

MEETING  
BEFORE THE  
CALIFORNIA AIR RESOURCES BOARD

BOARD HEARING ROOM  
2020 L STREET  
SACRAMENTO, CALIFORNIA

THURSDAY, MAY 27, 1999  
9:30 A.M.

Vicki L. Ogelvie, C.S.R.  
License No. 7871

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ii

MEMBERS PRESENT

Alan C. Lloyd, Ph.D., Chairman  
 Joseph C. Calhoun  
 Mark DeSaulnier  
 Dr. William Friedman  
 C. Hugh Friedman  
 Lynne T. Edgerton  
 Barbara Patrick  
 Sally Rakow  
 Barbara Riordan  
 Ron Roberts

Staff:

Michael Kenny, Executive Director  
 Tom Cackette, Chief Deputy Executive Officer  
 Mike Scheible, Deputy Executive Officer  
 Lynn Terry, Deputy Executive Officer  
 Kathleen Walsh, General Counsel  
 Jim Schoning, Ombudsman

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□

iii

I N D E X  
 --o0o--

	Page
Proceedings	1
Call to Order	1
Pledge of Allegiance	1
Roll Call	1
Opening remarks by Chairman Lloyd	1
AGENDA ITEMS:	
99-4-1 Public Meeting to Consider an Informational Report on the Health Impacts of Air Pollution	
Introductory remarks by Chairman Lloyd	2
Staff Presentation:	
Mike Kenny	3
Dane Westerdahl	4
99-4-2 Public Meeting to Consider an Informational Report on Air Quality Status and Trends	

Introductory remarks by Chairman Lloyd	37
Staff Presentation:	
Mike Kenny	37
Marci Nystrom	37

PETERS SHORTHAND REPORTING CORPORATION (916) 362-2345

iv

I N D E X (Continued)  
--o0o--

	Page
99-4-4 Public Meeting to Consider Research Proposals	
Introductory remarks by Chairman Lloyd	61
99-4-3 Public Meeting to Consider Proposals for the Air Resources Board's Innovative Clean Air Technologies (ICAT) Program	
Introductory remarks by Chairman Lloyd	
Staff Presentation:	
Tom Cackette	
Tony Andreoni	66
Public Comment:	
Ed Reynolds, The Reynolds Group	72
Michael Simon, ISE	79
Open Session to Provide an Opportunity for Members of the Public to Address the Board on Subject Matters within the Jurisdiction of the Board	91
Adjournment	92
Certificate of Reporter	93

--o0o--

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1 P R O C E E D I N G S

2 --o0o--

3 CHAIRMAN LLOYD: Good morning. The May 27, 1999  
4 Public Meeting of the Air Resources Board will now come to  
5 order.

6 I would like to lead us in the Pledge of  
7 Allegiance.

8 (Thereupon the Pledge of Allegiance was recited.)

9 CHAIRMAN LLOYD: Thank you. Will the Clerk of the  
10 Board call the roll.

11 MS. HUTCHENS: Calhoun.

12 BOARD MEMBER CALHOUN: Here.

13 MS. HUTCHENS: DeSaulnier.

14 BOARD MEMBER DeSAULNIER: Here.

15 MS. HUTCHENS: Edgerton.

16 BOARD MEMBER EDGERTON: Here.

17 MS. HUTCHENS: Professor Friedman.

18 BOARD MEMBER C.H. FRIEDMAN: Here.

19 MS. HUTCHENS: Dr. Friedman.

20 BOARD MEMBER FRIEDMAN: Here.

21 MS. HUTCHENS: Patrick.

22 BOARD MEMBER PATRICK: Here.

23 MS. HUTCHENS: Rakow.

24 BOARD MEMBER RAKOW: Here.

25 MS. HUTCHENS: Riordan.

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1 BOARD MEMBER RIORDAN: Here.

2 MS. HUTCHENS: Roberts.

3 BOARD MEMBER ROBERTS: Here.

4 MS. HUTCHENS: Chairman Lloyd.

5 CHAIRMAN LLOYD: Here.

6 Thank you very much.

7 Good morning, Mark.

8 Before we get started, I wanted to pass on a  
9 compliment to staff about our Website.

10 The Air Resources Board has received special  
11 recognition for the highly informative home page and that  
12 reflects well on everyone that makes that possible, the  
13 Website designers and clerical staff to the people that  
14 provide the technical information.

15 This is extremely good news, and I have many, many  
16 comments throughout the country from people visiting to see  
17 the Website.

18 I would like to get going with the first Agenda  
19 Item.

20 This is a presentation on the health impacts of air  
21 pollution.

22 I would like to remind anybody in the audience who  
23 wishes to testify on today's Agenda to sign up with the Clerk  
24 of the Board. If you have a written statement, to provide 20  
25 copies of that to the Board Clerk.

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1 The first item today is really a refresher on the  
2 health impacts of air pollution, to remind us all why we are  
3 here and the importance of this briefing.

4           Protecting public health is our number one mission,  
5 and we need to understand what the health issues are and what  
6 the actions can help address the issues.

7           I have asked the Research Division to give us a  
8 brief tutorial on how air pollution affects human health, and  
9 then to bring us up to date on the status of the benefits  
10 that we see from the research we have currently.

11           The summary will frame the next presentation on how  
12 air quality has changed over the past years and what we still  
13 need to do.

14           At this point, I would ask Mr. Kenny to introduce  
15 the item and begin the staff's presentation.

16           MR. KENNY: Thank you, Chairman Lloyd and Members  
17 of the Board.

18           Considerable improvement has been made in ambient  
19 air quality in the areas of the State. This has real  
20 benefits to health and welfare of the citizens.

21           More needs to be done. Levels are unacceptably  
22 high. The well-being of many Californians is at risk.

23           Dane Westerdahl, of the Research Division, will  
24 tell us of the biological effects of toxic air.

25           Dane will identify groups and explain why they are

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1 at special risk. He will remind us of the risk assessments  
2 and of the various contaminant programs.

3           With that, Dane.

4           MR. WESTERDAHL: Good morning, Dr. Lloyd.

5           Today, I would like to provide you with a brief

6 overview of the health impacts of air pollution. I could  
7 spend 15 to 20 minutes on the topics of each of the slides  
8 that I'll show you, but I only have a minute per slide.

9 So, we will get started.

10 First, we will look at the lung and discover how it  
11 is one of the key organs impacted by air pollution.

12 Next we will discuss which groups of people are at  
13 special risk from pollutants in the air, what makes a person  
14 sensitive and what makes people sensitive.

15 This will lead into a description of the ambient  
16 air quality standards and how they are established.

17 This will be followed by information on the  
18 characteristics and health impacts of two very important  
19 pollutants, ozone and particulate matter.

20 Finally, we will consider a few of the challenges  
21 before us and look at how ARB is responding to these  
22 challenges.

23 This is a lung.

24 Let's start with one of my take home messages. It  
25 is not a hollow like, a football that inflates and deflates

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1 each time we breathe.

