)

7 MR. CACKETTE: Yes, and that's done by the
8 so-called maximum incremental reactivity method developed
9 by Dr. Carter, which is, in this case, a way of
10 simplifying photochemistry into a tabular form, a
11 spreadsheet form where every hydrocarbon has its own
12 potency or amount of ozone that's formed per one mass unit
13 of hydrocarbon, and you add them all up together according
14 to how much of those individual constituents are present
15 in the exhaust and it gives you a measure of the
16 reactivity which is expressed in terms of the amount of
17 ozone that would be formed by one mass unit or one gram
18 of exhaust from that vehicle.

19 But to complete the equation, you're going to
20 have to determine how many grams are produced by a specific
21 car. That's where the mass comes in.

22 DR. WORTMAN: Sure. But, ultimately, the ozone
23 causing potential is a calculation.

24 MR. CACKETTE: Yeah. It's a calculation. But
25 in using that, it's an arithmetic calculation, because of

1 the MIR method. And that's a simplified form of the
2 photochemical modeling.

3 DR. WORTMAN: Precisely. But it is a form of
4 photochemical modeling, which requires a calculation. It's
5 not something that you receive on stone tablets.

6 MR. CACKETTE: No, there's a number of
7 techniques that are used to come up with the MIR. The
8 proof of the pudding is whether, when you use this
9 simple arithmetic method, and then compare it to an airshed
10 modeling approach, do they agree? And that's the so-called
11 correction factor, which we'll talk about later, the biased
12 correction factor.

13 DR. WORTMAN: When we discussed this last
14 time, there was -- (Complete comment not heard)

15 MR. CACKETTE: I'm not sure about the computer
16 code, but there have been some improvements made to the
17 methodology, yes.

18 DR. WORTMAN: We found an error in Carter's
19 calculation, which had to be corrected.

20 MR. CROES: Dr. Carter had forgotten to include
21 biogenic emissions, and that had a very minor effect
22 on the scale, an order of less than one percent. So, the
23 final scale, that was about -- that did include the
24 biogenic emission.

25 CHAIRWOMAN SHARPLESS: Mr. Lagarias had a

1 question.

2 MR. LAGARIAS: Tom, is there general agreement
3 in the scientific community on the MIR values that you are
4 using?

5 MR. CACKETTE: I would say there's not
6 universal agreement on the MIR values, no.

7 MR. LAGARIAS: Is it on just some of them, or
8 all of them?

9 MR. CACKETTE: Well, there's better
10 information on certain of the constituencies of those
11 hundred compounds than there is on others. And fortunately,
12 we have -- the better information tends to be on those
13 that are there in the largest -- contribution of the
14 largest amount of mass. But there's still ongoing work --
15 We've committed to continue to do work to improve this scale.
16 But I think what we've found in doing sensitivity analysis
17 is the scale is relatively robust and fairly significant
18 changes don't change this calculated RAF by very much at
19 all.

20 MR. LAGARIAS: Thank you.

21 MR. CROES: Mr. Lagarias, also, the approach has
22 been endorsed by the National Academy of Sciences.

23 MR. LAGARIAS: Well, I think the sensitivity
24 analysis is what I was really concerned about.

25 CHAIRWOMAN SHARPLESS: Okay, staff, would you

1 like to continue? The screen's straightened up now?

2 MS. GUERRERO: I would like you to look at the
3 monitor for this next slide, please.

4 CHAIRWOMAN SHARPLESS: Okay.

5 MS. GUEERERO: In determining the denominator
6 value of the RAF equation for LEVs, the ARB staff
7 installed electrically heated catalysts on six vehicles
8 operating on conventional gasoline and performed emission
9 testing and exhaust gas speciation analysis to determine
10 the reactivity of LEVs operating on Phase 2 reformulated
11 gasoline.

12 The numerator of the RAF equation, vehicles
13 with and without electrically heated catalysts were used.
14 A combination of electrically heated and nonelectrically
15 heated catalyst technology was chosen because it is
16 expected that manufacturers will utilize both options
17 when certifying their vehicles to the LEV standards.

18 No modifications were made to the TLEVs used
19 to determine the TLEV reactivity for vehicles operating
20 on Phase 2 gasoline, since some of the most advanced
21 vehicles currently available were already capable of meeting
22 TLEV standards.

23 In November, 1991, the Board adopted a reactivity
24 of 3.42 for TLEVs operating on conventional gasoline and
25 an RAF of 0.41 for TLEVs operating on methanol. The

1 following values are being proposed today. An LEV and
2 ULEV reactivity for vehicles operating on conventional
3 gasoline of 3.13; a TLEV RAF of .98; and an LEV RAF of
4 .95 for vehicles operating on Phase 2 gasoline.

5 The reactivity for ULEVs operating on
6 conventional gasoline was carried over from the LEV
7 category, since the same emission control hardware --
8 namely, electrically heated catalyst systems -- was used
9 to demonstrate the feasibility of both the LEV and the
10 ULEV emission standards in 1990.

11 Testing needed to complete the first two columns
12 of the table on this slide is now underway and will likely
13 be completed by the year 1993.

14 The remainder of the table will be filled in as
15 soon as possible. The reason we have not been able to
16 fill out the table before this point is that suitable
17 vehicles have not been available to test. Once the
18 reactivity of vehicles in each emission category when
19 operating on conventional gasoline are established, the
20 manufacturer can establish engine family specific RAFs
21 for any low-emission vehicle.

22 The following three slides summarize the
23 data generated for determination of the RAF. The vehicles
24 and exhaust reactivity of TLEVs operating on Phase 2
25 gasoline are shown here. The mean of these vehicles, 3.36,

1 is the numerator or upper half of the RAF calculation.

2 As you can see, the TLEV RAF for vehicles
3 operating on Phase 2 gasoline is therefore 3.36 divided
4 by 3.42, the value established by the Board a year ago,
5 which yields a RAF of .98

6 This shows the vehicles and exhaust reactivities
7 for calculating the LEV/ULEV reactivity for operation on
8 conventional gasoline, which is the lower half of the
9 RAF equation.

10 The mean of these numbers, 3.13, is the proposed
11 denominator of the RAF calculation for LEVs and ULEVs.
12 It is important to note that in setting this value, staff
13 selected advanced technology current production test
14 vehicles which, when equipped with electrically heated
15 catalysts, would meet the LEV standards when operating on
16 conventional gasoline.

17 With these test vehicles, the staff demonstrated
18 that a reactivity value of 3.13 was readily achievable.
19 It was not the staff's intent to characterize the
20 reactivity of the entire current fleet of vehicles, since
21 many of them would not be capable of meeting LEV standards
22 using conventional gasoline even if they were equipped with
23 electrically heated catalysts.

24 Further, if industry were to provide specific
25 test vehicles which would meet LEV standards when equipped

1 with electrically heated catalysts and operating on
2 conventional gasoline, but which also displayed higher
3 reactivity than the vehicle selected by ARB, staff would
4 not necessarily include them in setting this value, since
5 clearly, better technology in terms of reactivity is already
6 in production and available to industry today.

7 Staff is satisfied with the six test vehicles
8 used in setting this value are sufficient to demonstrate
9 the capability of achieving reactivity value of 3.13.

10 The vehicles and exhaust reactivity used to
11 determine the exhaust reactivity for LEVs operating on
12 Phase 2 gasoline are listed here. The mean of these
13 numbers, 2.97, is the numerator of the RAF calculation.
14 Therefore, the LEV RAF for vehicles operating on Phase 2
15 gasoline is 2.97 divided by 3.13, the reactivity of LEVs
16 operating on conventional gasoline, which yields a RAF
17 of .95.

18 In order to verify that a proposed RAF
19 accurately assesses the ozone impact of an alternative
20 fuel, i.e. it accurately predicts the ozone forming
21 potential of clean fuel, the emission results are subjected
22 to airshed modeling to simulate the air quality impacts of
23 emission inventories under varying meteorological
24 conditions.

25 The results of this analysis demonstrated that

1 the RAF determination and modeling exercise agreed within
2 five percent. Because of the close agreement, and
3 after discussion of interested parties, the staff is
4 proposing that no adjustment is needed for the Phase 2
5 gasoline RAFs.

6 A RAF of approximately 1 means that the amount
7 of ozone created by a gram of exhaust from a vehicle
8 operating on Phase 2 gasoline is roughly equal to the amount
9 of ozone created by a gram of exhaust from a vehicle
10 operating on conventional gasoline.

11 What these RAFs do not reflect is the very
12 significant mass emission reductions that result from the
13 use of Phase 2 gasoline. Comparative testing of the nine
14 cars on this slide shows that Phase 2 gasoline resulted
15 in reduction in ozone per mile of approximately 25 percent
16 compared to conventional gasoline.

17 In addition, there are significant NOx reductions
18 from using Phase 2 gasoline. Thus, even though the Phase 2
19 gasoline RAFs approached unity, the reduced NMOG with
20 NOx mass emissions result in a substantial reduction in
21 ozone formed per vehicle mile traveled.

22 In order to assess the real environmental
23 impact of Phase 2 gasoline, it is important to examine more
24 than just the RAF. As noted earlier,, the amount of ozone
25 formed by a vehicle operating on a clean fuel depends both

1 on the reactivity of the exhaust and the mass of emissions
2 generated.

3 For example, the exhaust reactivity of a TLEV
4 operating on Phase 2 gasoline is 3.36 grams ozone per
5 gram NMOG. While for TLEVs operating on methanol, the
6 reactivity is 1.3, which is markedly lower. As determined
7 from the vehicle fleets used to generate proposed RAFs,
8 similarly, the TLEVs operated on Phase 2 gasoline, the
9 average NMOG mass emissions were .1 gram per mile. For
10 the TLEVs operating on methanol, the average NMOG mass
11 was .241 grams per mile, which is markedly higher.
12 By multiplying the reactivity by the mass of of NMOG, the
13 ozone formed per mile of vehicle operation is determined.
14 In this example, you see that although the relative
15 reactivities and mass of Phase 2 gasoline and methanol
16 TLEVs are markedly different, the ozone per mile generated
17 by the methanol vehicles is only slightly lower.

18 Now, I will discuss three issues of controversy.
19 Comments have received suggesting that vehicle exhaust
20 reactivity and the subsequent RAFs have been determined
21 using too view vehicles to properly represent the vehicle
22 fleet. However, staff has used every reasonable means
23 to acquire test vehicles for develppng the data. ARB
24 staff sorted through 55 of the most advanced vehicles
25 available to finally utilize in the test program. Six

1 additional TLEV category vehicle tests were provided by
2 General Motors and one LEV category vehicle test was
3 provided by Ford. In all the ARB test vehicles represented
4 domestic, European, and Japanese models. In most cases,
5 as many or more vehicles were used to develop RAFs for
6 TLEVs and LEVs operating on a Phase 2 gasoline as were used
7 to develop the RAF for TLEVs operating on methanol
8 adopted by the Board in November, 1991.

9 In the case of determining the reactivity for
10 LEVs and ULEVs operating on conventional gasoline, which is
11 the bottom half of the equation, six advanced vehicles were
12 equipped by ARB staff with electrically heated catalyst
13 systems. These were the only vehicles available which
14 could meet the LEV standards when operating on conventional
15 gasoline. Emission variability was low, and staff considere
16 the data fully adequate to implement the program.

17 Some members of the industry maintain that the
18 exhaust reactivity in the LEV emission category vehicles
19 operating on conventional gasoline should be set at the same
20 value as for TLEVs or even more preferable, in their view,
21 at a level which is reflective of today's current production
22 cars. They mtaintain this would allow them to receive
23 credit for improvements to current emission control systems
24 which reduce exhaust reactivity in much the same way as
25 fuels which yield cleaner exhaust than baseline gasoline

1 receive credit in the RAF calculation.

2 While this may sound persuasive, such an
3 action would permit industry to use less than the best
4 available technology, in effect, relaxing the NMOG
5 standards.

6 In 1990, the staff demonstrated the technological
7 feasibility of electrically heated catalyst systems which
8 serve as the basis of setting the LEV/ULEV reactivities.

9 On the fuel side, however, the Phase 2 gasoline
10 had not even been identified in 1990. Thus, the
11 technology and fuels issue is not comparable. Nonetheless,
12 industry would receive credit for technologies better at
13 reducing exhaust reactivity in the staff's vehicles. In
14 fact, one manufacturer has already showed data to staff
15 of vehicles able to achieve much lower reactivity than the
16 ARB vehicles by altering vehicle calibrations and
17 hardware and for which they will receive a greater
18 reactivity adjustment.

19 The staff estimated that the effect of industry's
20 request would be to increase NMOG emissions between
21 29 and 87 tons per day in California.

22 At the hearing in November of 1991, the Board
23 adopted the TLEV RAF for methanol, which incorporated a
24 modeling adjustment. As discussed earlier in this
25 presentation, a modeling analysis was performed for the

1 Phase 2 gasoline RAF which showed that no adjustment is
2 needed.

3 In summary, the staff recommends that the Board
4 adopt the technical amendments proposed to assist in
5 properly implementing the low-emission vehicle program.

6 Further, it is recommended that the exhaust
7 reactivity of LEVs and ULEVs operating on conventional
8 gasoline be adopted, since these values are needed for
9 manufacturers to develop engine family specific RAFs for
10 any fuel and for staff to develop generic RAFs.

11 Not adopting these values could delay
12 implementation of the low-emission vehicle program.
13 Similarly, staff recommends that the RAFs for TLEV and
14 ULEV vehicles operating on Phase 2 gasoline also be
15 adopted.

16 Staff is recommending several changes to its
17 published proposal which has resulted from working with
18 industry to mitigate concerns which industry will outline
19 in its testimony.

20 Staff recommends the Board adopt the conventional
21 gasoline exhaust reactivity of 3.13 for LEVs and ULEVs,
22 and the Phase 2 gasoline RAFs of .98 for TLEVs and .95 for
23 LEVs for vehicles produced in the 1997 model year.

24 For 1998 and later models, staff would work with
25 the affected industry to see if better data or methods can

1 be developed. The staff will return to the Board in the
2 spring of 1994, with recommended RAFs for Phase 2
3 gasoline for 1998 and later model years.

4 A summary of these proposed changes and other
5 proposed changes to the technical comments is available
6 on the back table.

7 These changes, if approved, will be made
8 available to interested parties for a 15-day comment
9 period.

10 This completes my presentation and the staff
11 will be glad to answer any questions the Board may have.
12 Now, Bob Cross will read additional comments into the
13 record.

14 CHAIRWOMAN SHARPLESS: Let me ask, Bob, before
15 you read your comments, are there any questions by members
16 of the Board so far on what has been presented?

17 Okay. Boc, why don't you go ahead.

18 MR. CROSS: Okay. I'll try and make this brief.
19 We have a letter from Volvo asking that series hybrids be
20 treated as zero-emission vehicles.

21 CHAIRWOMAN SHARPLESS: Excuse me. Series
22 hybrid?

23 MR. CROSS: Basically, they're suggesting that
24 hybrids be treated as ZEVs, and that's a position that the
25 staff is opposed, because hybrids (unintelligible) emissions

1 deterioration.

2 CHAIRWOMAN SHARPLESS: Okay.

3 MR. CROSS: The American Automobile
4 Manufacturers Association has a fairly extensive set of
5 comments. The first part of it refers to the measurement
6 and testing procedures. And there's been a lot of
7 dialogue between the ARB staff and manufacturers for doing
8 these complicated tests on ways to improve the accuracy of
9 the procedures.

10 And the initial set of comments from the
11 auto manufacturers came in and was responded to by a
12 letter. And there's still some open issues. And the
13 industry has requested that there be a workshop to see
14 whether or not the still open testing issues can be
15 addressed. The staff has agreed to that, and that should
16 happen in the spring, probably April of this year.

17 There's a comment about assembly line testing,
18 which I believe has been resolved with the comments on the
19 back table.

20 There are a number of concerns expressed on
21 the reactivity adjustment factors. First, they raised the
22 concern about not crediting vehicle technology reactivity
23 properly. In other words, they suggest that the process
24 that the staff has embarked on only is crediting the fuel
25 and not the vehicle, which I think is an issue you'll hear

1 a lot about in their testimony.

2 They make a recommendation that the staff
3 establish -- the ARB establish baseline for RAF, reactivity
4 adjustment factors, of today's vehicles. And that's in
5 contrast of what will be put before you in the staff
6 proposal, which is baselining the technology which is
7 required to meet the standards on conventional gasoline.
8 Doing what they propose would reduce the stringency of
9 the standards.

10 They comment on the database that the staff
11 used. They think it's too small. The data don't
12 properly cluster around the values that are proposed, and
13 use of low mileage prototype vehicles. They recommend
14 an industry/ARB cooperative study to go out and set those
15 baseline values based on conventional technology.

16 They're opposed to the staff proposal for
17 cold CO standards saying basically they're insufficient
18 justification in the staff report. And then they comment
19 on --

20 CHAIRWOMAN SHARPLESS: Bob, are those the same
21 standards that we're trying to conform with the Federal?

22 MR. CROSS: Yeah. They're identical to the
23 Federal stands. There's one difference, which is that
24 we're extending the applicability of the standards to
25 nongasoline vehicles, but they're the same standards.

1 They also have a comment on feasibility and leadtime,
2 which I think you'll hear more about today. And I think
3 they've commented previously on this at the last hearing
4 on the low-emission vehicle program.

5 And there's a comment on the impact on vehicle
6 systems. They're concerned about the interaction between
7 exhaust standards and evaporative standards, for example.
8 And I think those -- that's been previously considered as
9 well.