2 I will let you pass the item around as I continue.

3 The lung and respiratory system are complex  
4 structures. At the simplest, the respiratory system serves  
5 two functions, to conduct air from the outside world and to  
6 deliver oxygen from that air to our bloodstream.

7 On the left side of the picture is the fine

8 structure of the lung, the region where the gas exchange  
9 occurs.

10 On the right side is the plumbing of the lung after  
11 the fine structure has been pruned away. This plumbing  
12 conducts air to where the gas exchange occurs.

13 I will take a second to tell you what I have handed  
14 out is, in the plastic bag, that is a real human lung.

15 In this picture, I have zoomed in to show greater  
16 detail of the conducting airways and the gas exchange areas.

17 Note the red bands that encircle the airways.  
18 These are muscles. They regulate the caliber or diameter of  
19 the airway.

20 They respond from signals from nerves. For  
21 example, they constrict when we breathe an irritant, like  
22 smoke.

23 The constriction causes the airways to become  
24 narrower, making the breathing more difficult. Asthmatics  
25 are a group that is seriously effected by this irritant

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6

1 response.

2 Airway constriction is characteristic of this  
3 disease and can be life threatening. Several common air  
4 pollutants can cause asthmatics to suffer.

5 About five to seven percent of us in this room have  
6 asthma. It is a fairly common chronic breathing problem.

7 The delicate grape-like structures at the lower end  
8 of the airways are called alveoli. This is where the gas  
9 exchange occurs. The tissues of these alveoli are very

10 delicate and are readily damaged by air pollutants.

11           This slide shows a highly magnified, single  
12 alveolus with a blood cell inside a capillary as a size  
13 reference. It illustrates several things.

14           First, it gives an indication of how fine the  
15 structure really is. Single cells are stretched very thin to  
16 form this structure.

17           Their thinness is essential to minimize the  
18 resistance to the flow of oxygen into the bloodstream. The  
19 thickness must be just right.

20           If the walls were any thinner, our lungs would  
21 drown us in fluids leaking from the bloodstream.

22           If they were any thicker, they would not deliver  
23 adequate oxygen to body.

24           The very delicate nature of the alveolus makes it  
25 particularly susceptible to the physical and chemical impacts

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7

1 of air pollution. We know that air pollution damage does  
2 occur to these structures.

3           If the cells of the alveolus are damaged, they may  
4 gradually repair themselves. However, if the damage is  
5 severe, structure and function is lost and the cells will  
6 die.

7           Let me shift now to the issue of who is most  
8 sensitive to air pollution. You can read the list.

9           The top portion of the list is not a surprise,  
10 elderly, children, people with existing respiratory disease.

11           It may surprise you to learn that athletes, despite

12 their vigor, are also in the high risk category because of  
13 the large amounts of air they inhale while exercising, often  
14 ten to fifteen times what a resting person inhales and the  
15 pollutants come with the air.

16 Take home message number two, sometime during our  
17 life, each of us is likely to be at increased risk from the  
18 adverse impacts of air pollution.

19 Next slide.

20 We can see two of the three of the groups of most  
21 concern, elderly, children and asthmatics. The elderly are  
22 of concern as they have had many of the health conditions  
23 that put them at risk over the course of their lifetime, and  
24 their immune system is decreasing with age.

25 Children are also high on the list, not because of

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8

1 the similarities of adults and elderly, but their lungs and  
2 bodily systems are still developing. They are very active  
3 and spend more time outside where they are exposed more than  
4 most of us, and these factors put them at high risk.

5 Childhood asthma has been in the newspaper  
6 recently, as being on the rise in this country and all over  
7 the world. Children have asthma at rates higher than adults,  
8 as high as 15 to 20 percent.

9 The wheezing sounds an asthmatic makes when trying  
10 to breathe are caused by the restriction of air as it moves  
11 through the narrowed airways. Asthma can be fatal if not  
12 properly treated and it clearly can limit a child's  
13 activities, and they need to be under treatment for such

14 things.

15           There is very little evidence that it is caused by  
16 air pollution, but it is made worse by air pollution.  
17 However, it can put a person with an existing asthmas  
18 condition at risk because it increases their sensitivity to  
19 allergens and other substances that can precipitate an  
20 attack.

21           What are air ambient air quality standards?

22           Standards are scientifically based determinations,  
23 which are part of the activity of the Board, in the case of  
24 ARB or the Administrator for U.S. EPA.

25           These two groups act upon their legislative

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1 mandates to produce public health policy definitions of clean  
2 and safe air, that form the foundation for State, Federal and  
3 local air regulatory programs.

4           Standards serve as the goal or objective for air  
5 qualities.

6           State and Federal standards may differ because they  
7 are developed under a different review schedule in  
8 consideration of the specific needs of specific populations  
9 and distinctive environmental conditions.

10           California standards are more stringent, protective  
11 than those established by the U.S. EPA, the Federal  
12 standards.

13           Now, for a few definitions. Basically, the first  
14 is pollutant of concern, and following is the level or  
15 concentration.

16           Duration is the term that modifies the standard,  
17 time frame for the standard, and form is the mathematical or  
18 statistical way for attainment, how many times you may  
19 violate a standard and be in attainment.

20           Ambient air quality standards are adopted in  
21 consideration of public health and public welfare  
22 considerations. Public health concerns include factors  
23 contributing to illness, discomfort and death.

24           Public welfare focuses on impacts on crops,  
25 visibility or losses or damage to materials.

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10

1           Neither State nor Federal regulators consider the  
2 cost of controls when they are promulgated.

3           Today's persistent pollutant problems include  
4 representatives from the ambient air quality standards list  
5 and toxic air contaminants.

6           How do ambient air standards differ from TACs?

7           Ambient air quality standards are designed to  
8 reflect the safe level for a specific pollutant, with an  
9 appropriate safety margin, and are usually established in  
10 response to respiratory or cardiac health impacts.

11           They are usually set for pollutants that have  
12 relatively short term health impacts. For example, the  
13 one-hour ozone standard was based on the way a brief ozone  
14 exposure affects lung function.

15           The longest time frame standards are for one year.  
16 These are usually designed to mitigate adverse effects that  
17 were associated with an average annual concentration.

18 Toxic air contaminants often have health effects  
19 that are only evident after extended incubation or long term  
20 exposure, such as the development of cancer over a  
21 substantial fraction of a lifetime.

22 Toxic air contaminants, TAC, standards are  
23 risk-based decisions, with no safe levels identified.

24 These are established by the Board and U.S. EPA.

25 I will focus the rest of the presentation on ozone

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11

1 and particulate matter.

2 The pollutants listed at the bottom of the slide  
3 might be labeled as "other."

4 They are the ones I would have added to ozone and  
5 PM if I made this presentation in the 1970s. They would be on  
6 the list of pollutants of major concern, and so would ozone  
7 and PM.

8 Effective control programs have reduced these  
9 pollutants to the other category, pollutants that do not  
10 generally exist at levels high enough to pose a significant  
11 health risk.

12 Two pollutants in this other list are on the watch  
13 list, carbon monoxide and nitrogen dioxide, because NO2 plays  
14 a role in ozone formation.