10 And then their last comment is they think
11 there's a need for an incremental cost-effectiveness
12 analysis on the low-emission vehicle program; in other
13 words, looking at the cost-effectiveness of each of the
14 standards compared with the others.

15 The last comment that we have is from Nissan
16 Research and Development. And their comments all relate
17 to the measurement procedure, and we believe that the
18 workshop proposed for April should address that -- those
19 comments.

20 As far as we can tell, all the other comments
21 that we have, there are witnesses signed up to address.

22 CHAIRWOMAN SHARPLESS: Okay. Fine. That,
23 again, was the American Automobile Manufacturers
24 Association?

25 MR. CROSS: Correct.

1 CHAIRWOMAN SHARPLESS: Formerly the MVMA?

2 MR. CROSS: Yes.

3 CHAIRWOMAN SHARPLESS: Okay. Are there any
4 questions so far along any of those lines? Okay.

5 Then we do have a witness list; some 12 people
6 have signed up. We'll start at the top and ask
7 Mr. Dale Kardos from the Association of International
8 Automobile Manufacturers to come up.

9 MR. KARDOS: Good afternoon. Dale Kardos of
10 the Association of International Automobile Manufacturers,
11 a nonprofit trade association that represents U.S. importers
12 and distributors of passengers and light trucks made both
13 here and abroad.

14 We welcome the opportunity to comment on the
15 proposed modifications to the low-emission vehicle -- to the
16 low-emission vehicle/clean fuel program being considered
17 today.

18 I'd like to first offer our support for the
19 changes suggested by the staff regarding zero-emission
20 vehicles, ZEVs. These included one change in the ZEV
21 regulation for a sales mandate to a requirement to produce
22 and deliver vehicles for sale and, two, allowing ZEVs with
23 fuel-fired heaters to qualify as ZEVs. Both these
24 provisions will help reduce the burdens of the program.

25 We must still, however, express to you our

1 members concerns regarding the salability of ZEVs absent
2 a tremendous breakthrough in battery technology.

3 Therefore, AIAM strongly urges the ARB to allow
4 series hybrid electric vehicles to qualify as ZEVs for
5 a limited period of time.

6 On a separate matter, I'd also like to express
7 our support for the staff's willingness to eliminate the
8 0.25 gram per mile nonmethane hydrocarbon phase-in
9 requirement for 1994.

10 An issue raised previously with staff in a
11 public workshop and later in a private meeting is the
12 modification of the rules regarding the movement of a
13 manufacturer from small to intermediate volume manufacturer
14 status based on sales fluctuation.

15 The staff's proposal suggests that if a
16 manufacturer exceeds the small volume sales limit, that
17 four years leadtime be given to meet the new requirements.
18 If a manufacturer falls below the limit, the change to
19 less stringent requirements would be immediate.

20 While this seems to be a fair proposition,
21 there is one potential case where it is not. If a small
22 volume manufacturer exceeds the 3,000 vehicle sales limit
23 in the year 1999, that manufacturer would have four years
24 leadtime to go from not having to plan for or produce
25 ZEVs to producing 10 percent of its fleet as ZEVs. This

1 simply is not enough time for a manufacturer with limited
2 resources to develop an entirely new power train technology.

3 We suggest that in the case of a manufacturer
4 that would be forced from non-ZEV production to ZEV
5 production, at least eight years leadtime be given before
6 ZEV production is required.

7 With regard to the materials that staff
8 has placed in the back earlier today, the staff's
9 proposal for modifications contained in the package,
10 I believe it's a step in the right direction.

11 With respect to reducing the burden on the
12 assembly line operation, with planned review, that proposal
13 will, in detail, during the 15-day comment period, would
14 provide some additional comments on that (sic).

15 We've also followed with interest the
16 petition filed by the Western States Petroleum Association
17 and the subsequent lawsuit regarding reactivity adjustment
18 factors, RAFs.

19 While we are not in a position to provide
20 detailed technical analysis on the RAF supporting data,
21 we are concerned that the absence of RAFs will reduce the
22 options a manufacturer has to comply with the LEV
23 requirements.

24 We still do not believe that the ultimate
25 feasibility of either the LEV or the ULEV standards has been

1 proven. Given this fact, the RAFs provide an option to
2 move toward a different fuel that may permit a manufacturer
3 to achieve the required levels with sufficient compliance
4 margin.

5 Elimination of the RAFs would take away that
6 option.

7 And that concludes my comments. I'd be happy
8 to try to answer any questions that you might have.

9 CHAIRWOMAN SHARPLESS: Your comment on the
10 small manufacturer and the provision that tries to deal
11 with people falling in and falling out of that category,
12 staff's proposal is to allow a three-year leadtime or
13 four-year leadtime if a small manufacturer changes over
14 by definition, because they begin selling above 3,000.

15 Staff, can you review that with me and again
16 maybe a little bit more succinctly talk about how that
17 provision works, and then tie in what this witness is saying
18 in terms of his suggestion. I think eight years is real
19 generous. But if you could just go back over that so I
20 clearly understand what we're doing?

21 MR. ALBU: Okay. What happens is that previous
22 years we have defined small volume manufacturer as one which
23 would not exceed 3,000 units.

24 CHAIRWOMAN SHARPLESS: Steve, you're going to
25 have to speak up, because I don't think the court reporter

1 can hear you.

2 MR. ALBU: Okay. I'll try again. The previous
3 definition of small volume manufacturer was that such a
4 manufacturer could not sell more than 3,000 units in any
5 given year. If they went over that limit, then they
6 become a large volume manufacturer. Because of this
7 concern that they have identified, what we have to propose
8 now is that the small volume manufacturer, in looking at a
9 running average over three years, then would have to average
10 more than 3,000 vehicles over that timeframe to be considered
11 large volume.

12 So, what we've done is we've extended the period
13 over which the determination is made. For example, in the
14 example cited, actually if you went over 3,000 units
15 in any given year, you'd have two more years to still be
16 above 2,000 before -- above 3,000 before you're considered
17 large volume.

18 So, as I see it, once you get above 3,000, you
19 might want to start considering whether or not you want
20 to build a ZEV.

21 Also, effectively, you could have six years of
22 leadtime once you go over 3,000 units. In addition, I'm
23 sure there'd be difficulties encountered getting a ZEV
24 into production within six years. But they also have
25 available to them the option to buy credits. Any

1 manufacturer that builds excess ZEVs above the two percent
2 requirement could thereby sell those additional vehicles
3 and gain credits to sell those additional vehicles.

4 So, we think there's a great deal of
5 flexibility, and we have come some distance in giving the
6 small volume manufacturer a break. So, that's the position
7 the staff is in.

8 CHAIRWOMAN SHARPLESS: So, we allow them a three-
9 year average for staying at the 3,000 car level.

10 MR. ALBU: Right.

11 CHAIRWOMAN SHARPLESS: And then, after the
12 third year, they have two years or three years to --

13 MR. CACKETTE: Four years.

14 CHAIRWOMAN SHARPLESS: Four years down the
15 line.

16 MR. ALBU: Six total.

17 CHAIRWOMAN SHARPLESS: Six total.

18 MR. KARDOS: It depends on how you look at it.
19 You know, four years, six years. Once the determination,
20 as the rule's been written, or as it's proposed that it
21 become, you're actually now a large volume manufacturer.
22 You have four years, as it's proposed. And I think there's
23 two points. One, the eight years comes from the idea
24 of trying to be consistent with what was proposed for the
25 large volume manufacturers originally in 1990.

1 CHAIRWOMAN SHARPLESS: Are you assuming that when
2 a small manufacturer comes to a large -- becomes a
3 large manufacturer in 1996 or '97, and finds themselves
4 in a position that they may have to produce ZEVs, that they
5 have to go back to zero where most car manufacturers
6 were? Don't you think that by that point there's some
7 shared technology out there that you might benefit from?

8 MR. KARDOS: I don't think it's going to be
9 like, you know, adopting technology to produce a ZEV.
10 It's not going to be as simple as, say, adopting technology,
11 say, to meet the LEVs standard, you know.

12 It may be one thing to adopt or license a
13 technology, say, for an electrically heated catalyst. But
14 with the ZEVs, it's not just a matter of getting a battery.
15 It's a whole vehicle, you know. Lamborghini just can't
16 go to Nissan and say, "We like your battery."

17 CHAIRWOMAN SHARPLESS: Yeah, but I don't
18 think Lamborghini's going to be selling 3,000 vehicles
19 here in California, do you?

20 MR. KARDOS: Well, there's other --

21 CHAIRWOMAN SHARPLESS: An aggressive marketing
22 program out there?

23 (Laughter.)

24 MR. KARDOS: Well, maybe Saab is a better example
25 You know, they're not going to be just able to go down to

1 the factory. It's going to be taken as an entire systems
2 approach, cloned chassis, control systems. So --

3 CHAIRWOMAN SHARPLESS: I appreciate that. But
4 I do think you have to be fair in point of time. And your
5 fear is judged on looking at it as though that the
6 car manufacturer would be in the same place that the
7 large car manufacturers were when we first adopted the
8 standard.

9 I think the staff has weighed those
10 considerations to come forth with a fairly equitable
11 suggestion here in dealing with that.

12 I'm only one person on the Board, but it seems
13 to me that, if we gave more time, we might be swinging
14 equity on the other side.

15 MR. KARDOS: Good point taken.

16 CHAIRWOMAN SHARPLESS: Yes. Okay. Any more
17 questions of this witness on any of the points he raised?
18 I appreciate it. Thank you very much.

19 MR. KARDOS: Thank you very much.

20 CHAIRWOMAN SHARPLESS: Me. Leonard, General
21 Motors.

22 MR. LEONARD: Good afternoon. My name is Sam
23 Leonard, Director of Automotive Emission Control. General
24 Motors' environmental energy staff -- and I'll try to keep
25 it under an hour today, Jan.

1 SUPERVISOR WIEDER: An hour, like the last time?

2 SUPERVISOR BILBRAY: Oh, no, the new policy.

3 CHAIRWOMAN SHARPLESS: For every minute you go
4 over ten minutes, Sam, it's a vote against you.

5 (Laughter.)

6 SUPERVISOR BILBRAY: And remember, the
7 effectiveness of a presentation is inverse to the time
8 it takes to present it.

9 MR. LEONARD: I understand.

10 SUPERVISOR WIEDER: Thank you, Brian.

11 MR. LEONARD: General Motors has worked closely
12 with the staff on a number of the regulatory changes being
13 proposed today, including the 50 degree Fahrenheit cold
14 temperature requirement and the assembly line audit canister
15 loading requirements, and supports the resolution on these
16 issues being proposed today.

17 Another major issue also being addressed today
18 is the reactivity adjustment factors, or RAFs. GM believes
19 the Air Resources Board took a very important step toward
20 improved emission control regulation in the low-emission
21 vehicle/clean fuel program by the introduction of RAFs to
22 control ozone emissions.

23 Although the science behind ozone formation is
24 still evolving, it is clear that different hydrocarbon
25 species present in exhaust vary widely in their tendencies

1 to form ozone.

2 Standards based on ozone forming tendency as
3 well as mass are clearly a step forward. General Motors
4 initiated and has strongly supported this effort in the
5 past.

6 With reactivity now a part of the standard, it is
7 essential that the industry know early in the vehicle
8 development process what the RAFs will be. The staff has
9 made considerable effort in the difficult and ground-
10 breaking task of developing RAFs. However, there remains
11 considerable disagreement between the staff and the industry
12 about the development of the RAFs and the baseline specific
13 reactivity values. That's the denominator of the equation
14 you see in front of you up here that are being proposed.

15 Perhaps the concerns of industry might be
16 resolved through further discussions with the staff and the
17 accumulation of additional data. However, the time
18 constraints for the development process preclude that
19 approach for the near-term model years. For that reason,
20 we have worked with your staff and concur with their
21 revised proposal to establish interim RAFs and
22 denominators for the 1997 and earlier model years on Phase 2
23 gasoline.

24 Our concurrence is contingent upon these
25 understandings: First, interim values for medium-duty

1 vehicles will be established promptly and will also apply
2 through the 1997 model year.

3 Second, that a rulemaking process will be
4 undertaken with industry participation to evaluate the
5 RAF process, including RAF denominators, for 1998 and later
6 model years. And, third, that values for 1998 and later
7 Phase 2 RAFs and RAF denominators for passenger cars and
8 light-duty trucks and medium-duty vehicles will be adopted
9 by March of 1994.

10 The staff originally had proposed interim RAF
11 denominator values of 1.03, 3.42 for TLEVs, and 0.99 RAF,
12 3.13 denominator for LEVs and ULEVs. In order to arrive
13 at these values, the staff had to adjust the originally
14 calculated RAFs based on modeling.

15 The staff adjusted the TLEV RAF of five
16 percent and the ULEV RAF from four percent. General Motors
17 did not believe that these specific adjustments are
18 appropriate either for generic RAFs or for manufacturer
19 generated engine family specific RAFs.

20 The intent of the grid model test of the RAF
21 methodology is to identify any substantial bias in the
22 methodology. If a substantial bias exists, then a model-based
23 corrections factor may be necessary to maintain the level
24 playing field concept inherent in the formulation of the
25 regulation. The results of the modeling -- results of

1 modeling the composite -- composite profiles of TLEVs
2 and LEVs operating on Phase 2 gasoline are summarized in
3 Table 6 and 7 of the December 15th, 1992 report by the
4 staff.

5 The results show no consistent bias one way or
6 the other over a range of meteorological conditions,
7 emission inventories, and ambient VOC/NOx ratios. The
8 results are consistently close to one for a wide range of
9 peak and exposure measures. Almost all the results are
10 plus or minus five percent of one. Thus, the grid models
11 show no substantial bias for the Phase 2 gasoline RAFs.
12 In other words, within the scenarios modeled, the observed
13 difference is insignificant. It's within the error band
14 or noise of the model.

15 Therefore, we urge the Board, because of this
16 error band or noise pattern, that, as a matter of policy,
17 use a modeling adjustment of one whenever the model factor
18 would be within plus or minus 10 percent of one.

19 For the Phase 2 generic and engine family
20 specific RAFs, as in the modified proposal by the Board,
21 or by the staff, the adjustment would be therefore be one (sic),
22 and, thus, the generic RAF for TLEVs would be at 0.98 and
23 a generic RAF for LEVs and ULEVs, 0.95. We at GM can
24 support interim RAFs at these levels.

25 Finally, as you know, we had hoped that the

1 Phase 2 gasoline would have lower reactivity. Specifically,
2 control of the multialkyl aromatics would have, we believe,
3 resulted in lower reactivity and, therefore, reduced
4 ozone.

5 However, during the Phase 2 gasoline rulemaking,
6 the Board chose not to control these components of Phase
7 2 gasoline on the basis of cost-effectiveness. For these
8 same reasons, and to be consistent with its actions in the
9 Phase 2 gasoline rulemaking as well as complying with the
10 California Clean Air Act, we believe the Board must examine
11 the low-emission vehicle program in the same manner --
12 that is, incrementally. It must look at the costs versus
13 the benefits of each step of the low-emission vehicle
14 program from conventional vehicles to TLEVs, from TLEVs
15 to LEVs, from LEVs to ULEVs, and from ULEVs to ZEVs.

16 The Board has never seen this type of cost-
17 effectiveness evaluation of the low-emission vehicle
18 program. General Motors requests that the Board direct
19 the staff to conduct this type of evaluation with industry
20 participation, and that it also be completed by March of
21 1994.

22 The results of the study on the incremental
23 cost-effectiveness of the low-emission vehicle program should
24 be used in the next review of both the Phase 2 gasoline
25 controls and the low-emission vehicle program. Thank you

1 for your time. I'll answer any questions.

2 Under an hour?

3 CHAIRWOMAN SHARPLESS: You did very well,
4 speeding right through there.

5 Yes, Supervisor Wieder.

6 SUPERVISOR WIEDER: I want to compliment you,
7 too, Mr. Leonard. I'd like to ask staff to respond to
8 his suggestion.

9 CHAIRWOMAN SHARPLESS: Which one? The
10 incremental cost?

11 SUPERVISOR WIEDER: No, the study.

12 CHAIRWOMAN SHARPLESS: Oh, the study. Okay.

13 MR. CACKETTE: You mean the incremental cost
14 study of the feasibility study? The last part --

15 CHAIRWOMAN SHARPLESS: No, I think she means
16 the whole --

17 SUPERVISOR WIEDER: Well, mostly the last part,
18 Madam Chairman.

19 CHAIRWOMAN SHARPLESS: Well, let me see if I
20 understand your question. Mr. Leonard is suggesting that
21 he can support the .98 and the .95 interim designations
22 for TLEVs and LEVs for Phase 2, if it is understood that
23 these interim standards would be incorporated in a study
24 that would, what, be complete by 1994?

25 MR. LEONARD: What we're looking for is to have

1 another look at the data, get more data in, look at the
2 methodology and the study by March of 1994, the RAFs,
3 and the denominator for 1998 and later model years.

4 Basically, I think what the staff is proposing
5 in their modification, I think it's consistent with the
6 staff recommendation.

7 CHAIRWOMAN SHARPLESS: Is that the study that
8 you're talking about?

9 SUPERVISOR WIEDER: No. That was the last
10 point, yes, but I --

11 MR. CACKETTE: There's two --

12 CHAIRWOMAN SHARPLESS: Because he also said
13 he was --

14 SUPERVISOR WIEDER: Well, the thing that I
15 really heard, I think, was the last.

16 CHAIRWOMAN SHARPLESS: The incremental cost.

17 SUPERVISOR WIEDER: Yes. And the study on that.
18 I don't want to ask you to read the last part of what you
19 said.

20 MR. LEONARD: I don't want to read it again.
21 But, basically, there's two main components to my
22 testimony. We basically support the modifications being
23 proposed by the staff today, including new RAFs, new
24 denominators for '98. That's part one.