15 Ozone is a gas that forms when hydrocarbons, oxides  
16 of nitrogen and sunlight are present.

17 Ozone attacks and damages organic material, the  
18 organic material that makes up our lungs. It is especially  
19 harmful to the fine structure of the deep lung.

20           This is a list that gives us specifics on ozone  
21 health effects.

22           The first three of these are relatively short term  
23 exposures. What we find is after one or two hour exposure of  
24 ozone, lung function declines for people working outside and  
25 aggravate people with other existing problems with breathing.

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1           There is long-term damage and less well-understood,  
2 and our standards do not recognize or do not establish to  
3 protect against the long-term consequences of ozone.

4           The State and Federal governments have established  
5 ozone standards. Both have a one-hour standards, and the  
6 Federal has recently developed an eight-hour standard.

7           These are based on decreases in lung performance.

8           The ARB evaluated the level of public health  
9 protection provided by the new eight-hour standard and found  
10 it to be equivalent to the State's one-hour standard.

11           As you may have heard, the U.S. EPA's new  
12 eight-hour ozone and its PM standards are currently being  
13 challenged in court.

14           Children and athletes, as I mentioned earlier, seem  
15 to be the people most at risk health consequences from  
16 outdoor exposure to ozone.

17           Each group is very active and is often outdoors  
18 when ozone levels are highest.

19           As a result, local air regulators in problem areas  
20 have implemented systems that warn the schools and community  
21 when unhealthy ozone levels are expected.

22 School activities are typically modified to avoid  
23 or limit high ozone exposure periods.

24 It is difficult to show the kinds of lung injury  
25 that occurs, but this slide demonstrates the damage this

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13

1 potent oxidant does to other kinds of living tissue.

2 These are lima bean plants, treated with ozone for  
3 several days, at levels similar to those that may occur in  
4 urban areas throughout the state on a bad day.

5 The light colored areas on the leaves show where  
6 the leave tissue is damaged or bleached by the effect of  
7 ozone. The discoloration is the result from the death of the  
8 cells within the leaf.

9 Similar sources of cellular injury is occurring in  
10 our lungs, not exactly what we have in leaves, but we have  
11 cells that exchange gases that are delicate.

12 Here is some evidence. Here is lung tissue of an  
13 air way of an animal that shows injury that probably occurs  
14 in people exposed to ozone. The wispy structures on the left  
15 work to keep the lung clean, and on the right, it is gone  
16 after exposure to ozone.

17 Most of the of the tissue may regrow. This sort of  
18 tissue loss is the reason why smokers cough in the morning,  
19 to do the job of the cells to clear the lungs of fluid.

20 Let's move to particulate matter.

21 Why are we concerned about particles? We have two  
22 good reasons, because of the adverse health consequences, and  
23 second, which I will talk about now, is visibility.

24                   These two slides were both taken from the same  
25 location on the UC Riverside campus.

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14

1                   The hills are a mile from where the pictures are  
2 taken, the picture on the left, which was taken on a clear  
3 day.

4                   The picture on the right is a day when the particle  
5 levels are high. You cannot see the hills. They also  
6 contribute to urban haze and decrease the visibility and  
7 clarity at vistas and parks and cities.

8                   This shows what the particles are composed of.  
9 This includes dry matter, liquid droplets and bits of solid  
10 material coated by liquids.

11                   We can see that they are a complex mixture of  
12 organic compounds, smoke, soil, dusts, metals, sulfate and  
13 nitrates.

14                   Particles are different than gaseous pollutants,  
15 that are simple chemicals. That is what sets particles  
16 apart, which are pure compounds.

17                   This is a very busy slide that I could spend a lot  
18 of time on. This shows the distribution of the particles in  
19 the air.

20                   On the right-hand side of the chart is about the  
21 size particles, 10 microns in diameter, and moving to the  
22 left, it is smaller and smaller until zero in size. Fine and  
23 course.

24                   We see two kinds of products in the humps. They  
25 make up the distribution of the sizes. In the course

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1 fraction, on the right, 2.5, 10 microns, we see mechanical  
2 processes, tires, oil, soil, the fine fraction. That happens  
3 to be the same PM 2.5 standard that the Federal government  
4 established, contains products from combustion, and we should  
5 be concerned about the range of products.

6 The left is a bar not labeled well, but that is the  
7 ultrafines. We are just recently becoming concerned with the  
8 health effects of ultrafines, those smaller than 0.1 in size,  
9 the smallest are 2.5 and smaller.

10 What are the health effects of particles?

11 Air quality has improved greatly in the State over  
12 the years, but we are finding effects of the particles and  
13 specific pollutants and ozone.

14 People with asthma reach for inhalers, call their  
15 doctors and converge on hospital emergency rooms.

16 Children suffer from bronchitis.

17 Studies, including some conducted in our State,  
18 continue to indicate that lung function declines when the  
19 particle levels are high.

20 Most disturbing is that when particle levels  
21 increase here or in the world, so do the rates of death and  
22 hospitalization of people who are already ill.

23 Is this a question of short term harvesting of or  
24 early death for people that might have died anyway?

25 No. Recent studies indicate that those deaths

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1 associated with PM resulted in a significant shortening of  
2 lives, on average, by two or three years longer had they not  
3 been exposed.

4 Which particles are of concern?

5 I talked about course, fine and ultrafines. All of  
6 the particles that we can inhale are a concern for our  
7 health.

8 Particles 10 to 15 microns in size do present a  
9 health concern. Anything larger, we filter with the nose and  
10 mouth.

11 Those between 2.5 and 10 microns in size tend to  
12 deposit in the airways, with a limited number reaching the  
13 deep lung.

14 Health studies confirm that asthma and bronchitis  
15 problems correlate with increased levels of these coarse  
16 particles.

17 Particles that are smaller than 2.5 microns in size  
18 easily penetrate into the deep lung. These particles appear  
19 to be associated with impacts on the heart and are also  
20 associated with increased risk of death.

21 Finally, the ultrafine fraction particles, those  
22 smaller than 0.1 micron, have not been widely studied, but  
23 many questions seem to revolve around the possible health  
24 effects.

25 These particles contribute almost no mass to a PM

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1 sample, because they are small, but they are present in huge

2 number counts and have large surface to mass ratios, and they  
3 may carry other harmful pollutants into the lung.

4 We must be concerned about all the particles that  
5 can be inhaled.

6 I find this slide interesting. It shows the  
7 surface of the lung that I passed around. You can see the  
8 material.

9 The black spots are carbon particles. This is a  
10 person, nonsmoker. The black spots are things the lung  
11 cannot eliminate. If you have that lung, you can see it on  
12 the lung as well.

13 The State and Federal PM standards are complex  
14 because of the new Federal standards. We both have a PM 10  
15 standard, and the Federal made it less stringent and added  
16 2.5.

17 Our PM 10 is more stringent and provides good  
18 protection from the coarse and fine particles. We anticipate  
19 that the Board will review the process, and we are watching  
20 the review process that the Federal government is doing, and  
21 we will all learn from that procedure.