25 However, we still think the whole program needs

1 to have a cost-effectiveness incremental level study,
2 where you look at each level of the standard and determine
3 whether it is worthwhile cost-effectively to go from
4 LEVs to ULEVS, to go from ULEVs to ZEVs. The Board has
5 never seen those numbers. Those numbers, to my knowledge,
6 have not been generated by the staff. And the Board has
7 never seen what the incremental cost is.

8 CHAIRWOMAN SHARPLESS: Yes, Mr. Lagarias.

9 MR. LAGARIAS: Certainly, I agree with the need
10 for such a study, and I would support that that be done.
11 But as I recall, one of the reasons that could not be
12 carefully done is some of the technology required for the
13 ULEVs and the ZEVs could not be identified except in a
14 general way. And until we get much more specific about
15 what hardware we are actually talking about, those cost-
16 effectiveness studies are going to be very generic.

17 MR. LEONARD: At this stage, it wouldn't be --
18 it would be generic, but it will give you an indication.
19 It can be updated, I believe, as more and more data
20 become available. It's something that should be looked
21 at on a continuing basis part of the biennial review of
22 the program, I believe.

23 CHAIRWOMAN SHARPLESS: Our cost-effectiveness
24 studies, though, are in addition to identifying technology
25 and making cost estimates, they're also put in the context --

1 staff, help me -- in the context of other control
2 strategies that ae adopt in the State of California, that's
3 how we determine whether a strategy is within the realm
4 of being cost-effective. And the staff did do that for the
5 entire program. And breaking it up incrementally I don't
6 think basically changes the results. Because, when you
7 look at the emission inventory and you see the level that
8 is the result of emissions from vehicles, anything that we
9 do in the vehicular area is going to be cost-effective when
10 you measure it against what can be done in other areas
11 in the State of California when we're talking about very
12 small sources being very expensive to get very small
13 emission reductions.

14 So, I'm wondering what you're really trying to
15 get at when you're talking about wanting the staff to
16 do incremental cost between the categories. Because the
17 result is going to basically be the same. The result is
18 that whatever figure they come up with, it's still going
19 to be relatively cost-effective to other things that
20 we've looked at. And when you look at the South Coast,
21 for instance, and you look at their Tier III, you know, it's
22 very difficult to figure out in some cases of their Tier
23 III what the cost impacts of Tier III are against something
24 that's identified in the cost area.

25 But I'd like staff to maybe to help us out in

1 terms of what legally we're required to do, and maybe react
2 to Mr. Leonard's general comment.

3 MR. LEONARD: Could I give just an illuminating --

4 CHAIRWOMAN SHARPLESS: You already illuminated,
5 Sam, but if you want --

6 (Laughter.)

7 MR. LEONARD: If you want to go four steps, and
8 the first step costs you one dollar, and the second step
9 costs you two, and the third one costs you four, and the
10 fourth one costs you eight dollars for each step, then the
11 average may be about four. And that's basically what
12 the staff has looked at in their cost-effectiveness.
13 And if you're comparing it against other things that are
14 five, then it looks very good, because it's four. Okay?
15 But if you look at each step incrementally, and that last
16 step costs eight and you've got control technologies
17 available elsewhere for five, then that last step doesn't
18 look so good.

19 CHAIRWOMAN SHARPLESS: Well, I haven't seen any
20 area where we've got it for five. But let me ask staff
21 if they'd like to comment.

22 MR. CACKETTE: Let me -- the Board provided
23 us with direction when they adopted this biennial review.
24 And the first biennial review was done in June of '92.
25 And so, in roughly June of '94 -- it says March, but I

1 think our timeframe is summer -- we would come back with
2 another biennial review.

3 The technology to achieve at that time will
4 be low-emission and ultra low-emission and ZEV standards.
5 TLEVs will be a production item by that time. They already
6 are right now, in fact.

7 The -- in doing that review, we have not looked
8 not only at the technology, but we'll look at the cost. At
9 the time of -- that you adopted these standards, we looked,
10 for example, at electrically heated catalysts. And we made
11 some estimates of what the costs were. And the industry
12 came back with estimates that were ten times higher. And
13 since then, of course, the technology's matured, and we can
14 start seeing more clearly exactly what it is, exactly what
15 it costs, and we'll be able to update those costs to you.

16 We then, of course, look at cost-effectiveness
17 as well. We look at things incrementally as well as
18 overall. But I think that Chairwoman Sharpless's comments
19 are to the point. You can take any regulation or any
20 proposal and you can find the least cost-effective piece
21 of it and, in fact, it may be a cost-ineffective piece.
22 But, first of all, it doesn't mean that you don't want to
23 do it because it may be very effective, for example, and
24 necessary to change the standard. And, second of all, it
25 may just be an important element. For example, a lot of

1 enforcement activities subjected to cost-effectiveness
2 analysis wouldn't look very cost-effective. But you
3 wouldn't have any regulation if you didn't enforce them.
4 So, there's those kind of considerations to take into
5 account, that cost-effectiveness has to be handled a little
6 with a grain of salt. And it's really not an absolute
7 value. It's something that you use to choose measures.

8 What I think this whole argument is about is,
9 are ZEVs cost-effective? And, quite frankly, I think the
10 Board will have a number of considerations to take into
11 account other than cost-effectiveness when it decides
12 whether it wants ZEVs to be part of this program or not or
13 continue to be part of this program.

14 But, in any case, we'll provide you with all the
15 data that is necessary to make those kinds of determinations
16 at our next review.

17 CHAIRWOMAN SHARPLESS: Well, forgive me, but I
18 think Sam tipped his hand a little bit before he started
19 talking about cost-effectiveness by bringing up once
20 again what the Board didn't do when it adopted Phase 2,
21 and that was looking at some of the other components that
22 GM -- and I don't know whether the other car companies feel
23 like GM -- but what you could do with fuel to further
24 reduce its reactivity or its mass. I think you referenced
25 reactivity. By further reducing reactivity, it might be
in the eyes of the car manufacturers more cost-effective

1 than some of the technology that they may have to design,
2 develop, and commercialize than if -- than if we went
3 back and did something on fuel. And I think that that
4 was another point that you were probably trying to make
5 to this Board at this time, wasn't it, Sam?

6 MR. LEONARD: Well, incremental cost-
7 effectiveness should apply to the whole program, the
8 LEV/clean fuel program. You should look at all aspects
9 of it.

10 CHAIRWOMAN SHARPLESS: That's true.

11 MR. LEONARD: Again, it's like you buy your
12 fourth car, the answer is, no, because the benefits -- the
13 incremental benefits of a fourth car in a family have
14 much more than the first. That's why you have to look at
15 the cost and benefits --

16 CHAIRWOMAN SHARPLESS: Unless you have four
17 kids.

18 MR. LEONARD: Unless you've got four kids, and
19 then the benefits are worth it.

20 MR. CACKETTE: Could I ask for some --

21 SUPERVISOR BILBRAY: Oh, I wouldn't say that.

22 MR. CACKETTE: Fine.

23 (Laughter.)

24 CHAIRWOMAN SHARPLESS: Mr. Cackette.

25 MR. BACKETTE: When he says the whole clean

1 fuel program -- I'm looking at the example in the second to
2 last paragraph -- it is not our intention, unless you so
3 direct us, to go back and relook at Phase 2 gasoline, and
4 the incremental cost-effectiveness of reducing the
5 concentration of multialkyl aromatics. And the Board made
6 that decision before, and it didn't ask for a technological
7 feasibility review. And we're not intending to go back.
8 We're looking at what does it cost and what are the
9 benefits of LEVs, ULEVs, and ZEVs, and applying the
10 technologies emerging on the timeframe that you
11 envisioned when you adopted this program and reviewed it last
12 summer.

13 CHAIRWOMAN SHARPLESS: I think whether we do it
14 or not, that GM will continue to do it for us and present
15 it to the Board as we go along, and any other new ideas
16 you might get as they occur to you.

17 MR. LEONARD: Especially if the incremental
18 cost-effectiveness of some portion of the LEV program is
19 greater than the line that was drawn in the sand with
20 the multialkyl fuels.

21 CHAIRWOMAN SHARPLESS: I didn't know that was
22 a line in the sand, but you're consistent, Sam.

23 One comment I'd like to make on the denominator.
24 The staff brought up, I thought, a really good point, Sam,
25 in the staff presentation. And I'm going to believe that

1 you're not suggesting that when the study -- this further
2 study to improve the science for RAFs takes place, that
3 the industry gets any signal from this Board that that
4 can be interpreted that the denominator is somehow going to
5 be used to lessen the stringency of the standard. In
6 other words, I think that the staff should continue to look
7 at the best technology and use that in determining where
8 the line in the sand ought to be for denominators.

9 I, as one member of this Board, do not want
10 the denominator deemed in such a way that we lose the
11 effectiveness of what we could get if we were using the
12 absolute best technology out there.

13 MR. LEONARD: What I would say about the
14 denominator is it's a philosophical question between you
15 and the Board and the industry, the automobile industry.

16 What we see being done with the denominator
17 that uses the low-emission vehicle as the denominator
18 is that the advances in the vehicle technology that have
19 led to a lower reactivity on the fuel are denied to be
20 part of what we can get -- what we can use.

21 CHAIRWOMAN SHARPLESS: We didn't establish our
22 reactivity factors based on reformulated gas. We did it
23 based on technology. Now, if we can get more because there
24 is Phase 2 out there, if we can get Phase 2 reductions in
25 reactivity and mass -- really in mass, I guess, more than

1 reactivity -- plus reductions in reactivity because of the
2 technology, then I think that's the direction this Board
3 goes.

4 Because when we first adopted this proposal, the
5 proposal looked at the available technology out there and
6 established the standards based on what we thought was
7 technically feasible. And to say now that we're going to
8 back off of that because Phase 2 came along and reduce some
9 of the mass, I think that that gives up the stringency
10 of our standard. And I think the staff mentioned in tons
11 per day how much that would be.

12 And given the fact that we're having, you know,
13 enormous difficulty in the severe and serious areas coming
14 up with strategies that will reduce emissions from vehicle
15 areas and, therefore, it translates into further reductions
16 on stationary sources, I don't think this Board can afford
17 to go in that direction.

18 I think the public demands that we hold tight
19 to what we have done. And any gaming on the denominator
20 that loosens it up, because reformulated came along, I think
21 is something that this Board has to go guard very -- very
22 closely against.

23 MR. LEONARD: The denominator is not dependent
24 upon reformulated. The denominator is dependent upon
25 conventional fuel. And basically, what this formula does

1 is -- there is a reactivity benefit of technology
2 hardware.

3 CHAIRWOMAN SHARPLESS: But it depends on --

4 MR. LEONARD: The reactivity benefit of
5 technology hardware. And what this formula does is says
6 that, to the extent that the average industry sees a
7 reactivity benefit of technology hardware from going from
8 a conventional vehicle to a TLEV or LEV, they don't get
9 the credit for the average reduction. They just get
10 credit if they go -- if that technology -- if their
11 specific technology goes further than what that average is.

12 CHAIRWOMAN SHARPLESS: Mr. Albu, I think I know
13 what I'm saying.

14 (Laughter.)

15 CHAIRWOMAN SHARPLESS: And maybe Mr. Leonard
16 was saying the same thing. I don't know.

17 MR. ALBU: I don't think so.

18 (Laughter.)

19 MR. ALBU: I think that all we were really saying
20 when we set the value that we set is that we identified
21 technology back in 1990, which was capable of achieving
22 a baseline reactivity of 3.13 grams of ozone per gram of
23 NMOG and using the catalyst cars and conventional gasoline.

24 And when you use that value, multiply it times the
25 .075 standard for LEVs, for example, you set an ozone per

1 mile standard indirectly of .234 grams per mile.

2 So, that's what we're trying to maintain. Now,
3 what Mr. Leonard is asking the Board to consider is take
4 today's vehicles, which have a much higher specific
5 reactivity, something in the order of 3.8 to 4, multiply
6 that times the .075 standard, and you get an ozone per
7 mile that is much, much higher than what we showed was
8 feasible back in 1990.

9 And so, what they're really saying is, "Give us
10 credit for improving emission control beyond today's
11 technology so that we do not have to use the best
12 technology that we have already demonstrated is out there."

13 That's why we're trying to hold the line. Now,
14 it's true that we give credit for Phase 2 gasoline, but
15 in 1990, we didn't have specifications for Phase 2
16 gasoline. But we did have a demonstration of technological
17 feasibility for heated catalyst systems. And that becomes
18 our baseline.

19 As we indicated in the presentation, we do have
20 data from one manufacturer which showed us specific
21 reactivity much lower than 3.1; in fact, it's 2.3. This was
22 achieved with an unheated catalyst. It was done by
23 recalibrating the vehicle and using some advanced hardware.
24 They haven't told us the exact details. But, because they
25 have achieved a greater value, which was 2.3 compared to our

1 3.1, they're going to get credit for it.

2 And what they do is they take 2.3 over 3.1,
3 which is about .7, multiply it times their NMOG emissions,
4 and they get credit to provide them with -- properly for
5 what they've done. And that's, we think, exactly right,
6 and went beyond what we were able to do , and they should
7 get credit for it.

8 We don't think we should back off on being able
9 to achieve at least what we demonstrated was possible back
10 in 1990. That's really the bottom line.

11 CHAIRWOMAN SHARPLESS: Mr. Lagarias.

12 MR. LAGARIAS: When we adopted the regulations
13 in 1990, the emissions for the LEVs, the ULEVs and the
14 ZEVs were based on mass emissions. And the combination
15 of having reformulated gasoline and improved technology
16 in the cars, it was expected to meet it, so everything that
17 comes out of reformulated gasoline makes the task --
18 every benefit from reformulated gasoline makes the task
19 of the manufacturers less onerous. And that's one way of
20 looking at it.

21 MR. LEONARD: This is not a benefit of
22 reformulated gasoline.

23 MR. LAGARIAS: I know that.

24 MR. LEONARD: It's a benefit of the technology
25 that's put on the vehicle. And it was an NGMOG standard that

1 was established, not an ozone forming potential standard.
2 And the effect of having a low number in the denominator
3 effectively decreases -- or decreases the NMOG number
4 and therefore increases the stringency, the standard, that
5 we thought we signed up for in 1990.

6 SUPERVISOR BILBRAY: Okay. We're not arguing.
7 We're trying to communicate to build consensus. Is there
8 anyone else that would like to communicate to try to build
9 consensus? Thank you. Appreciate it..

10 MR. LEONARD: Thank you very much.

11 SUPERVISOR BILBRAY: Michael Schwartz? You want
12 to give Ford's presentation?

13 MR. SCHWARTZ: Good afternoon. My name is
14 Mike Schwartz. I'm the manager of emission control
15 analysis at Ford Motor Company. Before discussing Ford's
16 concerns of the proposed amendments, I'd like to commend the
17 staff for the work it's done in several areas, particularly
18 in determining acceptable multipliers for the 50 degree
19 emission requirements which provided a means by which
20 manufacturers might avoid costly and time-consuming
21 evaporative canister loading assembly line testing, defining
22 the ZEV credit system, implementing a reasonable cold CO
23 implentation schedule and improving the hybrid electric
24 vehicle test procedures.

25 Ford is aggressively pursuing product development
in many areas, including advanced gasoline engines,

1 alternative fuel, advanced catalyst systems, and electric
2 vehicles.

3 We're involved in several consortia with other
4 manufacturers, as well as having extensive internal programs
5 to meet the technical challenges of the low-emission
6 vehicle/clean fuel regulations.

7 In addition, we are pursuing the development
8 of new on-board diagnostic systems for 1994 and later
9 models, and the development of high temperature, multiple-
10 day evaporative emission systems for the 1995 and later
11 models.

12 It is apparent that a great deal of work remains.
13 We will continue to apprise the Board of our progress. We
14 take great pride in our achievements in the reduction of
15 motor vehicle emissions. We have certified the 1993 1.9
16 liter Escort Tracer ST LEVs; the 1993 Taurus 3 liter
17 flexible fuel vehicle has also been certified recently
18 as a TLEV, which not only is a major accomplishment in
19 emission reductions, but demonstrates a milestone in the
20 development of alternative fuel vehicles.

21 We will begin shipping small numbers of Ford
22 Echostar, a zero-emission vehicle, again, the second-quarter
23 of 1993. The first hybrid Echostars are planned to be
24 shipped to California beginning in late 1993. These
25 vehicles constitute a pilot demonstration program to be used

1 in gathering valuable data to determine the product and
2 market feasibility of electric vehicles, a major open issue.

3 Despite these successes, we continue to have
4 major concerns about the feasibility and cost-effectiveness
5 of the program, and we question the Board's June, 1992,
6 finding that the development of LEV and ULEV technology
7 is on course to support 1997 production. We also worry that
8 ZEVs will not be sufficiently marketable to meet mandatory
9 sales levels starting in 1999.

10 We also have issues concerning the proposed
11 reactivity adjustment factors, on-board diagnostics, and
12 potential changes to CARB's evaporative emission
13 requirements.

14 The reactivity adjustment factors recently
15 proposed by the staff are disappointing, in that the
16 scarcity of low-emitting vehicles has resulted in a very
17 small database. The results of this testing are
18 scattered exhibiting little tendency to cluster around the
19 average levels. Despite these concerns, Ford believes
20 that the use of RAFs to take reactivity into account and thus
21 provide a level playing field for competing fuels is
22 technically valid. Therefore, we support the staff's
23 proposal for a cooperative program between ARB and industry
24 to improve the representativeness of the database and
25 consider modifications to the analytical methods used to

1 compute RAFs.