22 Last couple of slides, as Dr. Lloyd indicated,  
23 there are major research programs going on in the State and  
24 country to learn about the effects of PM and other air  
25 pollutants.

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1 They include all the size fractions that I  
2 mentioned, the coarse, PM 10. The first two are the pivotal  
3 one's in terms of the standards revision. These studies are

4 reanalyzed to be certain that the findings are correct.

5           They have confirmed that the original findings were  
6 correct.

7           There are studies going on to determine whether a  
8 national health report can be put together to serve to tell  
9 us about the effects of PM on cardiac patients and the  
10 elderly people and animals.

11           Specifically, in California, we have an exciting  
12 program.

13           Next slide, Steve.

14           We have a really exciting and developing program to  
15 discover more about air pollution. It is important to gather  
16 the information that is California-specific.

17           If you looked at the two-humped slide, the  
18 constituents and relative range is dependent largely on local  
19 sources and transport.

20           If you live in one part of the country, the air  
21 quality and chemistry will be different. We have very  
22 specific PM problems. It is important to understand what the  
23 effect is and how best to go forward with the controls to  
24 protect the population.

25           We are covering a wide range of epidemiologic

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1 studies and animal exposures. The most exciting is the  
2 Vulnerable Population. Pop program, which Governor Davis  
3 added to the budget and the Legislature gave over two million  
4 a year for the study.

5           That program that will run for quite sometime, and

6 initial work is on asthmatic children and families in Fresno,  
7 and that's scheduled to start soon.

8 We are asking for more bang for our buck to answer  
9 the questions efficiently.

10 In summary, I hope I made the point that we are all  
11 likely to have at elevated risk from air pollution during  
12 some time in our lives. Factors, such as our overall health,  
13 activity levels and location will influence how we react to  
14 community air pollution.

15 Some of us are at special risk, such as children,  
16 the elderly and those with existing heart and lung disease.

17 Ambient air quality standards stand as an important  
18 foundation to many of our program, they define clean and safe  
19 air.

20 There are many challenges in our future, things we  
21 need to do to assure we are protecting the public health.

22 Our health research program at ARB is very  
23 proactive in its pursuit to get the information to do that  
24 job.

25 This concludes the presentation.

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20

1 Thank you.

2 CHAIRMAN LLOYD: Thank you very much, Dane.

3 Thank you for getting through a lot of information  
4 in a relative short time.

5 Before we start the questions, I would like to ask  
6 Mr. Kenny, we have heard and read a lot on the recent court  
7 decision to EPA standards.

8 How does that effect this?

9 MR. KENNY: Not really directly.

10 We have State standards as well as we are  
11 progressing to develop the program in the State to meet the  
12 State standards.

13 With regard to the Federal program specifically,  
14 the trial court did uphold the EPA, and the Appellate Court  
15 did not act in promulgating -- the EPA will appeal that.

16 At that point in time, we will get a ruling from  
17 the court that will go one of two ways, sustain that or over  
18 turn that.

19 If they sustain the original ruling that EPA acted  
20 improperly, it is likely that EPA will go back and  
21 repromulgate, and we will have a loss of time.

22 If it overturns the standard, will stay in place  
23 and proceed to implement them pursuant to EPA guidelines.

24 CHAIRMAN LLOYD: I noticed in the press release  
25 California was not listed.

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21

1 Is there a reason?

2 MR. KENNY: No reason.

3 We support EPA. We supported it at that point in  
4 time.

5 I cannot explain that.

6 CHAIRMAN LLOYD: Questions from the Board?

7 BOARD MEMBER EDGERTON: When you said that if  
8 the -- I assume you mean the full court, if the DC circuit  
9 hears it en banc?

10 MR. KENNY: I'm not sure if they ask for  
11 reappearing or appeal en banc.

12 They have not made a determination.

13 BOARD MEMBER EDGERTON: Then they seek review by  
14 the Supreme Court of the United States.

15 It was your opinion that if the opinion was  
16 sustained that then EPA would repromulgate the regulations.

17 Could you be more specific about why you think the  
18 language of the current decision, if sustained, would allow  
19 repromulgation in a modified form?

20 MR. KENNY: It talks about EPA failure to  
21 articulate rationale why they picked specific standard  
22 points.

23 That is where EPA can address the court's concerns  
24 about what the rationale is for the particular points.

25 It talks about unconstitutionality delegation.

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1 That is confusing.

2 What will happen there is ultimate determination,  
3 how it works out will play out, and that is the place where  
4 there is a place to resolve that, may help in the court's  
5 rationale on the unconstitutionality delegation, that level  
6 of specificity may alleviate the concerns on the court.

7 Does that help?

8 BOARD MEMBER EDGERTON: Uh-huh.

9 Ms. Walsh, anything to add?

10 MS. WALSH: No.

11 Mike and I are in agreement on the decision. If

12 you read the delegation, the language regarding the  
13 delegation, the use of the delegation did not find that the  
14 statute was unconstitutional, but EPA's application of the  
15 description provided was unconstitutional, basically citing  
16 that EPA had not stated intelligible principles for selecting  
17 the cut points that they did.

18 That opens the door for the procedure that Mike  
19 laid out. Should EPA not succeed in having the decision over  
20 thrown on rehearing or appeal to repromulgate and do a better  
21 job of explaining the cut points.

22 BOARD MEMBER EDGERTON: Thank you.

23 There is a copy of the decision. That is good of  
24 you to provide that.

25 The point is well made that it was not a ruling

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1 that the statute was unconstitutional, that the Clean Air Act  
2 was unconstitutional, but more with respect to application,  
3 and that can be corrected, hopefully, if it is worst-case  
4 scenario.

5 I wanted to ask a procedural question following on  
6 the Chairman's information. Have you considered whether the  
7 Air Resources Board, or would you make a recommendation as to  
8 whether California should file an Amicus brief?

9 MR. KENNY: We are strongly in support of that.

10 BOARD MEMBER EDGERTON: It may be useful.

11 It seems to me in that we are so closely following  
12 this, and we are so involved in the sense that we have  
13 problems ourselves and are in the lead.

14 MR. KENNY: If you look at the State standard, we  
15 are aware of where EPA is trying to go to provide the same  
16 level, and we support what they are trying to do.

17 One of the key issues is what is going to happen  
18 with the guidance with regard to designations that promulgate  
19 this summer.

20 When I was back in Washington recently, I asked,  
21 what do you want us to do with designations, and EPA is going  
22 forward with the designation. They do not think that the  
23 court opinion limits them in the designation process, but  
24 actually to clarify the designation, taking the standards and  
25 having the States designate in the geographic regions whether

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1 the regions are in compliance or not.

2 BOARD MEMBER EDGERTON: I, for one, support Amicus  
3 brief.

4 CHAIRMAN LLOYD: Yes.

5 BOARD MEMBER FRIEDMAN: I wanted to return to  
6 Dane's report.

7 BOARD MEMBER FRIEDMAN: I appreciated the report  
8 and the shopping list of where we have been, but it occurs to  
9 me, and I agree, the next decade will see an up surge in  
10 research in general on the issue of particulates in every  
11 aspect.

12 What I don't know yet, and I don't know a lot of  
13 things, but one of the things that I don't know is the  
14 prioritization of the questions that we should ask about  
15 particulates, not only the biology but the sources, not that

16 we cannot control a source, and in this we may be able to  
17 control.

18           It occurred to me that perhaps Alan and you all  
19 could convene a high class group of folks to help crystallize  
20 for us what are the critical questions that we should be  
21 approaching in the next years with respect to investigation  
22 in this area.

23           We get to RFA go out, and we get good response, but  
24 that is not part of the tapestry that I understand. I think  
25 it would be helpful to put it together, integrate some of the

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1 things, so that we can all understand as laypeople and  
2 scientists to see the general directions that we are going to  
3 go, that the path is going to follow to learn about the  
4 aspect of air pollution.

5           CHAIRMAN LLOYD: I'm glad you brought that up. You  
6 must be reading my mind.

7           I have asked Dr. Passat to work with staff to  
8 organize such a group, and he has started.

9           We are right on things. It is very important,  
10 because for me, coming to the Board, this is an important  
11 question.

12           We have limited resources where should we target  
13 them, and as we launch into programs, we need the information  
14 to act on in that way.

15           I think that staff is working with that as well.

16           MR. KENNY: Actually, the idea is a good one by  
17 both of you, and we are pursuing it.

18 MR. WESTERDAHL: Thank you, Dr. Friedman for the  
19 comments.

20 We are actively involved at the national level as  
21 far as PM research, and I have been on a Federal Advisory  
22 Panel helping set EPA's course for PM.

23 We have staff here that are involved, and we are in  
24 high consciousness to the prioritization for PM research.  
25 There is a lot to learn.

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1 We try to keep what are our opportunities, because  
2 we cannot resolve the problems ourselves. The first portion  
3 is looking at asthmatic children and families in Fresno.

4 Fresno has a very high, complex PM, and the largest  
5 PM monitoring program in the world, and it was an opportunity  
6 to focus on something to get some answers.

7 The point is well taken.

8 MR. KENNY: There is one thing that we are doing in  
9 the area of health effects, a firm based in Boston is doing  
10 work on, and they did provide them with contract monies as a  
11 way of trying to supplement what they are trying to do and  
12 work closely with them.

13 That is one of the things that we think will be  
14 helpful.

15 CHAIRMAN LLOYD: I hope by the next Board meeting  
16 we will have a plan from the staff of when the meeting will  
17 take place.

18 BOARD MEMBER ROBERTS: Just a quick question.

19 I thought the presentation was excellent, and one

20 thing I hoped you would comment on, ozone, what is the most  
21 significant cause, and what are those most likely to be part  
22 of the regulatory effort in the near term?

23 MR. WESTERDAHL: What are the sources of ozone that  
24 people breathe, a great portion is from motor vehicles, and  
25 they're active programs at the State and Federal levels.

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1 So, that is one major emphasis and will be in the  
2 foreseeable future.

3 BOARD MEMBER ROBERTS: With regard to that, what is  
4 principal area?

5 MR. WESTERDAHL: Fuels, motor vehicles emissions,  
6 emissions from refineries, we do what we can, all precursors  
7 from oxides of oxygen and hydrocarbons, but we have emission  
8 controls.

9 DR. HOLMES: We are doing research on emissions on  
10 various kinds of solvents.

11 You will hear later a project to reduce or get a  
12 better handle on a relatively small source, like paint  
13 striping operations.

14 There is no large source to go after for  
15 hydrocarbons. We are going after the medium to small size  
16 sources that will contribute to the overall program which, of  
17 course, is headed up by the motor vehicles.

18 BOARD MEMBER ROBERTS: I was asking, if you see a  
19 new regulatory effort or are we just getting on the sources  
20 and bringing them in conformance with the standards?

21 DR. HOLMES: That is the name of the game.

22           As far as the regulatory program goes, look for  
23 sources, evaluate them and when appropriate, reduce  
24 emissions.

25           We are not scrapping the bottom of the barrel, but

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28

1 we are down to smaller and smaller sources.

2           The SIP, State Implementation Plan, is the road map  
3 that leads us, not necessarily to the standard, but to a lot  
4 closer than we are now.

5           MR. KENNY: One of the things that we are looking  
6 at fairly seriously right now is the toxic elements with  
7 mobile sources.

8           There was a report that talked about the risk from  
9 mobile sources, and that was high, and the risk in part of  
10 California was in the 450 million type of range. That was  
11 ambient, not hot spots, and if you take the hot spots, you  
12 have triple that number.

13           We have severe exposure to do something about.  
14 That is something new that we must look at and address. I  
15 might add that what we have done with ozone, we have had a  
16 lot of success with ozone, but we are not there yet.

17           What the Board did last year, the LEV-2 and jet  
18 skis, that was significant, and we will bring to you in the  
19 next year the next level that will target the ozone problems  
20 and target or begin the task of the toxics problem.

21           One of the big races is the diesel on and off road.  
22 We see emissions coming, if you look at light duty, there is  
23 a lot of progress, and heavy duty, there is a lot to do, and

24 we will focus on that.

25 BOARD MEMBER ROBERTS: That is what I was looking

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1 for, where specifically, in what direction might the new  
2 programs lie.

3 In doing what we have done in the area of the hot  
4 spots, do you see more work there?

5 MR. KENNY: I see a lot.

6 We are looking at specifics in targeting the hot  
7 spots. We have not done that in the past unless requested by  
8 communities.

9 One of the things in the future is where the  
10 communities make a request on their own and bring the  
11 monitoring in and identify the risk and identify the  
12 strategies to reduce the risk.

13 We are beginning to reallocate resources and  
14 finding additional resources to do that, because the report  
15 that came out of Congress was significant.

16 We worked with Congress a little bit, and we found  
17 the numbers were accurate. If you see the numbers that high,  
18 we have something to address and address it relatively  
19 quickly.

20 BOARD MEMBER ROBERTS: Any efforts under way in San  
21 Diego?

22 MR. KENNY: Yes.

23 In San Diego, the Baro-Logan area, we are working  
24 with the leaders there to bring a monitoring effort in the  
25 area and figure out what that means and strategies to pursue.

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1 BOARD MEMBER ROBERTS: I would like to talk to you  
2 more about that.

3 CHAIRMAN LLOYD: I thought Supervisor Roberts was  
4 one of the community leaders.

5 MR. KENNY: I caught that.

6 BOARD MEMBER DeSAULNIER: He is trying to be.

7 BOARD MEMBER ROBERTS: That would be false modesty.  
8 That is something that has come up in a couple of  
9 conversations, and I would like a better handle on what we  
10 are doing and could be doing.

11 BOARD MEMBER C.H. FRIEDMAN: I wanted to follow-up  
12 on Lynne's question.

13 With respect to this Federal court decision, I'm  
14 wondering, is EPA considering repromulgating with more  
15 articulation and more intelligible language that underlies  
16 the standards that were struck down pending the opinion?