2 In particular, we believe the staff should
3 consider adopting a single baseline reactivity value for
4 a RAF denominator for all categories of vehicles.

5 Back just in time, Madam Chairwoman.

6 CHAIRWOMAN SHARPLESS: I heard it.

7 SUPERVISOR BILBRAY: She heard it. She hears
8 everything.

9 MR. SCHWARTZ: Here's an opportunity to beat me
10 up.

11 SUPERVISOR BILBRAY: The Chair is omnipresent.

12 (Laughter.)

13 MR. SCHWARTZ: This baseline reactivity should
14 be determined from a fleet of current vehicles tested on
15 current gasoline. In this manner, all future improvements
16 in exhaust emission reactivity occurring due to advances
17 in vehicle or fuel technology would be fully reflected.

18 I don't think you've heard anything different
19 in those statements than what Mr. Leonard explained. And
20 I have the same reasons to support it as he. I didn't
21 feel that, in 1990, when the regulations were adopted, that
22 there was an expectation on anybody's part -- on Board
23 members' parts, or in industry's part -- that what was going
24 to result from this was something more than the fleet
25 average for new vehicles dropping from a level of .25 down

1 to a level of of .062, which is the NMOG requirement in
2 2003.

3 And what we recognize now through this
4 methodology of recomputing that denominator is that, in
5 fact, that doesn't represent what you're getting. The
6 staff has estimated you're getting 27 -- I forget what
7 their numbers were -- some range of tons per day beyond
8 that.

9 All we're saying is that the technology finding
10 on this is not rock solid, so it's not -- to say that
11 the technology -- that the feasibility is in the bag and
12 to revise this methodology would give away those tons
13 makes an assumption that I don't think is warranted. I
14 mean this is technology forcing to the limit.

15 So, I just question whether we have that
16 stake in the ground and we can't make adjustments from
17 that.

18 CHAIRWOMAN SHARPLESS: Mr. Schwartz, though,
19 along those lines, the LEV and the ULEV factors are both
20 .313; is that what it is, staff?

21 MR. CACKETTE: 3.13.

22 CHAIRWOMAN SHARPLESS: 3.13. Thank you. And
23 that's allowing ULEV a bit of a give, I think, because
24 ULEV probably could be lower than that. But given the
25 fact that the staff was working with cars that they

1 themselves were retrofitting to meet ULEV standards, I
2 think they believed -- at least at this time -- that that
3 was where they ought to set it.

4 Mr. Albu, is that about correct? I mean, I
5 just think it's kind of fastincating that you all --
6 particularly you guys who came in early and certified
7 Ford Escorts as TLEVs that really could meet a LEV standard,
8 and are still talking about whether or not these
9 technologies are feasible. Ford Motor Company has been
10 pretty good in terms of bringing in some cars that are
11 looking fairly good in terms of meeting low-emission
12 certification requirements.

13 But be that as it may, you're probably acting
14 from a very conservative point of view here in terms of
15 your entire fleet and bringing your entire fleet down to
16 those levels.

17 But it gets back to the argument and the
18 discussion that we were having with Mr. Leonard as to
19 whether or not what this Board actually did in 1990 and
20 the rules that we set, and how we're going to count -- if
21 we're going to discount that feasibility, because we
22 formulated 2 came along or Phase 2 came along. And I
23 think that it would be really remiss -- this Board would
24 really be remiss if we were to allow making the standards
25 less than stringent, because you've been able to use

1 Phase 2 as one way to reduce emissions. You know, and
2 I think there's a lot more that can be done, and that this
3 Board has to hold the line on them.

4 Mr. Albu, did you want to say something the ULEV
5 category of 3.13?

6 MR. ALBU: Yeah. I think that it was reasonable
7 for us to assume that, because we used the same heating
8 catalyst technology for LEVs and ULEVs to illustrate
9 feasibility of that value of 3.13 was appropriate for
10 both categories. I think, in terms of the technological
11 feasibility of the heated catalyst I've seen in the past
12 couple of years, I've seen amazing progress in that
13 technology. I think even Mr. Schwartz is aware of some
14 developments within Ford where they've improved upon that
15 3.13 without heated catalysts.

16 MR. SCHWARTZ: Some are higher, some are lower.

17 MR. ALBU: The work is going on to try and find
18 out which aspects of vehicle technology and calibration
19 techniques can lower specific reactivity. I personally
20 believe, based on some of the initial data I've seen,
21 that they will indeed improve on 3.13 that we've shown in
22 the heated catalyst cars in our six-vehicle sample without
23 even using heated catalysts. So, I remain somewhat
24 optimistic.

25 CHAIRWOMAN SHARPLESS: Is that for ULEV, Steve?

1 MR. ALBU: Yes. Yes. It could be applied to
2 ULEV or LEV. So, I remain optimistic that what we're
3 doing is reasonable and fair, and indeed protects the
4 air quality levels that we showed were feasible back in
5 1990.

6 CHAIRWOMAN SHARPLESS: Mr. Schwartz, go ahead.

7 MR. SCHWARTZ: Yeah. I think we can move on.
8 But before we do, I think the fact that the staff has
9 committed to enhance the database will help a lot in this.
10 Part of the problem is that you're always trying to chase --
11 with the current methodology, you're always trying to chase
12 after and guess at what the technology will be in the
13 future, and then not test them too fresh to where you have
14 unrepresentative data.

15 And the situation now is we have -- we have
16 six electrically catalysts in the baseline data and five out
17 of nine vehicles in the Phase 2 data for the numerator or
18 electrically heated catalyst, and you'll probably recall
19 that in June, when you got the technology status report
20 from the staff, the said that the technology for LEVs
21 for smaller vehicles doesn't involve an electrically
22 heated catalyst. For larger vehicles, it involves only a
23 cold start catalyst.

24 So, the point is that we can really improve on
25 that database and that we may find that the number of tons

1 penalty that we computed, which was based on the small
2 database and the 3.13 denominator, that the difference
3 isn't that large.

4 And I still think that there are major questions
5 on the feasibility, and we have to take our successes,
6 which we're proud of, in context. Those transitional
7 low-emission vehicles -- I really disagree with anybody
8 characterizing them as really LEV capable, because that
9 doesn't take into account in-use deterioration.

10 It is a transitional low-emission vehicle.
11 We're proud of it, but don't say it's anything more than
12 that.

13 CHAIRWOMAN SHARPLESS: I don't think we were.
14 We were looking at how the emissions -- what emissions
15 were coming out of the tailpipe and where they would fall
16 on certification levels. And so, you called it what you
17 called it, and that's what it is.

18 And that's where it stands. We're saying that
19 there's very promising technology out there that is
20 advancing along, and we want to take advantage of it here
21 in California, and not step back.

22 When you talk about representative, we're not
23 talking about, you know, representative averaging all of
24 the cars in the universe, some of which are on the dirtier
25 end, and in finding a common number. What we're talking

1 about is taking the cleanest cars and averaging the
2 emissions from those to come up with a number.

3 And I just want to make sure that, if the Board
4 agrees to this suggestion that's being put out by now the
5 staff and by the industry, that we don't come back with
6 something that the Board isn't going to be satisfied
7 with, and make sure that we direct the staff to go with the
8 best technology that they can in the representative
9 sample, not something else. Okay?

10 MR. SCHWARTZ: To get back to the statement,
11 we do support the cooperative study and we believe it
12 could be completed and appropriate Board action taken
13 in time to affect the RAFs and baseline reactivities
14 for the 1998 auto year.

15 Ford will accept the staff proposed Phase 2
16 RAFs and baseline reactivities through the 1997 model
17 year.

18 ARB's OBD II regulations, when coupled with the
19 LEV standards, currently present an insurmountable task
20 for the industry. It is generally recognized by industry
21 and the staff that the compliance with the LEV standards
22 will require drastic reductions in emissions in the first
23 few seconds after vehicle start-up. And this will
24 necessitate some type of small close-coupled and/or heated
25 light-off catalyst. ARB regulations specify that the use of

1 such catalysts, however, require that the catalyst be
2 monitored by the OBD II system.

3 Unfortunately, the only known method of
4 knowing catalyst efficiency -- that is, oxygen storage
5 technique -- will not work in a small catalyst as the high
6 flow rates in small catalysts do not yield a measurable
7 level of oxygen storage.

8 Thus, the technology most likely to aid in
9 compliance with the LEV standard is in direct conflict with
10 the OBD II regulations. Because the LEV and OBD regulations
11 are so strongly related, we recommend that staff include
12 a comprehensive review of both regulations when it conducts
13 its review of the OBD requirements for LEVs, which is
14 tentatively scheduled for Board action this fall.

15 Ford's also concerned about possible changes
16 to ARB's high temperature multiple day evaporative
17 emission regulations due to current EPA action. The major
18 differences between EPA and CARB's regulations include
19 different drive cycles in the running loss test, and EPA's
20 addition of a, quote, "short test" emphasizing a rapid
21 purge of the canisters.

22 If the ARB regulation is changed, development of
23 new purge strategies will most likely be required, adding
24 to the leadtime and feasibility concerns for TLEVs, LEVs,
25 and ULEVs. A major change in these rules would greatly

1 increase the likelihood of substantial evaporative
2 and exhaust emission interaction.

3 Ford will continue to work hard to extend
4 the limits of current technology and to develop new
5 technology to meet the LEV program's requirements.

6 To date, this work has yielded some encouraging
7 results, some not so encouraging.

8 In concluding, we make the following
9 recommendations: First, implement the staff
10 recommendation to establish a rulemaking process to
11 enhance the database and evaluate new analytical methods
12 for establishing RAFs for the '98 and later model years;
13 adopt the staff proposed RAFs and baseline reactivities
14 for model years prior to '98.

15 Second, schedule a comprehensive review of the
16 LEV/clean fuel regulations in conjunction with the review
17 of the OBD II regulations for LEVs by the fall of 1993.

18 This concludes my statement. I'll be glad to
19 take questions.

20 CHAIRWOMAN SHARPLESS: Okay, Mike. Thanks.
21 The relationship between OBD II and the LEV requirements,
22 Mr. Albu, do you have a comment on what you intend to review
23 for that fall meeting?

24 MR. ALBU: At the present time, we're looking
25 at what we can review. One of the things we wanted to look

1 at was the threshold levels for illuminating the malfunction
2 light for the LEVs. Now, we relied to some extent on
3 industry providing us some of that data. And it's going
4 to depend upon our ability to talk with them in getting
5 that kind of data.

6 We will also be embarking soon on a program of
7 our own to investigate this on a few of our own cars.

8 The issue of monitoring of the heated catalyst
9 is one we have heard before, but we're not requiring
10 the electrically heated catalyst to be monitored alone
11 if it is indeed a small catalyst. What we do permit is
12 it to be monitored in conjunction with the next catalyst
13 in a series in the exhaust system. And the way electrically
14 heated catalyst systems are developing, what's happening
15 is you -- the manufacturers are developing a very small
16 EHC. And right behind it is a larger volume nonheated
17 monolith catalyst. And it's still overall a fairly moderate
18 size catalyst.

19 So, what the regulation requires is that when
20 the efficiency of that combined unit drops, such that the
21 front unit can be determined to be bad, then the lights
22 would come on. And we have some manufacturers -- I think
23 about three of them -- signed up for catalyst monitoring
24 of this type, not EHCs, but small to moderate light
25 catalyst monitoring in 1994. And these manufacturers were

1 willing to sign up for the OBD II requirements that
2 early. Now, Ford and GM have brought up some issues
3 about cerium content in some of these smaller catalysts
4 and the correlation between cerium content and oxygen
5 storage and so forth.

6 All I can say at this point is that we're looking
7 hard with the catalyst suppliers and catalyst coaters
8 to determine the extent of this interaction. But at this
9 time, at least, several manufacturers are willing to
10 accept the level of cerium, its relationship to oxygen
11 storage, and move ahead in 1994 to monitor these small
12 smaller volume catalysts.

13 So, I don't think this is going to be a problem,
14 but I can't say for sure that we have every stone unturned
15 yet. We're hoping to identify these issues more fully as
16 long as we can get enough cooperation from industry to
17 address these issues reasonably.

18 CHAIRWOMAN SHARPLESS: So, you wouldn't be
19 asking of Mr. Schwartz to work with you to provide you
20 with what? What would you need?

21 MR. ALBU: In terms of the emission thresholds,
22 some sensitivity study to deteriorated components and
23 their effect on emissions on a LEV level vehicle, and then
24 to further explore the issue of cerium content and oxygen
25 storage. Again, we don't think this is a show stopper,

1 because other manufacturers have signed up already in '94
2 to use this kind of monitoring and feel comfortable with
3 doing so.

4 CHAIRWOMAN SHARPLESS: Mr. Schwartz, I'd
5 recommend that you get with Mr. Albu and find out what
6 information you can provide him, and then we'll see where
7 we go from there.

8 MR. SCHWARTZ: We'll, of course, do that. I
9 guess what I'd mainly want people to realize is that it
10 can effectively be a show stopper. There are different
11 BOD requirements for LEVs than for non-LEVs, exemptions
12 for OBD run out in 1995. So, this is -- well, it will tend
13 to limit technologies that you can apply to electrically
14 heated catalysts. I guess the difference here is that
15 Steve has more confidence that OBD technology for those
16 technologies can be developed.

17 CHAIRWOMAN SHARPLESS: And if you can provide
18 us with some information that shows differently or shows
19 what you are facing, then I think we have a better basis
20 to try to decide what to do about it.

21 MR. SCHWARTZ: We'll be doing that.

22 CHAIRWOMAN SHARPLESS: Okay. Thank you very
23 much. Any further questions of Mr. Schwartz? Okay.
24 Thank you. Frederick Maloney, Chrysler?

25 MR. MALONEY: Good afternoon. My name is Fred

1 Maloney.

2 CHAIRWOMAN SHARPLESS: You're going to have to
3 talk into the mike, please.

4 MR. MALONEY: Good afternoon. My name is Fred
5 Maloney. I'm an emissions planning specialist for Chrysler
6 Corporation.

7 SUPERVISOR BILBRAY: Fred, why don't you pull it
8 in towards you?

9 MR. MALONEY: Okay. Chrysler appreciates this
10 opportunity to comment on the proposed revisions to the
11 California low-emission vehicle program. Although we
12 continue to have many concerns with the LEV program, such
13 as leadtime, feasibility, I would like to address just two
14 issues today: reactivity adjustment factors, once again,
15 and electric vehicle incentive.

16 Chrysler believes the issue of RAFs, including
17 ozone forming potential of baseline vehicles and fuel, and
18 the method for their determination need to be established
19 so that manufacturers can get on with the development and
20 certification of all classes of low-emission vehicles.

21 Also, incentives for electric vehicle sales need
22 to be put into place now to ensure that vehicles are
23 purchased in the numbers required by the regulations
24 beginning in the 1998 model year.

25 Chrysler supports the use of interim RAFs and

1 ozone forming potentials, the denominator, through the
2 1997 model year proposed here today. Since the science
3 for determining RAFs is still in the developmental stage,
4 Chrysler agrees that the RAF values should not be adjusted
5 for the proposed modeling base correction factor. We
6 agree with the proposed RAFs for Phase 2 gasoline of .98
7 for TLEVs and .95 for LEVs and ULEVs.

8 Although we do not believe the ozone forming
9 potential of LEVs and ULEVs should be 3.13, we accept the
10 value through 1997. And in return, we ask that CARB agree
11 to the proposed program that Ford and GM mentioned today.
12 The program should establish the baseline denominator for
13 vehicles certified to .39 and .25 grams per mile of NMOG
14 so that the effects of technology as well as fuel is
15 accounted for in emissions control development.

16 Interim RAFs are also needed for medium-duty
17 vehicles so that manufacturers have established procedures
18 and emission levels to which to design and certify.
19 Chrysler is currently in the process of certifying a CNG
20 van to the medium-duty LEV standards for 1994 model year.
21 Because of the lack of an RAF for this class of vehicle, the
22 process of obtaining an executive order has been very
23 tedious. To aid in certifying for 1995, having a RAF in
24 place would be a big benefit.

25 Early determination of the ozone forming potential

1 and reactivity adjustment factor values provides the industry
2 with stability for planning purposes.

3 Additionally, stability and standard increased
4 leadtime provide -- and increased leadtime provide the
5 much needed development time to maximize cost-efficiency
6 of the hardware.

7 The possibility of the RAFs or the ozone forming
8 potential changing from model year to model year results
9 in effectively revising the emission standard. Such
10 modifications are likely to violate leadtime constraints
11 or could neccitate a costly change in our product plan.

12 The LEV regulations proposed today require
13 manufacturers to certify, produce, and deliver for sale in
14 California ZEVs beginning in the 1998 model year. While
15 there are still many shortcomings of the electric vehicle,
16 we are trying hard to meet both the standards and the
17 customer requirements for an acceptable vehicle.

18 Competition among the manufacturers produce
19 an acceptable vehicle as evidenced by Chrysler's recent
20 announcement of a quick-charge electrical system.
21 Cooperation among manufacturers and between government and
22 industry has been displayed by the formation of various
23 corsortia. Despite this level of activity, there is still
24 no guarantee that there'll be sales in the numbers
25 required by these regulations which even the Air Resources

1 Board says is technology forcing.

2 We need CARB's participation as well as
3 participation from other State and local agencies to assure
4 that there'll be a market large enough to meet the sales
5 requirement of the regulation. Government incentive, such
6 as a meaningful tax incentive and subsidies, government
7 purchases, a recharging infrastructure, and a general
8 communication program to reinforce the environmental
9 benefits of EVs are necessary to ensure that EVs are
10 sold in the number required.