17 MR. KENNY: I have not heard that.

18 What I have heard from them is that they intend to  
19 appeal. At this point in time, that is where they are going.

20 They may be thinking that way, but they are  
21 indicating that they are unhappy with the Court's decision  
22 and disagree.

23 BOARD MEMBER C.H. FRIEDMAN: Is the effect to stay,  
24 any enforcement on the part of the industry to comply?

25 MR. KENNY: Nothing that readily needs to.

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1           The key was process of implementation and  
2 designation that the States would be participating in, I did  
3 specifically ask the question, what are you going to do with  
4 going forward, and they plan to issue the statement, they are  
5 not stayed by the Court's action.

6           BOARD MEMBER C.H. FRIEDMAN: Okay. Thank you.

7           I too think we ought to weigh in.

8           CHAIRMAN LLOYD: Could we ask staff to prepare  
9 something and work with the Governor's office on that?

10          BOARD MEMBER EDGERTON: Just following up on that,  
11 the questions were excellent with respect to planting the  
12 seed, why do they not go ahead and do it to mute out the  
13 specificity issue, and it might be that doing that would not  
14 take longer than getting it through the Court?

15          BOARD MEMBER C.H. FRIEDMAN: The intelligible  
16 principle.

17          BOARD MEMBER EDGERTON: That was a brilliant  
18 thought by Professor Friedman.

19          BOARD MEMBER C.H. FRIEDMAN: Thank you for that.

20          BOARD MEMBER EDGERTON: A lot of common sense  
21 there, and the thought that he inspired in me is for us to  
22 answer, as you consider what is the appropriate course to  
23 take, Amicus brief, what is best for California to, what do  
24 we think needs to be done now that there is this rather  
25 controversial decision, which puts a lot of important health

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1 issues in limbo, if we think that the thing to do is

2 repromulgate, or if you think that or as the Chairman says,  
3 in his collective wisdom, and the Governor does that, the  
4 question to focus on is what is best for the folks?

5 I'm sure you will follow that.

6 CHAIRMAN LLOYD: Thank you.

7 I would like you to comment on, we talk about  
8 children's health and focus, and it is disturbing to see in  
9 The Bee and Chronicle the high levels of toxics that children  
10 in the portable classrooms are breathing and being exposed  
11 to.

12 Are we doing anything on that or looking at the  
13 risk?

14 MR. KENNY: We have been concerned, and we have  
15 people in Research looking at the indoor air quality. We  
16 have done a lot with Education, but we have no authority to  
17 regulate indoor air.

18 The opportunity is there to educate the population.  
19 If you look at prefabricated and the types of materials used  
20 in those buildings, there are substances that we are  
21 concerned about for indoor air quality and what exposures are  
22 for the people, since they spend so much time inside.

23 We have tried to do things in the area, but we  
24 don't have the regulatory authority. We are limited.

25 More specifically, Tom Phillips is here. He is a

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33

1 point person, and he could add additional information.

2 MR. PHILLIPS: Tom Phillips, good morning.

3 CHAIRMAN LLOYD: It is, when you have a smog alert

4 day, children are told to stay indoors, and now they are  
5 stuck inside with potential bad exposure, like being between  
6 a rock and a hard place.

7 MR. PHILLIPS: Don't breathe.

8 BOARD MEMBER RAKOW: Who does have the authority to  
9 regulate indoor air?

10 MR. KENNY: The Health Department has authority,  
11 but the authority is not generally the same as we have.

12 We have been in a regulatory setting for the  
13 standards and have the industry comply. The Health  
14 Department does not act in the same way.

15 We have had negotiations with the  
16 Health Department to give authority to the Air Resources  
17 Board, but they have been ambivalent.

18 BOARD MEMBER RAKOW: Who has the authority over the  
19 school buildings?

20 MR. PHILLIPS: We looked into that.

21 The Department of General Services has general  
22 requirements but not -- classrooms fall under the purview,  
23 and they do not check the plans and components for the  
24 building plans and the ventilation are not checked for new  
25 schools, and it is left up to the district and local

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34

1 departments.

2 So, it does not happen.

3 BOARD MEMBER RAKOW: Is it because they have no one  
4 experienced or with the knowledge?

5 MR. PHILLIPS: The response is no money to do it.

6 BOARD MEMBER RAKOW: I suspect there is a place  
7 that everything is falling through the cracks.

8 BOARD MEMBER DeSAULNIER: I have a question on  
9 vulnerable population program, give us a time line, Dr.  
10 Holmes or Dane, can answer the question.

11 Where I'm going is where Ron was in hot spots in  
12 terms of children and vulnerable populations, how do we  
13 protect where they live, and I wanted to know why Fresno, and  
14 I assumed it was because of you, Barbara.

15 BOARD MEMBER PATRICK: It was.

16 MR. WESTERDAHL: That makes it interesting.

17 All of the factors may be important for asthma. It  
18 is, we do it through the approaches, and many of the things  
19 we are taking a look at in the available database that the  
20 State and Federal government has for matching with the air  
21 quality, and what we know about where they live and the level  
22 and can identify, are there hot spots or areas of interest  
23 that should be followed further.

24 We are working with other groups and in other  
25 programs to correlate the efforts not just to know what in

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35

1 general but in the children's study, we did the monitoring in  
2 the schools and home and in the community to make sure we are  
3 representing what people, kids are really exposed to.

4 This vulnerable population study will focus on  
5 what's going on, what the climate is and what they are  
6 exposed to.

7 The most bang for the buck opportunity. We find a

8 problem and where people are spending a great deal of money,  
9 we jump on that.

10 As the program develops, over the years it will go  
11 beyond Fresno and asthma and look at elderly people, people  
12 with existing cardiac problems.

13 We have identified the research, and others help  
14 identify where we need to go. We are not concerned.

15 Our major regulatory concern is not to protect the  
16 average but the people who need the protection.

17 BOARD MEMBER DeSAULNIER: I bring it up because of  
18 the industrial belts, not necessary the age, senior, I'm  
19 attempting to come up with a brilliant thought here, but in  
20 terms of interest, last month, as the refineries came out  
21 with their risk management plans, the concern was on the  
22 fence line and the vulnerable population, the children as  
23 they look at the plumes, it is interesting, versus the mobile  
24 source.

25 As we evolve, I would be interested in seeing the

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36

1 differences between environment and fence line versus the  
2 concerns, what Mr. Kenny talked about.

3 MR. WESTERDAHL: And there are efforts to add some  
4 considerable amount of community fence lines, school yards  
5 and effects especially for children.

6 There are things moving forward.

7 CHAIRMAN LLOYD: Any other questions?

8 I think I have a personal interest in the issue as  
9 well, and it is important to work with everyone, and we have

10 a lot of money in the Children Health's Study to see where  
11 that goes, because we go on into multi-year studies, what are  
12 we getting out of it, and there are competing concerns, and I  
13 understand what Mr. Westerdahl is saying, vis-a-vis,  
14 resources to share.