11 Suggestions to change the regulation allowing
12 manufacturers merely to have to make available for sale
13 should be closely scrutinized to assure that important
14 partnership between manufacturer and government is not
15 lost.

16 In summary, we support the concept of interim
17 RAFs and the CARB/industry test program to develop RAFs
18 for 1998 and beyond. We also urge CARB to support industry
19 in its efforts to sell electric vehicles. That concludes
20 my statements. I'd be happy to answer any questions.

21 CHAIRWOMAN SHARPLESS: Thank you, Mr. Maloney.
22 Well, as you know, we do have an interagency working group,
23 and you are participating on it?

24 MR. MALONEY: Right. Our concern is the change
25 in the language. We just want to make sure that the

1 cooperation remains.

2 CHAIRWOMAN SHARPLESS: Change in which language?

3 MR. MALONEY: Pardon?

4 CHAIRWOMAN SHARPLESS: Change in which language?

5 MR. MALONEY: Well, there's concern that just
6 making available for sale means that we'll be stockpiling
7 these vehicles in our dealership and that they won't be
8 sold. It's an expensive vehicle to be holding in our --

9 CHAIRWOMAN SHARPLESS: No. I think it should be
10 reemphasized that we have a stake as well. The reason
11 why that mandates there is that we need the cars to be
12 driven for air quality reasons. So, I just continue to
13 encourage you to participate in our interagency working
14 group and with the other agencies that have a part of
15 bringing these various pieces together. I think that we
16 will be able to put some proposals out on the table that
17 might help the industry make these cars -- at least in the
18 early years, to make these cars attractive.

19 Thank you very much.

20 MR. MALONEY: Thank you.

21 CHAIRWOMAN SHARPLESS: We have now Mr. Trunek,
22 who will be representing Arco and WSPA.

23 MR. TRUNEK: Good afternoon. My name is Bob
24 Trunek, and I'm the senior vice president for manufacturing,
25 engineering, and technology for the Arco Products

1 Company. I am speaking today on behalf of the Western
2 States Petroleum Association, or WSPA.

3 And let me say that I do appreciate the
4 opportunity to address you on the subject here today, and
5 I'll be very brief.

6 As you are aware, in a recently filed lawsuit,
7 WSPA is questioning the underlying methodology for
8 determining reactivity adjustment factors, or RAFs, as they
9 were adopted in November of 1991. And we are not
10 discussing that methodology here today. Instead, I do want
11 to express our serious concerns over the technical
12 deficiencies, as we see them, with the originally proposed
13 RAFs for Phase 2 gasoline.

14 The staff proposal that we just heard addresses
15 some of these concerns, although I am somewhat unclear
16 in that the written materials did not seem to address the
17 joint test program that was discussed in the oral
18 presentation. In the oral presentation, I didn't hear
19 discussed the setting of the RAFs as interim RAFs. And
20 I'm assuming that both of those elements are indeed part
21 of what is currently on the table.

22 CHAIRWOMAN SHARPLESS: Mr. Jennings?

23 MR. JENNINGS: The materials placed on the
24 table only included the regulatory language or regulatory
25 changes. And that -- and in those changes, we would have

1 the RAFs apply only through the 1997 model year. Our
2 intent is that the direction for the development or
3 analysis of any additional data would be reflected in the
4 resolution.

5 CHAIRWOMAN SHARPLESS: In the resolution.

6 MR. BOYD: If I might, that's implicit in the
7 staff presentation and modifications and changes.

8 CHAIRWOMAN SHARPLESS: So, first of all, to
9 Mr. Trunek: Yes, we are talking interim. And, two,
10 Mr. Albu and Bob Cross -- he's talking about joint testing.
11 Do you want to comment on that?

12 MR. CROSS: Yes. The staff proposal does include
13 an element of embarking on a cooperative program to look
14 at these issues.

15 CHAIRWOMAN SHARPLESS: You have to get close to
16 the mike or it's not on.

17 MR. CROSS: Okay.

18 CHAIRWOMAN SHARPLESS: Does that include a
19 joint testing?

20 MR. CROSS: Yes, it does. There are -- I think
21 there's a burden on the industry, though, to provide a lot
22 of support in this. Recall that the staff has already gone
23 very far in terms of developing its own test vehicles, if
24 you will, to develop the numbers which are before you today.
25 And I think that the success or failure of additional

1 endeavors in this direction is critically dependend on
2 industry providing test vehicle data and kind of opening up
3 a little bit more with us for something like this for --
4 but the resolution, the draft resolution does include that
5 cooperative program.

6 CHAIRWOMAN SHARPLESS: Okay.

7 MR. TRUNEK: Okay. Thank you.

8 Let me say that we are pleased that the work
9 to date does demonstrate that Phase 2 gasoline will
10 dramatically reduce mass emissions and, thus, ozone
11 formation. We are, however, somewhat perplexed with the
12 result to suggest that there's no reactivity benefit.

13 It is our observation that the data today really
14 are technically insufficient at this time to support the
15 establishment of reactivity adjustment factors for Phase 2
16 forever.

17 We do, however, support the setting of interim
18 RAFs, as it's been said before, through the 1997 model
19 year.

20 The original vision for reactivity adjustment
21 factors was that each emission category and fuel type would
22 be established from a statistically significant sample of
23 vehicles representing the mix of hardware content of the
24 future fleet.

25 And for a host of reasons -- and I understand the

1 problem of getting vehicles that were representative.
2 And hopefully, this joint program will overcome that as
3 part of the expectation here.

4 But for a host of reasons, the data we have
5 today don't match that vision. And specifically, the
6 testing procedures we believe are significantly less
7 rigorous than those required of our manufacturers.

8 Secondly, there are too few vehicles and,
9 thirdly, it uses a nonrepresentative mix of vehicles. The
10 mix doesn't even really come close to the mix that's
11 expected on the road in the model years into the future.

12 CHAIRWOMAN SHARPLESS: Mr. Trunek, you know,
13 this is the point, I think, that is so difficult for
14 people to understand about what we're talking about when
15 we talk about representative mix.

16 I think when we did Oil/Auto, and we were looking
17 for representative mix -- because we were trying to figure
18 out, given the cars that were out there on the road that
19 would be there, what would you do with different fuel
20 mixes and how would they react? That's one philosophy
21 of dealing with the problem. But I do not believe that
22 when we're talking about setting RAFs, that we were talking
23 about taking the existing population of cars out there that --
24 and coming up with a representative mix, representative
25 under the RAF program has a whole different connotation to

1 it. It's representative of future technologies. And
2 I don't know. I guess I'd like Mr. Cross or Mr. Albu to
3 maybe further clarify that point for the Board so people
4 don't get confused about representative samples, what
5 representative means, whether we're talking about taking a
6 whole mix of cars that are out there and averaging dirty
7 and clean alike.

8 What are we talking about when we talk about
9 looking at a sampling of cars, and why does the staff
10 feel so confident that the cars that they did have in -- that
11 they did test and that they did do speciation on are
12 representative of the types of new technology that we
13 hope will bring the reactivity down and, therefore,
14 produce cleaner cars for the road?

15 Could you try to --

16 MR. CROSS: Those are big questions, but I'll
17 take a shot at it.

18 CHAIRWOMAN SHARPLESS: -- answer those?

19 MR. CROSS: Mr. Albu spoke earlier to this point,
20 but I'll reiterate it in a slightly different view.
21 The denominator of the equation, which is essentially the
22 baseline or the yardstick, if you will, that indexes the
23 stringency of the whole system is tied to the 1990 view of
24 what was technologically feasible at the time you adopted
25 the whole low-emission vehicles program.

1 So, in putting that yardstick in place, the
2 staff was not trying to represent the universe of what
3 might be out there in 1998 in the LEV and ULEV categories.
4 What we were trying to do was say, in 1990, we established
5 what was technologically feasible for the standards set
6 for 1998 LEV and ULEV categories, which was going to be
7 the catalyst technology. That was one way of doing it.
8 I'm not saying the only way.

9 Therefore, we were attempting to characterize
10 the reactivity of that as a baseline and say if manufacturers
11 were able to do better than that, which we think that
12 they'll be able to -- if they do worse than that, then
13 we would have concerns.

14 So, for the denominator of the equation, we're
15 trying to -- we're not trying to be representative of the
16 fleet. We're trying to be representative of the
17 technological feasibility showing we made in 1990, and
18 basically test it on vehicles to that we're sure of where
19 we were (sic), which we felt was the six vehicles the staff
20 did. They lined up reasonably well in terms of emission
21 results.

22 And we think it did a sufficient job. Now, in
23 the case of the numerator of the equation, the Phase 2
24 gasoline, we did want to represent what would be out there.
25 Because now we're saying what is the technology/fuel

1 combination that the manufacturer's like to produce?

2 CHAIRWOMAN SHARPLESS: Let me interrupt there,
3 Bob. So that, when the car manufacturers say that they're
4 not going to get any credit for this technology -- in
5 other words, to put it their way, that we're making the
6 standards more stringent because we won't offset what
7 gasoline has given them in terms of a mass production.
8 The point I'm making here is that on the numerator, they do
9 get credit for whatever technology improvement they make
10 above and beyond where we put the stake in the ground in
11 1990, right?

12 MR. CROSS: That's correct. But I think if you
13 look at our test fleets for the LEV category, for example,
14 because of the difference between the fuels, the numerator
15 test fleet that's actually less technically advanced for
16 the denominator test fleet -- in other words, because when
17 you set the LEV standards, Phase 2 hadn't yet been adopted.
18 So, the denominator test fleet is this technically advanced
19 test fleet which can meet the standard on conventional
20 gasoline.

21 When we put Phase 2 into the equation, less
22 technology's required, okay, and so the numerator test
23 fleet is slightly less advanced. How that all works out
24 is that is a reactivity adjustment factor which is fairly
25 close to one.

1 And when the car manufacturers go to certify
2 their cars on Phase 2 gasoline, they still get the mass
3 benefit of Phase 2 gasoline, which is 20 or 30 percent.

4 CHAIRWOMAN SHARPLESS: Mr. Lagarias?

5 MR. LAGARIAS: Let me look at it a little
6 differently. In 1990, when we adopted the regulations,
7 we had the baseline gasoline, conventional gasoline and
8 conventional technology.

9 And when we look at the MIRs of the conventional
10 gasoline to get a reactivity -- specific reactivity and
11 emissions from the car, we get our denominator; is this
12 correct?

13 MR. CROSS: Yes.

14 MR. LAGARIAS: Then for 1990, then, the
15 numerator then would have been the conventional gasoline
16 and the car technology that was available at that time
17 would result in the same specific reactivity and the
18 number one?

19 MR. CROSS: That's absolutely right.

20 MR. LAGARIAS: Now, if we look at the TLEVs,
21 why shouldn't we keep the same denominator, the
22 conventional gasoline and the conventional technology of
23 1990, and compare the TLEVs for using conventional
24 gasoline and the TLEV technology? That would give us one
25 number. And if we look at that TLEV using reformulated

1 gasoline, that'll give us another number.

2 I guess the question I'm asking is why can't
3 we keep the denominator consistent with 1990, which is
4 what I hear the automobile industry suggesting.

5 MR. CROSS: I think the key thing to
6 recognize is that even in 1990 when we brought the staff
7 proposal to you, we were aware that better technology
8 generally means lower reactivity. Therefore -- that's
9 why we didn't come to you with a proposal in 1990 to
10 establish the reactivity adjustment factor or soon
11 thereafter.

12 MR. LAGARIAS: All we adopted was mass
13 reductions.

14 MR. CROSS: Right. And we were in the process
15 of setting the reactivity adjustment factors. And the
16 reason we couldn't give you a proposal to establish
17 reactivity adjustment factors then was because we realized
18 that we were going to have to deal with a reduction in
19 in reactivity adjustment factors, which happens as
20 technology improves.

21 MR. LAGARIAS: And we also knew at that time
22 there were benefits in reformulated gasoline that would
23 reduce --

24 MR. CROSS: That's correct. And the point you
25 made about the -- if you did it on conventional gasoline

1 and ended up with a reactivity adjustment factor of one
2 is true. What's happened, though, is that -- is that
3 car manufacturers want to use Phase 2 gasoline to certify
4 and, therefore, we're establishing reactivity adjustment
5 factors which reflect the technology which they'll use
6 for Phase 2 gasoline and keeping the baseline for
7 technology which is required with conventional gasoline.

8 And, fortuitously, that works out pretty close
9 to one. It's slightly less.

10 MR. LAGARIAS: Sorry for the interruption

11 CHAIRWOMAN SHARPLESS: The second question, though,
12 was getting to the -- why you feel that the sample that
13 you have -- -- that the lay people have that the bigger
14 your sample is the better the numbers that are going to
15 come out. So, why does the staff feel that, given the
16 cars that you tested, that you feel so confident with the
17 numbers that you came out with as an average?

18 MR. ALBU: I'll give that a try one more time.

19 Basically, the denominator, the lower part of
20 the RAF equation, is the stringency part of the RAF
21 equation. Once we demonstrate that six vehicles --
22 basically vehicles pulled from dealer showrooms -- equipped
23 with heated catalysts could achieve a certain grams of
24 ozone per gram of NMOG value -- in this case, 3.13 for
25 LEVs -- we feel that that demonstrates that, with those

1 six cars, that's something that's possible to do readily
2 easily. And if the manufacturer wants to duplicate that
3 kind of performance, they can go and get one of the cars
4 and retest it and find out what they do and do the same
5 thing.

6 So, there's nothing magic about the cars we
7 used. It's just that, when equipped with a heated
8 catalyst, which lowers specific reactivity in and of itself,
9 the level of technology -- rather, the level of reactivity
10 achievable has been demonstrated with six cars. It
11 doesn't take 100 cars to show that something is possible.

12 I would have been happy, frankly, to take two
13 cars we used in 1990, look at the reactivity for the
14 denominator from just those two cars. But just to make
15 sure that it wasn't something anomalous about those two
16 cars, we built up four more.

17 And, frankly, I think it's extravagant to take
18 six cars to demonstrate something is feasible. To me,
19 once you've done it on one or two cars, that's enough.
20 If you take six cars and show it, it certainly says that
21 it can be done and surely that it shows that it -- what
22 I'm saying is, you certainly can't say it can't be done.
23 I guess that's what I'm trying to say.

24 MR. BOYD: Madam Chair? The difference in
25 semantics here -- we're not trying to do what a random

1 statistically valid sample of some population. In
2 effect -- and here's the semantics. In effect, we're
3 establishing a baseline BACT -- if I can take it from the
4 stationary area -- we're setting a best available control
5 technology benchmark against which to measure things.

6 And it happens to be kind of the denominator
7 of a certain equation. But it isn't from mathematical
8 statistics as much as it is the feasibility of a performance
9 level, which becomes -- if I might -- BACT, RACT, or
10 whatever acronym you might want to use.

11 MR. ALBU: When it gets to the numerator,
12 though, that's where we could look at the variety of vehicles.
13 Because we're trying to characterize the vehicle fleet
14 in the numerator. And the point is, we want to know what
15 vehicles/fuel combinations will be out there without going
16 through a lengthy speciation process for every engine
17 family.

18 So, to do that, we would like the numerator to
19 properly reflect what's actually going to be built.

20 And right now, all we can do is take some pretty good
21 guesses based on technology we have and fuels we expect
22 will be out there, particularly Phase 2 gasoline.

23 So, I think where industry could really help
24 in this proposal is in the numerator more than the
25 denominator. Because they have more vehicles. They're more

1 in tune with what they might be actually producing. And
2 that's where we can use the help primarily I think.

3 As far as the denominator, there's not much
4 more we can do. Six vehicles. What more can we do? It
5 demonstrated what we were trying to do is feasible.
6 With the numerator, there's still room to provide more
7 data. We'd be glad to accept it and use it. And, in
8 addition, if we find out that the data that was provided
9 was skewed in any way, when we go to do in-use compliance
10 testing, we will do speciation ourselves. If we find out
11 that the numerator was inappropriately set because the
12 vehicle was somehow biased some way, we will go back and
13 collect that.

14 Right now, we're just trying to estimate
15 the numerator that is going to be out there and take a
16 representative sample. The denominator is not the same
17 issue. It's a different issue.

18 CHAIRWOMAN SHARPLESS: Yes, Dr. Wortman.

19 DR. WORTMAN: Along the lines of Mr. Lagarias'
20 questions, I think we're presenting the industry with a
21 sporting challenge of a fast moving target.

22 (Laughter.)

23 DR. WORTMAN: But that's beside the point.
24 However, with the denominator, you must have done a
25 statistical analysis on that, a regression? What is the

1 confidence level?

2 MR. ALBU: With the six cars we have, we felt
3 there was very close agreement.

4 DR. WORTMAN: You didn't do a statistical
5 analysis on test data?

6 MR. ALBU: Well, six cars does not lend itself
7 to a lot of analysis.

8 DR. WORTMAN: That's precisely the point I'm
9 making.

10 MR. ALBU: But my point is that that number
11 is not expected to change in the future. It's fixed.

12 DR. WORTMAN: But you haven't statistical
13 analysis. You cannot base your confidence on anything.

14 CHAIRWOMAN SHARPLESS: I'm not sure that the
15 statistical analysis was what this was about. This was
16 about what types of technology you put on a car to meet
17 the levels that were established; is that not right,
18 Mr. Albu?

19 MR. ALBU: That's correct. If the industry
20 wants to provide us --

21 CHAIRWOMAN SHARPLESS: Proving technological
22 feasibility.

23 MR. ALBU: That's correct. I think, again, that
24 the data that we saw was close enough car to car that the
25 value we established was reasonable. Every fuel/vehicle

1 combination will have a basically unchanging baseline.

2 So, even if we're off by a slight amount,
3 there's no bias to any fuel/vehicle combination. There's
4 a fixed value. It's not meant to change in the future,
5 unless there's some small analytical changes or things like
6 that.

7 But the precision of that value is not that
8 critical. What's important is that we set it and move on
9 with it, because every fuel's going to be compared on the
10 same basis. And there is no bias in fuel/vehicle
11 combinations.

12 CHAIRWOMAN SHARPLESS: Mr. Bilbray?

13 SUPERVISOR BILBRAY: You know, I almost want to
14 go back to Mr. Boyd's comment, because if you go to
15 stationary sources, if you had six different power plants
16 designed differently, build by different people, and
17 six of them in the State have been able to be retrofitted
18 with a certain device to get a certain emission level, we
19 would then say that that is, you know, we're going to
20 accept that that means this technology is feasible until
21 proven otherwise. Or at least the odds are overwhelming
22 that it's feasible in most applications.

23 It doesn't mean that it's going to be feasible
24 in all applications, but darn well enough to be able to
25 justify using that as a standard. And we hear that all the

1 time with stationary. "Well, that doesn't mean that just
2 because all these plants have had it placed on their
3 stacks that it can be applied to all of them."

4 But that darn well means that the odds are that
5 the great majority of them will. And I think there is an
6 argument of saying you can't apply it everywhere. But the
7 fact is we've got to apply it. We've got to hold the
8 standard. And there may be applications where there's
9 major problems. But right, with consistency with our
10 stationary sources, we make them tow the line. And that's
11 the standard, and that's the standard you're going to live
12 by if we can prove that it overwhelmingly has been proved
13 to be feasible.

14 CHAIRWOMAN SHARPLESS: I think the other point
15 to be made is these are retrofitted. I mean, these are not
16 cars that are originally manufactured. These are cars that
17 were taken from rent-a-car agencies and then the
18 electrically heated catalysts were installed by ARB
19 staff, and run to get these low reactivity figures.

20 I mean, if ARB staff can do it on a rent-a-car --
21 (Laughter.)

22 CHAIRWOMAN SHARPLESS: -- it makes you ponder,
23 doesn't it?

24 SUPERVISOR BILBRAY: Especially when they rent
25 the staff, too.

1 (Laughter.)

2 CHAIRWOMAN SHARPLESS: Dr. Wortman.

3 DR. WORTMAN: On the other hand, I come from an
4 industry where the demonstration will exceed any
5 production version. You lucky taxpayers have been buying
6 the production versions, not the demonstrators.

7 A specially prepared model can beat the
8 production model.

9 MR. CROSS: But, Dr. Wortman, these cars were
10 not. These were procured from rent-a-car agencies, and
11 we left the existing catalyst system on the car, which was
12 already in use from people driving these rent-a-cars
13 around, and just put the electrically heated catalyst in
14 there.

15 So, it's not a situation where, you know, where
16 we had some goldplated prototype exhaust system go in on the
17 car. We just added the electrically heated catalyst.
18 We didn't even recalibrate the car.

19 So, there are a lot of things that a car
20 manufacturer can do that we couldn't do to make the car
21 cleaner.

22 DR. WORTMAN: You still don't have a statistically
23 significant sample.

24 MR. CROSS: That's true. But we didn't pick the
25 lowest value either.

1 DR. WORTMAN: Since you don't have a statistically
2 significant sample; you can't say that. You may have
3 plucked --

4 CHAIRWOMAN SHARPLESS: It's true. The number
5 could be a lot lower.

6 (Laughter.)

7 CHAIRWOMAN SHARPLESS: Mr. Trunek, we interrupted
8 your cogent remarks here. Can you figure out where you
9 need to pick out?

10 MR. TRUNEK: I think so. In summary --

11 (Laughter.)

12 MR. TRUNEK: And that's really where I am.
13 In summary, we are supportive of the current proposal --
14 we understand it -- which embodies the joint test
15 procedure, and it does adopt interim RAFs with a
16 full intent that RAFs for model year '98 and beyond will be
17 set at some subsequent point.

18 CHAIRWOMAN SHARPLESS: Great. Now, I'm going to
19 give you an opportunity. Do you have anything to say
20 about zero-emission vehicles?

21 MR. TRUNEK: No, Madam Chairwoman.

22 CHAIRWOMAN SHARPLESS: That's a throw-away,
23 Mr. Trunek.

24 MR. TRUNEK: I do not.

25 CHAIRWOMAN SHARPLESS: Thank you very much.

1 MR. TRUNEK: Thank you.

2 CHAIRWOMAN SHARPLESS: Dennis Lamb, Unocal.

3 MR. LAMB: My name's Dennis Lamb. I am manager
4 of planning for the refining and marketing division of
5 Unocal. I will keep my remarks very brief.

6 And really, the remarks are directed at the
7 fact that a few days ago, we submitted written comments.
8 Included in those comments was a vision that there could be
9 an establishment of interim RAFs; that there could be a
10 review or a renewed look at this.

11 And what I want to say here to -- so that the
12 staff doesn't spend a lot of time trying to summarize the
13 written comments and trying to see if my oral comments
14 comport with those, we think the staff proposal is
15 sufficiently consistent with our recommendation that we
16 would endorse that proposal.

17 At the risk of throwing one more log on that
18 representation comment, I'll just share with you the source
19 of my confusion and what I think may be the source of other
20 people's confusion. And I quote from the staff report.
21 And I believe it's contained in the November 13th
22 supplemental report. It states, and I quote: "In order
23 to establish the specific reactivity numbers for the base
24 gasoline and the fuel being evaluated, it is important
25 to obtain speciated emission data that are representative

1 of the vehicles that manufacturers will actually produce.
2 And what I see happening is a technology setting the
3 baseline and then manufacturers coming forth with vehicle
4 technology that is consistent with that. They don't seem
5 to need that new technology.

6 CHAIRWOMAN SHARPLESS: I appreciate that,
7 because I think that the discussion has brought out that
8 very point, the point of what we're talking about in terms
9 of representative and against what benchmark and against
10 what technology, and in combination with the fuel. So,
11 I appreciate that, Mr. Lamb. I think you're right.

12 But in the discussion with the staff, I think
13 that there's now more clarity on that point as to what
14 that actually means, because you can't take that out of the
15 context of everything that has been written or said here in
16 the record as to what the intent was on how the staff came
17 up with the methodology that they came up with.

18 There's been a lot said, yes.

19 MR. LAMB: That's true. I have no other
20 comments.

21 CHAIRWOMAN SHARPLESS: Any comments or any
22 questions of Mr. Lamb? Thank you very much, Mr. Lamb.
23 Mr. Bea of Chevron?

24 MR. BEA: Good afternoon, Madam Chairman --
25 Chairwoman, members of the Board. My name is Donald Bea.

1 I'm the gasoline emission manager for Chevron USA products
2 company. I'd like to say that we support the testimony
3 given earlier by Mr. Trunek from WSPA, and we have some
4 additional comments of our own.

5 We, in partnership with Texaco, have undertaken
6 a substantial vehicle testing program to evaluate the
7 impacts of Phase 2 gasoline on TLEVs and the reactivity
8 adjustment factors. The baseline specific reactivity,
9 which we determined from our vehicle fleet, substantially
10 is higher than the baseline specific reactivity established
11 by CARB, even though several of the vehicles in our fleet
12 were certified TLEVs. We believe the difference in our
13 fleet selection -- excuse me -- we believe the differences
14 in both fleet selection and analytical methodology
15 contributed to this discrepancy.

16 When testing with Phase 2 gasoline, we determined
17 the reactivity adjustment factor of .96 for Phase 2
18 gasoline. While this was in good agreement with the
19 proposed base reactivity adjustment factor of .98 for
20 TLEVs, it may be a coincidence, since we and CARB used
21 different methods to derive our RF-A.

22 In our experimental work, industry average and
23 Phase 2 gasolines were both tested in the same vehicle
24 fleet. By contrast, CARB's staff used industry average
25 in one fleet of vehicles and Phase 2 gasoline in a different

1 fleet.

2 We strongly believe that due to significant
3 vehicle-to-vehicle variability, it's important that the
4 same fleet be used to test both fuels.

5 In addition, we also agree that all vehicle
6 technologies need to be evaluated.

7 It's also very surprising to us that modeling
8 adjustment factor was initially proposed. As a consequence,
9 we are very pleased with the staff's recommendation today
10 that no modeling correction factor be required for Phase 2
11 gasoline.

12 However, it should be noted that we reach our
13 conclusion for this factor one by a different approach.
14 In our line -- our reasons for this are outlined in our
15 written comments, which I won't go into today.

16 We're also concerned with the staff's selection
17 of LEV vehicles which have been alluded to a number of times
18 already today, but we're also concerned about the low
19 mileage on these vehicles and the lack of durability
20 testing.

21 To summarize, we believe that there are
22 uncertainties in the measurement methodology, the modeling,
23 the fleet selection which could significantly impact the
24 baseline specific reactivities and/or reactivity adjustment
25 factor. These issues need to be resolved. We are pleased

1 to hear the suggestions made by staff this afternoon. They
2 seem to address some of our concerns. I thank you. I'd
3 be happy to answer any questions you may have.

4 CHAIRWOMAN SHARPLESS: Yes. Questions of
5 Mr. Bea?

6 Mr. Lagarias.

7 MR. LAGARIAS: You believe that the differences--
8 did you use different values for the maximum incremental
9 reactivities?

10 MR. BEA: No, we did not. We used the same
11 values that everybody else was using, around the Carter
12 factors.

13 MR. LAGARIAS: I didn't -- doesn't the fact
14 that these are ratios in determining the reactivity
15 adjustment factors sort of cancel out what the differences
16 in analytical techniques --

17 MR. BEA: No, when I'm talking analytical
18 techniques, I'm talking about really the detailed
19 chromatographic analysis of the components. The procedure
20 we used is very similar to the latest version being used
21 by Auto/Oil. We can analyze up to about 160 compounds.
22 And the procedure used by CARB does not allow you to go that
23 deep. We found quite a significant difference when we just
24 used the compounds that they look at.

25 MR. LAGARIAS: But even so --

1 MR. BEA: If I understand what they proposed
2 to do in this next go-around --

3 (Thereupon, the witness' microphone
4 was cutting in and out, and the reporter
5 could not understand his statement.)

6 MR. LAGARIAS: But even so, I think the fact
7 that you used different analytical techniques both for
8 your denominator and your numerator results, and then get
9 the same essential RAF is verification to both techniques.

10 MR. BEA: The RAF may be. But I think that
11 also could be a coincidence. Because, again, we used a
12 vehicle-to-vehicle comparison on our numbers. They used
13 two different fleets. And so, we're not really comfortable
14 that that is a comparison or not. It may be.

15 MR. LAGARIAS: Well, we're not particularly
16 comfortable with that either. But I think, under the
17 circumstances, it's the best we have available at this
18 time. And that's why we're going to an interim RAF.

19 MR. BEA: I'm really not disagreeing with that.
20 The area that I do have concerns with is the base
21 reactivity which has been discussed numerous times already
22 today. And what we find is that we get a much higher
23 value than CARB has. And part of that we think is due to
24 the fleet selected and part is also due to the analytical
25 techniques.

1 CHAIRWOMAN SHARPLESS: Well, let me ask staff.
2 You've had an opportunity to review Chevron's fleet that
3 they used to come up with their reactivity factor. Do
4 you have any comment on it?

5 MR. ALBU: Well, basically --

6 CHAIRWOMAN SHARPLESS: Steve, up close or --
7 (Speaking of microphone.)

8 MR. ALBU: Basically, there were four vehicles
9 that were run on conventional gasoline under TLEV
10 standards in their fleet. Three of those four vehicles
11 were General Motors cars, and we have seen some evidence
12 that General Motors' calibration techniques tend to result
13 in higher specific reactivity than other manufacturers.
14 And we think, in this case, that part of the reason is
15 that -- that they have higher values -- is because of that
16 fleet selection as we just heard.

17 I think that, as was suggested, we should work
18 to look at these differences further. And I think the
19 problem we've talked about will help resolve some of this.
20 It's a product of fleet selection I believe.

21 CHAIRWOMAN SHARPLESS: Okay. And one other
22 point, in your letter, you say -- this is in your
23 paragraph -- the end of the first page.

24 MR. BEA: Repeat the numbers or give me an
25 idea --

CHAIRWOMAN SHARPLESS: Well, it's about your

1 belief. You strongly believe that due to significant
2 vehicle-to-vehicle variability, it is important that the
3 same vehicle fleet be used to test both fuels.

4 MR. BEA: Yes.

5 CHAIRWOMAN SHARPLESS: Okay. Let me ask you.
6 What do you do in the case of compressed natural gas
7 cars?

8 MR. BEA: I knew you were going to ask something
9 like that. I thought you'd use LPG or something similar.

10 CHAIRWOMAN SHARPLESS: No, I like CNG, because
11 it makes it more difficult for you to answer.

12 MR. BEA: Well, that's an example. Obviously,
13 in certain situations like that, that's an impossibility,
14 particularly if it's a dedicated vehicle, which you're
15 talking about a dedicated CNG or dedicated methanol
16 vehicle. Where you don't have the variability to do that,
17 you have to use different fleets.

18 But I guess what we're talking about is the
19 approach used by CARB. If you use a large amount of
20 vehicles so that you do have a statistically sound basis
21 of all the technologies being considered, then the approach
22 of using one set of vehicles to generate the base with
23 conventional fuel and had a different set used to generate
24 the denominator -- numerator, excuse me -- it's a valid
25 approach. The question is, we don't -- we're not certain

1 that there's been an adequate number of vehicles used to
2 establish either the denominator or the numerator.

3 CHAIRWOMAN SHARPLESS: The fact that the
4 differences are so small in the ones that they did test,
5 I mean, I wonder if a larger field of cars is going to
6 give you a much different picture?

7 MR. BEA: Well, if you look at the variability
8 on -- just take the TLEV base reactivity. There's quite a
9 variation between the top and bottom, plus or minus 15
10 percent in either direction. That's a fairly large
11 number.

12 CHAIRWOMAN SHARPLESS: But you --

13 MR. BEA: This is not talking -- he sort of
14 implied on the LEVs it's a small difference. But I think,
15 even on LEVs, we haven't addressed that -- there's
16 probably going to be different technologies being used for
17 LEVs. They have an electrically heated catalyst. Why
18 should they preclude it from being considered? There was
19 a lot of discrepancy on here.

20 I think some of these things will be ironed
21 out in the next go-around. But we had some feelings that
22 they were getting locked into some things that we don't
23 really want --

24 CHAIRWOMAN SHARPLESS: You may be right that,
25 in terms of testing, you know, we're going to find more

1 verification for what we're doing, or we're going to find
2 different answers.

3 I think the thing that I want to make clear
4 is that we're not talking about using an approach that
5 lessens the standards that the Board established by
6 creating a RAF program in the first place.

7 And the ozone per mile, we're still looking at
8 to be as low as we expected to be when we adopted the
9 1990 LEV program; right, staff?

10 MR. CROSS: Absolutely.

11 CHAIRWOMAN SHARPLESS: And because it seems
12 that sometimes we agree to these proposals and then come
13 back because people have different understandings as to
14 what we would agree with -- that's why I keep reiterating
15 this point over and over again, so that there is no misunder-
16 standing as to -- at least from the Chair's point of view --
17 what we hope to gain out of this joint effort testing
18 process.

19 MR. BEA: I hate to stand up for the "Autos,"
20 but I think one of the things they alluded to earlier
21 was cost-effectiveness. And, you know, if you start
22 using the best technology to --

23 CHAIRWOMAN SHARPLESS: Be careful, the cost-
24 effectiveness might come down on you.

25 MR. BEA: I know it is.

(Laughter.)

1 MR. BEA: To generate the reactivity factors
2 that might cause the autos to change their technology
3 in the rest of the vehicle to get down to that or use
4 that technology. That might cost them a lot of money to
5 do that, and that would have to be incorporated into the
6 analysis.

7 MR. CROSS: It already was.

8 MR. BEA: I don't think so. We're talking
9 about different types of start-ups and stuff like that.

10 MR. CROSS: In the 1990 rulemaking, we didn't
11 assume Phase 2 gasoline at all.

12 MR. BEA: I'm not talking Phase 2 gasoline.
13 I'm just talking about the vehicle you run.

14 MR. CROSS: Well, we assumed EHCs on all of
15 them. And, in fact, Phase 2 has taken EHCs off a whole
16 lot of LEVs.

17 MR. BEA: I'll leave that lie.

18 CHAIRWOMAN SHARPLESS: Yes. That's for another
19 discussion, not here.

20 Okay. Any other questions of Mr. Bea? Thank
21 you very much, Mr. Bea. Dan Gong, California Energy
22 Commission.

23 MR. FONG: Good afternoon. Chairwoman
24 Sharpless and other distinguished Board members, my name is
25 Dan Fong. I'm manager of the transportation technology

1 and fuels office at the California Energy Commission.

2 My remarks today and the written statement that
3 I am sending to you are made on behalf of the Energy
4 Commission.

5 And, as I have stated in the past, the
6 Commission's interest in this matter before you today is
7 based on our responsibilities in ensuring a reliable and
8 affordable energy supply consistent with protecting the
9 State's environment, its public health, safety, and
10 general welfare.

11 The low-emission vehicle and clean fuel
12 regulations are important provisions that encourage a fuel-
13 on-fuel competition and, in the Commission's mind, can
14 bring energy diversity to the transportation sector. And
15 that in itself provides a worthwhile measure of energy
16 security.

17 We commend the Board staff in developing
18 important vehicle emission control parameters, particularly
19 reactivity adjustment factors and for maintaining their
20 fuel neutral character of these regulations.