15 It is not easy to embark for a goal of 10 years and  
16 at four years you have to cut it off. We owe it to people to  
17 understand what they are getting, and I hope to report back  
18 to the Board how we utilized that, and Mr. Kenny, the  
19 Legislature.

20 If there are no more questions, it is not a  
21 regulatory item, and we don't need to close the record.

22 I thank the Research staff and Dane for the  
23 excellent presentation and discussion.

24 We will start the next item as soon as we have the  
25 exchange of places. We hope to have a press event at eleven

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37

1 o'clock with the truck and bus outside. We may be running a  
2 little late.

3 We will see how that goes.

4 Next on the Agenda is 99-4-2, Public Meeting to  
5 Consider Air Quality Status and Trends.

6 Now that we have heard the bad news about harmful  
7 effects of air pollution, it's time to look at something  
8 positive and see the progress that we have made and all the  
9 results of our investment both that have translated into the  
10 Research Program and the regulatory actions that the Board  
11 has taken so we can see the substantial progress that has

12 occurred.

13 Mr. Kenny.

14 MR. KENNY: Thank you, Mr. Chairman and Members of  
15 the Board.

16 We have made great strides in improving air quality  
17 as the result of the efforts of this Board, the government,  
18 the business community, public, everyone in California.

19 We take pride in the fact that the air is cleaner  
20 and healthier and that the key to the success, are the regs  
21 that we have implemented.

22 Marci Nystrom will begin the staff presentation.

23 MS. NYSTROM: Thank you, Mr. Kenny. Thank you.

24 Good morning, Chairman Lloyd and Members of the  
25 Board. As Mr. Kenny said, I will be talking about California

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38

1 Air Quality Status and Trends.

2 In general, I will talk about the pollutants that  
3 pose the greatest challenge here in California and the issue  
4 that we face in continuing to recuse ambient concentrations.

5 The bulk of my presentation deals with our status  
6 relative to three pollutants, ozone, particulate matter and  
7 carbon monoxide.

8 As Dane told you earlier, toxic air contaminants  
9 also pose problems throughout the State. I will not be  
10 discussing them in this presentation.

11 The staff plans to present an informational item on  
12 specifically on toxics later this year.

13 Let's get started with ozone.

14           As you well know, ozone is the main component of  
15 urban smog. It is a secondary pollutant, which means that  
16 ozone is not directly emitted into the air, instead, it's  
17 formed in the atmosphere through a photochemical process.

18           In the simplest terms, hydrocarbon and oxides of  
19 nitrogen precursor emissions, react in the presence of  
20 sunlight to form ozone.

21           Because it can take some time for the photochemical  
22 reactions to occur, ozone generally impacts a widespread  
23 region. Furthermore, both ozone and its precursor emissions  
24 can be carried from one area to another.

25           This results in transport impacts in downwind

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39

1 areas. In some cases, high ozone concentrations can result  
2 primarily from transport. In other cases, there can be a  
3 shared impact from both transport and local emissions.

4           These maps show the current area designations for  
5 the State and National one-hour ozone standards. Basically,  
6 the term nonattainment means that ozone levels exceed the  
7 health-based air quality standards.

8           Virtually all of the major metropolitan areas fall  
9 into the nonattainment category.

10           When we see a great deal of overlap in the State  
11 and National nonattainment areas, more areas are  
12 nonattainment for the State standard, because the State  
13 standard it is more stringent than the National one-hour  
14 standard.

15           While California still has a substantial number of

16 nonattainment areas, we have made dramatic improvements in  
17 ozone air quality. On a Statewide basis, peak ozone levels  
18 decreased an average of 49 percent from 1980 to 1997.

19 This decreased occurred, despite a 39 increase in  
20 population, and a 78 percent increase in the number of  
21 vehicle miles traveled each day.

22 This significant decline, in the face of  
23 substantial growth, demonstrates the overall success of our  
24 ozone control programs.

25 This slide shows how the ozone problem in

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40

1 California compares with the rest of the nation. It shows  
2 the top 10 urban areas, ranked by average number of days with  
3 ozone concentrations above the National one-hour standard.

4 California areas, shown in light yellow, fill seven  
5 of the top ten ranks. The only other areas are Houston, in  
6 fourth place, Baltimore, in ninth place and Saint Louis, in  
7 tenth place.

8 This slide points out that although we have made  
9 substantial improvements in ozone air quality, we still have  
10 a large number of unhealthy days, and, as you know, any  
11 concentration above the standard is a health concern.

12 So, while we've been very successful with our past  
13 programs, it is clear that we still have a lot of work ahead  
14 of us.

15 The time frames for attaining the National one-hour  
16 standard is quickly approaching.

17 This slide shows the attainment dates specified in

18 the State Implementation Plan or SIP. Four areas have  
19 attainment dates in the next year and a half. The remaining  
20 four must attain in the next five to ten years.

21 I'd like to talk just briefly about the three  
22 starred areas. As you know, the San Francisco Bay Area  
23 became attainment in 1995, and then was redesignated as  
24 nonattainment in 1998.

25 During the last several years, concentrations in

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41

1 this area have been bouncing around, very near the level of  
2 the standard.

3 We have seen the same thing in Santa Barbara  
4 County. Some of the variability in the ambient  
5 concentrations is caused by meteorology.

6 As a result, we must be diligent in reducing  
7 emissions so that we can maintain the standards under a  
8 variety of meteorological conditions not just the most  
9 favorable conditions.

10 The last area I'd like to mention is the San  
11 Joaquin Valley. This area has an attainment date of this  
12 year.

13 However, the Valley will not meet this deadline and  
14 will be reclassified as severe nonattainment area.

15 The deadline will be extended to 2005.

16 This slide shows the 1998 state designation values  
17 for California's six most populated air basins. To give you  
18 a brief explanation, we determine a designation value each  
19 year based on the previous three years of data.

20           We use the designation value to determine whether  
21 an area is attainment or nonattainment for the State  
22 standards. The designation value represents the highest  
23 measured concentration that remains after we exclude the  
24 extreme values.

25           You can see that the designation values exceed the

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42

1 State standard in all six air basins. California's worst  
2 ozone problem is found in the South Coast, where the  
3 designation value is more than twice the level of the State  
4 standard.

5           It is interesting to note that the designation  
6 values for the other five areas are quite similar, ranging  
7 from 0.13 parts per million, or PPM, to 0.17 PPM.

8           Therefore, each of these areas must achieve similar  
9 reductions in their peak values in order to reach attainment.

10           There are a number of things that we must address  
11 in our future efforts to reduce ozone. Several important  
12 ones are listed here.

13           They include the impact of controls on the peak  
14 values and the number of exceedence days, their relationships  
15 between ozone precursors and their control, the implications  
16 of weekend effect, the promulgation of the new eight-hour  
17 National standard, the lack of progress in the San Joaquin  
18 Valley and the impact of meteorological variability.

19           Let's look at each of these in more detail.

20           There are a number of things we can look at in  
21 gauging our progress. One way is look at the peak values.