21 The Commission agrees with your staff's approach
22 in using the Carter maximum incremental reactivity scale,
23 combined with adjustments from airshed modeling results.

24 This is the most defensible and valid approach
25 in determining the ozone producing potential of all fuels.

1 Thus, we find the proposed reactivity adjustment factors
2 for Phase 2 gasoline to be fair and reasonable.

3 With your staff's recent consideration of fuel
4 cycle emissions, the conditions for fuel-on-fuel
5 competition will be enhanced, since emissions upstream of
6 the vehicle should also be included in comparing air
7 quality attainment options.

8 Alternative fuels clearly have reactivity
9 benefits over conventional fuels, and it's important to
10 credit where it is due. We also encourage the staff to
11 further explore the reactivity benefits that might be
12 associated with alternative fuel evaporative and running
13 loss emissions from vehicles.

14 The Commission agrees with your staff's
15 decision regarding the adjustment of the 50 degree
16 Fahrenheit NMOG multiplier for all transition low-emission
17 vehicles. This important flexibility will allow further
18 needed development for all fuels.

19 The Commission agrees with the proposed baseline
20 specific reactivities for low-emission vehicles and
21 ultra low-emission vehicles and supports their adoption.

22 In our view, the establishment of these baseline
23 specific reactivities are basic to the development of
24 reactivity adjustment factors for all clean fuels.

25 We also recognize that the Board will be

1 flexible and will make adjustments in these regulations
2 should the Carter factors be revised or if other
3 methodological improvements appear necessary to maintain
4 the scientific integrity of specific reactivities and
5 reactivity adjustment factors.

6 In closing, I would like to emphasize the
7 importance of the low-emission vehicle regulations and
8 the Commission's view that they have great potential to
9 encourage fuel diversity in the transportation sector.

10 We also strongly recommend that the Board
11 adopt the staff's proposal and urge you to continue the
12 determination of reactivity adjustment factors for various
13 fuels, especially alternatives, in combination with the
14 three different low-emission vehicle categories as these
15 vehicles become available from auto manufacturers.

16 I'd be pleased to respond to any questions.

17 CHAIRWOMAN SHARPLESS: Thank you very much,
18 Mr. Fong. We appreciate your support as a sister agency.
19 And I don't know -- are there any questions by members of
20 the Board?

21 No. Your statement was quite clear. Thank you.

22 Leo Thomason, California Natural Gas Vehicle
23 Coalition.

24 After you, we'll take a slight break.

25 MR. THOMASON: Madam Chairwoman, members of the

1 Board, members of the ARB staff, my name is Leo Thomason.

2 I'm the executive director of the California
3 Natural Gas Vehicle Coalition. Members of the coalition
4 are actively involved in marketing natural gas as a vehicle
5 fuel and natural gas vehicles in the State of California.

6 Currently, there are 38 public access fueling
7 stations and 18 private access natural gas fueling
8 stations in the State.

9 The coalition has been involved in the reactivity
10 adjustment factor determination process and has
11 supported the establishment of RAFs as a mechanism to
12 identify and track contributions to ozone improvement
13 made by various alternative fuel vehicles.

14 The coalition continues to support ARB's
15 activities and RAF determination.

16 Members of the coalition have identified natural
17 gas vehicles that meet ARB's low-emission vehicle
18 requirements and provided those vehicles to ARB for RAF
19 determination for light-duty natural gas-powered TLEVs.
20 This process is continuing and coalition member companies
21 will provide additional natural gas vehicles to the ARB
22 for RAF determination when they do that for medium-duty
23 natural gas-powered TLEVs.

24 As other speakers have said today, we also
25 support the development of a baseline RAF for alternative

1 fuel low-emission vehicle.

2 The coalition supports and has worked with
3 staff to establish the methodology for including reactivity --
4 or excuse me -- for including the reactivity of methane
5 in a NMOG reactivity calculation procedure for natural gas
6 vehicles. However, we believe that an additional step
7 in the reactivity calculation procedure needs to be taken.
8 That step is the inclusion of CO reactivity in the RAF
9 process. The reactivity of CO is between 8 and 10 times
10 that of methane.

11 While the ARB has a standard for CO, the
12 reactivity of CO is not currently included. And I want to
13 point out that we're not proposing to strengthen or
14 tighten the CO standard, but rather to add the reactivity of
15 CO to the reactivity calculation process.

16 We believe that the reactivity of CO should be
17 included in the RAF process.

18 That concludes my formal comments. And I'd be
19 willing to answer any questions that you might have.

20 CHAIRWOMAN SHARPLESS: Adding a new wrinkle, huh?

21 MR. THOMASON: Not really. We've testified on
22 that issue before.

23 CHAIRWOMAN SHARPLESS: Okay. Let me ask staff
24 about that. I know we're including methane, but what are
25 we doing for CO?

1 MR. ALBU: We are including methane for CNG
2 vehicles only, because they're the only vehicles really
3 that exhibit much of it.

4 In the case of CO, we believe that when LEVs
5 and ULEVs come into the market, the CO differences between
6 CNG and Phase 2 gas and our other types of cars will not
7 be significantly different.

8 So, we have not at this point tended to include
9 that. The same way, we think that NOx emissions won't be
10 much different, so we haven't included NOx in these
11 calculations. So, since we don't think there's much
12 difference, there isn't much gained by adding a complexity
13 to the process.

14 CHAIRWOMAN SHARPLESS: What do we have as grounds
15 for making the statement that we don't think that there would
16 be much difference?

17 MR. ALBU: Well, the test cars that we have
18 looked at for LEV and ULEV categories have about the same
19 CO emission level as the CNG cars that we tested in the
20 same categories.

21 So, for that reason, right now, we don't see
22 a need to make this adjustment and add, again, more
23 complexity.

24 However, in the future, if we do see a
25 significant difference,, I think there would be merit in

1 making this kind of a change, and I think we could take
2 it under advisement,

3 CHAIRWOMAN SHARPLESS: Mr. Cross?

4 MR. CROSS: One additional note is that we have
5 resisted putting in CO activity because there's a separate
6 CO standard anyway, which has no reactivity associated
7 with it.

8 So, we felt that the CO emissions were
9 appropriately dealt with through the CO standard. I think
10 that his suggestion, as Steve mentioned, at very low
11 levels, we may need to look at this issue again, just as
12 we've looked at methane again.

13 But the original philosophy was there's already
14 a standard for CO, so why include it in the NMOG
15 calculation?

16 CHAIRWOMAN SHARPLESS: Well, obviously, he must
17 think that there's some benefit to natural gas cars, because
18 they might be producing less CO and, therefore, that would
19 be picked up if we included in the RAF factor. Do you
20 have any evidence at all to present to the Board staff
21 at some point that would support that conclusion?

22 MR. THOMASON: We'd like them to revisit that
23 after we complete the investigation that they're conducting
24 into the establishment of the reactivity factors for light-
25 duty vehicles. We are going to contribute eight more

1 vehicles to that process, and perhaps we can revisit that
2 at that time.

3 CHAIRWOMAN SHARPLESS: Is it designed to look
4 at the CO reactivity factor?

5 MR. CROSS: We'll see it when we test the
6 vehicles.

7 CHAIRWOMAN SHARPLESS: Okay.

8 MR. THOMASON: The vehicles have to meet the
9 TLEV emission standards in order to enter into the program
10 to be considered for reactivity determination for a
11 transitional low-emission natural gas vehicle.

12 CHAIRWOMAN SHARPLESS: Okay. Well, as
13 Mr. Cross says, if we see some significant advantage to
14 that, then that would be something probably that staff would
15 want to bring back and advise the Board, and then we
16 would decide what action needed to be taken. So, we
17 appreciate you continually bringing this to our
18 attention, and your participation in that testing of those
19 cars.

20 MR. LAGARIAS: Madam Chair?

21 CHAIRWOMAN SHARPLESS: Yes, Mr. Lagarias.

22 MR. LAGARIAS: I'd like to ask the staff, just
23 what is the significance of CO in the formation of ozone
24 as a reactant in this process? Is it a major player?

25 CHAIRWOMAN SHARPLESS: Remember the -- was it the

1 ethanol people who were coming in and saying that there
2 was a significant advantage if you reduced CO, you would
3 create less overall reaction in hydrocarbon and NOx?
4 Was that their argument?

5 Bart?

6 MR. CROES: CO has a very low reactivity. It's
7 more than methane, but it's still lower than all other
8 hydrocarbons. But the only time it can play an
9 important role is if the mass of CO is so much larger than
10 hydrocarbon. And apparently that's what happens in some of
11 the CNG vehicles.

12 MR. LAGARIAS: Along similar lines, but not
13 identical, the MIRs that we're identifying for the various
14 hydrocarbon compounds, are the maximum incremental
15 reactivity -- but, as I recall, they don't all occur at the
16 same time. Some take longer to react. And how is that
17 taken into the modeling, the fact that some of these
18 compounds may have a high MIR, but it takes a longer time
19 for them to get into the play?

20 MR. CROES: For each hydrocarbon, we use kind of
21 the -- what we call the average reaction time. So, that is
22 all taken into account. The reason something like CO
23 or methane have very low reactivity is because they take
24 such a long time to react.

25 MR. LAGARIAS: Thank you.

1 CHAIRWOMAN SHARPLESS: Okay. Thank you,
2 Mr. Thomason. We're going to take a break, a five-minute
3 break here for the court reporter. We'll be back at
4 five to 4:00.

5 (Thereupon, there was a recess taken.)

6 CHAIRWOMAN SHARPLESS: We'll go back on the
7 record and ask the audience to please take their seats.

8 I'll call up Mr. Paul Goodson from Southern
9 California Gas.

10 MR. GOODSON: Good afternoon. My name is Paul
11 Goodson, and I'm here today on behalf of Southern
12 California Gas Company.

13 SoCal Gas is the largest natural gas distribution
14 utility in the United States. We serve approximately
15 one trillion cubic feet of gas each year to over 14
16 million people in the greater Southern California area.

17 This represents approximately six percent of
18 all the natural gas distributed through the United States.

19 Without commenting on the accuracy of any of the
20 proposed reactivity adjustment factors, SoCal Gas would
21 like to express its support to the fundamental concept of
22 using these factors that place different fuels on an
23 equal footing in terms of their potential to form ozone.

24 We believe this is a logical extension of the
25 establishment of a nonmethane hydrocarbon standard, which

1 was the first and most significant step in differentiating
2 vehicle emissions according to their ozone forming
3 potential.

4 And if you'll permit me, I'd like to make a
5 brief remark also on the carbon monoxide issue, which
6 Mr. Thomason addressed a few moments ago.

7 Before your Board today is a proposal to
8 include the reactivity of methane in the calculation of
9 ozone forming potential. We accept the inclusion of
10 methane as a natural outcome of the reactivity adjustment
11 system. In the same spirit, however, SoCal Gas proposes
12 that carbon monoxide emissions also be included.

13 Carbon monoxide between four and ten times
14 more reactive at forming ozone than methane. Furthermore,
15 the mass rate of its emissions from vehicles are many times
16 that of methane.

17 The combined effect of higher reactivity and
18 higher mass emissions can make carbon monoxide up to 100
19 times more potent at forming ozone than methane emissions
20 from a natural gas vehicle.

21 If the Board believes that methane is of
22 sufficient concern to include its ozone forming potential,
23 then legally, the Board cannot escape the same conclusion
24 with respect to carbon monoxide. I realize that this
25 suggestion has been made before, and staff's consistent

1 response has been that a vehicle standard already exists
2 for carbon monoxide.

3 However, I would submit to you that a vehicle
4 standard exists for CO because an ambient air quality
5 standard exists for CO. But the vehicle standard for
6 CO says nothing about the contribution of CO to ozone
7 formation.

8 Staff notes that to preserve the integrity
9 for the RAF concept, methane must be included in the
10 calculation. We agree with this. But we also believe
11 CO must be included for the same reason. Please understand
12 that I'm not advocating a typing (sic) of the CO standard.
13 I don't think that would be possible even if someone was
14 interested in that. I thought I'd get that out before
15 being physically assaulted by any of the interested parties
16 here today.

17 I'm only proposing the reactivity of CO be
18 included with the various hydrocarbons to provide the
19 greatest possible differentiation in the fuels and to
20 preserve the integrity of the RAF process.

21 Today, you're also considering several
22 modifications to the evaporative emission standard. One
23 purpose of these modifications is to exempt hybrid electric
24 vehicles that have sealed fueled systems from the
25 evaporative standards. We propose that the same exemption be

1 applied to natural gas vehicles, which also employ clean
2 fuel systems.

3 While we are not commenting today on the
4 proposed values for the baseline specific reactivity of
5 gasoline, nor on any of the proposed RAF figures, we urge
6 the Board, as it implements this program, to assure that
7 sufficient flexibility exists to incorporate new
8 and more scientifically valid data as they become available.
9 In other words, I think this is consistent with the
10 call of others for interim figures.

11 Thank you for the opportunity to comment. And
12 I'd be pleased to answer any questions.

13 CHAIRWOMAN SHARPLESS: Yes, Mr. Goodson, we
14 did discuss with the last witness the CO issue, and when
15 it would be appropriate to consider CO's reactivity
16 factors, and the fact that there will be testing going on.
17 And if we find that the evidence from that testing convinces
18 the staff that they should come back to the Board and
19 suggest a CO RAF, I think that's the process that's
20 established here as to the approach to address your
21 particular issue. And you are probably aware of that?

22 MR. GOODSON: I was aware of that, and I just
23 wanted to lend our support to that approach. That's a
24 fair approach.

25 CHAIRWOMAN SHARPLESS: Okay. Thank you very much.

1 Any further questions? Yes, Dr. Wortman.

2 DR. WORTMAN: You mentioned that CO is much
3 more reactive methane, and there's much more of it,
4 of course. What would be the contribution of the overall
5 reactivity?

6 MR. GOODSON: I can only answer that question in
7 terms of the data that staff has recently released for
8 methane and CO.

9 If you look at the maximum incremental
10 reactivity numbers that came out in the December 15th
11 report -- I'm sorry. I can't cite the report now. I've
12 got it back in my chair. But those values range from
13 anywhere of a ratio of four for the incremental
14 reactivity of CO compared to methane.

15 Now, taking into account a hypothetical
16 situation where you have a vehicle that may emit let's
17 say three grams of carbon monoxide per mile against, again,
18 another hypothetical .3 grams of methane per mile. There's
19 a ratio of 10 right there. So, you have 10 times the mass
20 emissions, and then you have anywhere from four to ten
21 times the reactivity. So, you're dealing with something
22 of the order of 40 to 100 times greater ozone production
23 potential from CO over that of methane.

24 DR. WORTMAN: But what would be the
25 contribution for the total reactivity of fuel? I don't

1 want to put you on the spot.

2 MR. GOODSON: I'm sorry. I don't have that
3 information. It certainly would be a good piece of data
4 to have. I'd be glad to work with staff to develop
5 that if there's an interest.

6 DR. WORTMAN: How about you, Bob? Do you have
7 a number? (Addressing Mr. Cross)

8 MR. CROES: We had worked this out a year ago.
9 I just don't recall the number. But I think for TLEVs it
10 was much less than 10 percent, maybe even less than five.
11 But, I think, when you got down to the -- some of the
12 vehicles that were tested which were more in the LEV
13 category, it got to be quite a bit more. I believe
14 that it was not above 20 percent.

15 DR. WORTMAN: But that's quite a bit.

16 MR. CROES: Yeah. I don't recall the number.
17 It's somewhere between zero and 20.

18 DR. WORTMAN: We just spent half a day arguing
19 over essentially five percent -- from 3.4 to 3.1, didn't
20 we?

21 CHAIRWOMAN SHARPLESS: Okay. Mr. Goodson, thank
22 you very much.

23 I'd like to ask David Modisette to come up,
24 California Electric Transportation Coalition.

25 MR. MODISETTE: Thank you, Chairwoman Sharpless,

1 members of the Board.

2 I'm Dave Modisette. I'm the executive director
3 of the California Electric Transportation Coalition.

4 The members of the coalition, for those of you
5 who don't know, are the Los Angeles Department of Water &
6 Power, Pacific Gas & Electric Company, the Sacramento
7 Municipal Utility District, San Diego Gas & Electric
8 Company, and the Southern California Edison Company.

9 I have submitted a written statement, which
10 we would like to have included in the record, which I will
11 not read in its entirety, but I would like just briefly
12 to summarize it for you.

13 The California Electric Transportation Coalition
14 has consistently supported the California Air Resources
15 Board low-emission vehicle regulations specifically as they
16 pertain to zero-emission electric vehicles and hybrid
17 electric vehicles. We previously commented on the proposed
18 regulatory changes before you today, and we've worked
19 with your staff throughout their development.

20 We would urge your adoption today of the staff
21 proposed revisions pertaining to zero-emission vehicles,
22 including the allowance of certain fossil fired heaters
23 in ZEVs, the clarification of the ZEV credit system, the
24 expansion of the weight category ZEV, ZEV mandate
25 compliance.

1 I should also say that we've been pleased with
2 the dialogue between the automakers and the staff on the
3 hybrid electric vehicle testing procedure, and we'd like
4 to see that dialogue continue.

5 Just in closing, let me say that we would like
6 to continue to work with you and your staff on these issues.

7 I'm available for any questions.

8 CHAIRWOMAN SHARPLESS: Thank you, Mr. Modisette.
9 I would like to recognize that your group that's included
10 in the California Electric Transportation Coalition are
11 the types of people that we need to help to bring the
12 pieces together to make ZEVs a reality in California.
13 And I appreciate the fact that you are a relatively new
14 organization, and you've been doing good work. And thank
15 you for your help, and we look forward to working with
16 you still.

17 Are there any additional questions? No. Thank
18 you.

19 MR. MODISETTE: Thank you very much.

20 CHAIRWOMAN SHARPLESS: Paul Wuebben, South Coast
21 Air Quality Management District.

22 MR. WUEBBEN: Good afternoon, Madam Chairwoman
23 and members of the Board. My name is Paul Wuebben. I'm
24 the fleet fuels officer for the South Coast Air Quality
25 Management District. And I'm here on behalf of the

1 district's executive officer, and am very pleased to be
2 able to present our comments to you today.

3 The district especially appreciates ARB's
4 previous efforts in implementing your landmark low-emission
5 vehicle/clean fuels program, because we believe this is
6 critical to the success of our air quality management plan
7 and is, in fact, a testament to your staff's and your
8 Board's commitment to improving air quality in California.

9 The proposed reactivity adjustment factors
10 for Phase 2 gasoline were developed through a rigorous
11 peer review process, and we support them without
12 equivocation. They reflect the most up-to-date scientific
13 understanding of air quality and the complexities of
14 photochemistry.

15 The district, therefore, also wants to
16 compliment your staff in working with a wide range of
17 organizations and parties in its development. I'd also
18 like to single out the Auto/Oil participants for their
19 extensive work and demonstration of the cooperation
20 that is being on by your staff.

21 The district agrees with the continued use of
22 the maximum incremental reactivities that are forming the
23 basis of these RAFs. The MIR approach is a justified
24 approach, given that in an area such as South Coast,
25 hydrocarbon controls are of greatest benefit, and

1 particularly where population densities are especially
2 affected by hydrocarbon emissions.

3 Furthermore, coupled with ongoing stringent
4 NOx controls, the MIR approach continues to successfully
5 demonstrate the basinwide ozone control strategies which
6 are being pursued by our Board are effective.

7 And the district also supports the proposed
8 specific reactivity of the baseline reactivity (sic), the
9 denominator, which has been discussed today. We believe
10 that those baseline reactivity levels are needed right
11 now to allow auto manufacturers to expedite their
12 development of low-emission vehicle and ultra low-emission
13 vehicle technologies, such as electricially heated
14 catalysts and alternative fuels.

15 Without these baseline factors, manufacturers
16 would be inhibited from seriously pursuing nongasoline
17 options for complying with increasingly stringent LEV
18 standards. And while more data will inevitably be
19 developed to refine those factors, your staff has proposed
20 very reasonable initial baseline values.

21 We also believe that your staff have been
22 appropriately conservative by establishing a constant
23 baseline between the LEV and ULEV factors, that 3.13 level
24 for both LEV and ULEV.-- pending the acquisition of data.

25 I'd also like to reiterate a point that the

1 RAFs and the baseline factors not be set at a level that
2 would be at least informally used to relax the LEV
3 standards.

4 The simple policy here, I think, which was being
5 enumerated before, is that the denominator in that calculation
6 not be used in a way which would perhaps -- perhaps a
7 covert way by manufacturers, be used to relax the actual
8 standards.

9 So, I think the principle there of maintaining
10 integrity of your LEV standards is important. I'm sure
11 that the program is designed to reflect that fundamental
12 diplomacy.

13 I'd also like to add that the latest air quality
14 modeling performed for the ARB by Carnegie-Mellon
15 University reinforces our confidence in the proposed
16 RAFs. Your staff has been very diligent in looking at and
17 overseeing that effort. The best emissions inventories
18 are being used by the Air Resources Board. They
19 incorporate the latest data available from not just the
20 Auto/Oil study but also from Chevron Research and, of
21 course, in your own independent testing.

22 Furthermore, you have separate ozone episodes
23 which are being evaluated and separate statistics of
24 ozone sensitivity in evaluating that data. So, we think
25 that that's a very rigorous analysis that has been performed.

1 We also think that the proposed RAFs and
2 baseline factors proposed today are a logical step in the
3 progression of our scientific understanding of emissions
4 reactivity. And in order to continue that progress and
5 refining our understanding, the district is, in fact,
6 sponsoring additional environmental chamber analysis
7 through the statewide Air Pollution Research Center, and
8 we're happy to become sponsoring that (sic) with the
9 Air Resources Board, along with the Coordinating Research
10 Council.

11 So, I think that that demonstrates the
12 cooperative effort which is being laid as a foundation
13 for this continuing RAF development.

14 And I'd like at this point -- and I still -- I
15 think it would be germane to remind you of the testimony
16 of the district's chief scientist, Dr. Allen Lloyd,
17 when we last addressed the subject in November of 1991,
18 when he stated that on the basis of his experience in
19 science and technology, he recommended that you not delay
20 at any stage the acquisition of the data and that you not
21 delay your actions.

22 For example, having been involved with chemical
23 mechanism development for nearly two decades, Dr. Lloyd
24 pointed out, "I believe that even if we delay for an
25 additional several years, we will still be faced with

1 uncertainties. Each time we believe that all the science
2 is understood, we are constantly surprised," and, on the
3 other hand, thinks that, "We now understand the
4 system sufficiently to avoid making serious errors."

5 Certainly, the data development that's gone on
6 in the last year and a half has fully confirmed
7 Dr. Lloyd's confidence. So, on that basis, the district
8 strongly endorses the proposed RAFs and baseline factors.
9 I'd also like to just add that a second time here related
10 to your hybrid electric vehicle considerations, and we're
11 certainly fully supportive of the electric vehicle
12 certification aspect in your rulemaking, and would actually
13 just ask that you may want to consider additional
14 credits for hybrid electric vehicles. Because we
15 recognize that they will become increasingly important.
16 And for that reason, you may want to consider adopting
17 credits if manufacturers choose to bring in a large number
18 of hybrid electric vehicles, say, starting in 1995,
19 similar to the early introduction of flexible fuel
20 vehicles by manufacturers.

21 So, that's in our testimony, and I refer you to
22 that. But, in conclusion, I'd like to again thank you
23 for the opportunity and urge you to adopt these proposed
24 regulations today.

25 Thank you very much.

1 CHAIRWOMAN SHARPLESS: Thank you, Wuebben.

2 Any questions of Mr. Wuebben?

3 Thank you very much. We have come to the end
4 of the long witness list.

5 And I believe, Mr. Cross, that you already
6 entered the written statements into the record?

7 MR. CROSS: That's right.

8 CHAIRWOMAN SHARPLESS: So, I believe it's
9 probably appropriate at this time to close the record on
10 the agenda item, and also recognize that a number of
11 amendments have been made to the proposal, so we'll
12 have a 15-day public comment period after notice. However,
13 for those comments -- well, written and oral comments
14 received during this hearing, I will close the record
15 and it will not be -- any comments or written testimony will
16 not be accepted after the official record of the agenda item
17 is closed.

18 When the record is reopened for the 15-day
19 comment period, the public may submit written comments at
20 that time on the proposed changes, which will be considered
21 and responded to in the final statement of reasons for the
22 regulation.

23 I would ask at this point if there's any
24 ex parte communications that Board members need to enter
25 into the record at this time?

1 MR. LAGARIAS: Madam Chair?

2 CHAIRWOMAN SHARPLESS: Yes, Mr. Lagarias.

3 MR. LAGARIAS: I had a telephone conversation
4 yesterday with Kelly Brown of Ford Motor Company, who
5 essentially presented the suggestions presented by public
6 testimony this morning.

7 CHAIRWOMAN SHARPLESS: Fine. Any others?

8 That's it? Okay. Thank you very much.

9 I believe the staff has passed out the
10 resolution. Mr. Cackette, would you explain what's in the
11 resolution at this point?

12 MR. CACKETTE: Yes. If you get by all of the
13 introductory stuff to the indented "whereases," I think
14 you'll see that it reflects both the change we suggested
15 this morning to make the proposed RAFs only applicable
16 through the 1997 model year for Phase 2, and to adopt
17 the no correction factor -- no bias correction factor,
18 meaning the RAFs for Phase 2 TLEVs would be .98, and Phase 2
19 gasoline LEVs and ULEVs would be .95.

20 It does include a statement trying to capture
21 your thoughts, Chairwoman Sharpless, about not sort of
22 doing a de facto relaxation of the standard by changing
23 the denominator of the RAF equation, and identifies a
24 commitment to work with the industry over the next year,
25 and return to the Board in the spring of 1994 with our

1 recommendations for 1998 and subsequent model year RAFs
2 for Phase 2.

3 In addition, we will -- as some of the testimony
4 had indicated, we are proceeding to try to develop RAFs
5 for medium-duty trucks, and particularly for CNG vehicles
6 as well. So, we hope to fill out much more of that matrix
7 by the time we come back to you next time.

8 CHAIRWOMAN SHARPLESS: And would that other half
9 of the matrix be filled out in 1994?

10 MR. CACKETTE: Well, it's all contingent upon
11 getting vehicles. But we are, as Mr. Thomason said, we
12 are testing quite a few natural gas vehicles. And Steve
13 can say which categories of CNG RAFs we hope to be able to
14 propose.

15 MR. ALBU: Yeah. We expect to have the LEV
16 medium-duty truck RAFs established by early 1994. Again,
17 we have to establish the baseline reactivity value for
18 those vehicles. And in discussions this morning with a
19 couple of people from industry, it looks like they're
20 really going to help us a little bit more this time with
21 medium-duty trucks and natural gas testing. So, we're
22 hopeful, but I can't promise at this point, but maybe
23 mid-1994.

24 CHAIRWOMAN SHARPLESS: Okay. What's the pleasure
25 of the Board?

1 MR. LAGARIAS: Madam Chair?

2 CHAIRWOMAN SHARPLESS: Yes, Mr. Lagarias.

3 MR. LAGARIAS: I'd like to first compliment the
4 staff on an outstanding job in resolving many of the
5 contentious issues and developing a program that works
6 with the affected industries to achieve the goals of the
7 Air Resources Board.

8 And I would move adoption of Resolution 93-3,
9 which contains those elements.

10 SUPERVISOR WIEDER: Second.

11 SUPERVISOR RIORDAN: I'll second that motion.

12 CHAIRWOMAN SHARPLESS: Okay. It's been moved
13 and seconded. Is there any further discussion? Yes,
14 Dr. Wortman.

15 DR. WORTMAN: It seems to me that the point
16 about the CO was well made, and it could be up to 20
17 percent apparently. I think that we should consider it
18 as part of the reactivity adjustment factors. We argued
19 over half a day over five percent.

20 CHAIRWOMAN SHARPLESS: Right, Dr. Wortman. I
21 think that -- I don't know how you feel about this, but
22 the process that I think we've developed here is to allow
23 the staff to do the testing of the vehicle and make a
24 determination, based on the testing of those vehicles,
25 exactly what might be the result after looking at those

1 tests, and they come back to the Board and report.

2 SUPERVISOR BILBRAY: Yeah. Madam Chair, in
3 fact, if the makers of the motion wouldn't mind, I think
4 it would be appropriate to include direction to the staff
5 to come back, if nothing else, with a verbal presentation
6 about this issue after the testing has been looked at.

7 And I don't think it needs to be a major issue,
8 but it should be at least discussed and reviewed.

9 CHAIRWOMAN SHARPLESS: So, we insert that
10 in the resolution?

11 SUPERVISOR BILBRAY: I'd ask that that be
12 included.

13 MR. LAGARIAS: I certainly concur.

14 MS. RIORDAN: I second that.

15 CHAIRWOMAN SHARPLESS: Mr. Cackette.

16 MR. CACKETTE: Just for your information, when
17 the Board heard this issue and similar issues at a previous
18 meeting, there was a lot of expression about including the
19 sort of a life cycle emission reactivity impacts of fuels
20 as well. That means things like, if a fuel has a beneficial
21 reactivity effect and its emissions occur during
22 distribution or during production, that we should look at
23 that. And we do have a major study underway that also
24 could result in the need to change the RAF process.

25 And we could come back with just -- we could

1 combine it with that activity, and try to put it into the
2 next -- just, again, spring, '94, at the time we come back
3 and talk about the RAFs. If that's too late, we can give
4 you just -- get some information on the CO aspect
5 earlier. But for consistency in trying to look at the
6 big picture, I think we could get it all in this 394
7 review, it might be the most convenient.

8 CHAIRWOMAN SHARPLESS: Dr. Wortman, what you're
9 getting at is that, if it is an issue, it ought to be
10 dealt with, and you want that to be recognized.

11 DR. WORTMAN: The point was raised, and I think
12 correctly, and the response was that on LEVs it might be
13 as high as 20 percent. And for the sake of science, of
14 which I seem to be the sole defender --

15 (Laughter.)

16 DR. WORTMAN: -- I think we should look at it
17 very carefully.

18 CHAIRWOMAN SHARPLESS: I don't think anybody's
19 opposing your issue here. It's a question of how we go
20 about it and when we bring it back to the Board, and whether
21 good information to give the Board some direction can
22 occur at what point, and we need a little direction from
23 the staff on that.

24 But, I think the motion is that we have direction
25 to the staff in the resolution. What we're struggling with

1 here is when you come back with the information.

2 SUPERVISOR BILBRAY: Well, I think that staff
3 should be sensitive to the issue if we detect that new
4 information comes in, that we want it brought to us
5 quickly. I support my Godless, hedonist friend over here
6 who believes that science ought to be looked at. If it
7 is that hot an issue, we need to know about it. We need to
8 know about it before 1994, in my opinion, because I think
9 that sends a signal out -- we need to send a signal to
10 the industry of where we want to go here, what is the
11 priority and where is the weight resting. And if CO's
12 a major issue, it needs to be addressed.

13 MR. CACKETTE: Well, we certainly get the sense
14 of the Board, and we can take a look at this again.

15 For clarity, though, the 20 percent number
16 that Dr. Wortman is talking about is that CO could account
17 for 20 percent of the reactivity of a very low-emitting
18 vehicle's emissions. However, if the CO is the same for
19 a very low-emitting natural gas vehicle and a very low-
20 emitting gasoline vehicle, and a very low-emitting methanol
21 vehicle, it doesn't make any difference at all.

22 So, that's the point.

23 SUPERVISOR BILBRAY: If it's all the same, though,
24 you've got to look at that --

25 MR. CACKETTE: Right.

1 SUPERVISOR BILBRAY: -- to be able to make sure --

2 MR. CACKETTE: It's a little --

3 SUPERVISOR BILBRAY: -- sure it is the same.

4 MR. CACKETTE: I mean our judgment right now
5 is that it's all the same, because those vehicles all have
6 CO emissions that are typically a half-gram per mile or
7 less, really, really clean.

8 We'll go --

9 CHAIRWOMAN SHARPLESS: But the question is --

10 MR. CACKETTE: -- back and do what yiou would
11 like.

12 CHAIRWOMAN SHARPLESS: -- whether or not this
13 test -- this testing that staff indicated that they were
14 doing is going to generate the kind of information that
15 you can come back to the Board at some point and make any
16 kind of valid conclusion.

17 MR. CACKETTE: Well, we could do it on existing
18 dat a now, or we can wait until we get more data in from
19 this one-year cooperative process.

20 CHAIRWOMAN SHARPLESS: Well, the existing data
21 now, I think, is what you're basing there is no difference.

22 MR. CACKETTE: Yeah, typically. But you wanted
23 to know how much the difference could be, for example, we
24 could look at the highest emitting CO gasoline vehicle
25 and compare it to average or the lowest CNG and get some,

1 you know, sensitivity feeling on the issue.

2 MR. LAGARIAS: Like one that would report the
3 CO in pack of cigarette equivalents.

4 (Laughter.)

5 CHAIRWOMAN SHARPLESS: All right. We would
6 like a provision in this resolution that indicates that
7 we are concerned about the CO, and we would like the
8 staff to come back to the Board at some point with
9 information indicating whether this is something that we
10 need to do in terms of a RAF, given whatever new information
11 you're going to be gathering.

12 Okay?

13 SUPERVISOR BILBRAY: Let's go for it.

14 CHAIRWOMAN SHARPLESS: Any other comments?

15 DR. WORTMAN: One final one. I guess I'm
16 making progress here. I've finally convinced Brian.

17 SUPERVISOR BILBRAY: It's election year. I'm
18 easy to deal with.

19 (Laughter.)

20 CHAIRWOMAN SHARPLESS: Okay, then. Would the
21 Board Secretary please call roll.

22 MS. HUTCHENS: Bilbray?

23 SUPERVISOR BILBRAY: Aye.

24 MS. HUTCHENS: Boston?

25 DR. BOSTON: Yes.

1 MS. HUTCHENS: Hilligoss?

2 MAYOR HELLIGOSS: Aye.

3 MS. HUTCHENS: Lagarias?

4 MR. LAGARIAS: Aye.

5 MS. HUTCHENS: Riordan?

6 SUPERVISOR RIORDAN: Aye.

7 MS. HUTCHENS: Wieder?

8 SUPERVISOR WIEDER: Aye.

9 MS. HUTCHENS: Wortman?

10 DR. WORTMAN: Aye.

11 MS. HUTCHENS: Madam Chairwoman?

12 CHAIRWOMAN SHARPLESS: Aye.

13 MS. HUTCHENS: Passes 8-0.

14 CHAIRWOMAN SHARPLESS: Okay. Thank you very
15 much.

16 I think that probably takes care of most of the
17 audience.

18 For those of you who are staying for the
19 research proposals, it might be wise to wait until the
20 audience clears the room.

21 Thank you, staff.

22 Okay. I would appreciate the cooperation
23 of those who are leaving the room to please do so
24 expeditiously, because we're going to start on the next
25 item. I'll ask the folks for the next item to please come