22 Another is to look at the number of days with  
23 concentrations about the standard, or exceedence days.

24 Over the last 20 years, we have made substantial  
25 reductions in the peak values. For example, during the

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43

1 1960s, one-hour ozone concentrations in Southern California  
2 were as high as 0.65 PPM.

3 Today's values are about one-third of that.

4 However, despite this large decrease in peaks, we  
5 still have a substantial number of exceedence days.

6 The South Coast provides a good example. This  
7 graph shows the peak one-hour ozone trend. The peak value,  
8 plotted in orange, is a calculated value that represents the  
9 highest concentration we would expect to occur, once per  
10 year, on average.

11 Because it is more statistically robust, the peak  
12 value is the one that I will be talking about. However, for  
13 comparison, I have also plotted the maximum measured  
14 concentrations.

15 These are shown in yellow. You can see that the  
16 peak value has declined steadily over the years. It shows an  
17 overall decline of about 50 percent from 1980 to 1998. The  
18 peak value in 1980 was 0.45 ppm, compared with 0.23 PPM last  
19 year.

20 In contrast to last graph, this one shows the  
21 number of days above the one-hour standards. Days above the  
22 State standard are shown in yellow, and days above the  
23 National standard are shown in magenta.

24 Both indicators still show a significant number of  
25 unhealthy days.

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44

1 During the early 80s, nearly every day during the  
2 ozone season had values above the State standard.

3 During the last several years, concentrations  
4 exceeded the State standard on about half the days during the  
5 ozone season.

6 A comparison with Houston, Texas, provides a good  
7 example of just how severe our problem is. During 1994 to  
8 1996, their maximum ozone value was 0.24 PPM.

9 This is similar to the maximum of 0.26 PPM in the  
10 Riverside/San Bernardino area.

11 However, during this same time period, the Houston  
12 area had an average of only 37 exceedence days. Compare this  
13 with 107 in Riverside/San Bernardino.

14 It's clear that our future efforts must be aimed  
15 not only at reducing the peaks but at reducing all  
16 concentrations that exceed the standards.

17 The next point I would like to talk about is  
18 precursor emission controls. As I said earlier, hydrocarbon  
19 and NOx emissions react in the presence of sunlight to form  
20 ozone.

21 However, NOx is interesting in that it has a dual  
22 nature. It can destroy ozone as well as create it.

23 During the last several decades, we have  
24 implemented controls to reduce both hydrocarbons and NOx. As  
25 a result of this strategy, our ozone concentrations have

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45

1 decreased significantly.

2           Despite our success, some of the ozone modeling  
3 studies conducted over the past few years have shown that  
4 while NOx controls provide overall regional benefits, NOx  
5 controls may not provide benefits in some localized areas.

6           However, as I mentioned earlier, ozone is a  
7 regional pollutant and the modeling results should be  
8 evaluated on a regional basis rather than a subregional  
9 basis.

10           It is also important to note that our  
11 concentrations have decreased at a faster rate than those in  
12 other areas of the nation. These other areas have relied on  
13 a hydrocarbon-only control strategy.

14           Using the EPA's indicator, one-hour ozone dropped  
15 on average only 15 percent nationwide, between 1987 and 1996.

16           In California, the decrease was 18 percent  
17 Statewide and 33 percent in the South Coast.

18           Given the success of our approach, it is not  
19 surprising that the National Academy of Sciences has been  
20 critical of the hydrocarbon-only strategy.

21           Furthermore, it is clear that we need to continue  
22 with programs that reduce both hydrocarbons and NOx. This  
23 strategy is critical not only for ozone but also for  
24 particulate matter.

25           Another issue deals with the differences in ozone

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1 on weekends and weekdays. Many people have the perception  
2 that ozone on weekdays is decreasing while ozone on weekends  
3 is increasing. However, in reality, ozone is decreasing on  
4 all days.

5           What is happening is that ozone is decreasing less  
6 on weekends.

7           The weekend-weekday phenomenon has raised a number  
8 of questions, and we're continuing work that will help us  
9 better understand it.

10           In the past, ARB and others have conducted data  
11 analyses, but none of these studies has shed much light on  
12 the cause-and-effect relationships.

13           However, based on an understanding of atmospheric  
14 chemistry and the weekend-weekday emission differences, there  
15 are several competing theories.

16           These theories are based on the timing emissions,  
17 the various mix of emissions and the total amount of  
18 emissions.

19           Each theory has different control implications.

20           Although we cannot yet explain it, the key to  
21 determining the cause of the weekend effect seems to be  
22 understanding emission.

23           To help in this effort, we have initiated a number  
24 of studies to collect the necessary activity data and develop  
25 a weekend emission inventory.

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1           Air quality monitoring and statistical analyses

2 will be used as complementary approaches to assess the  
3 emission inventory estimates, determine their effect on ozone  
4 levels and their implications for ozone control policies.

5 We have a workshop scheduled next month to gather  
6 comments on our proposed workplan. Our goal is to analyze  
7 the existing data in time for the Year 2000 Air Quality  
8 Maintenance Plan. Analysis of new data would then be  
9 completed in time for the 2003 AQMP.

10 This graph for the South Coast illustrates the  
11 weekend-weekday effect. It shows the average number of hours  
12 above the standard on weekends in yellow and on weekdays in  
13 magenta.

14 As you see, the number of exceedence hours has been  
15 decreasing for both weekends and weekdays, however, the  
16 exceedence hours on weekdays are declining at a faster rate.

17 As a result exceedence hours on weekends now  
18 account for a greater percentage of the total than they did  
19 during the early 1980s.

20 The next thing I would like to talk about is the  
21 new National eight-hour ozone standard. Although our past  
22 efforts have focused on achieving the one-hour standards, we  
23 must now concentrate on reducing eight-hour concentrations as  
24 well.

25 While the recent court decision has set in motion a

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48

1 legal process that will take some time to sort out, we are  
2 still moving ahead with our work in this area.

3 We expect the U.S. EPA will designate areas for the

4 eight-hour standard in the summer of 2000. Based on our  
5 analysis, we expect there will then be a better match between  
6 the State and National nonattainment areas.

7 Plans for attaining the eight-hour standard are due  
8 in 2003. During the interim, we expect that emission  
9 reductions aimed at achieving the one-hour standard will also  
10 be effective in reducing the eight-hour values.

11 Furthermore, any controls we implement to meet the  
12 State standard will move us closer to attaining the new  
13 eight-hour standard.

14 This slide shows the current State nonattainment on  
15 the left, the areas that we expect will be nonattainment for  
16 the eight-hour standard are shown on the right.

17 As you can see, there is a very good match among  
18 the areas. This overlap of areas should facilitate a more  
19 comprehensive and integrated approach to ozone control.

20 As I said, our efforts to reduce one-hour  
21 concentrations have also benefitted the eight-hour  
22 concentrations.

23 This slide for the South Coast illustrates the  
24 progress that we have already made. It shows the decrease in  
25 the one-hour values, plotted on the left axis, and the

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49

1 eight-hour values, plotted on the right axis.

2 Concentrations for both averaging times are  
3 declining at similar rates. Furthermore, since the National  
4 eight-hour standard is now closer in stringency to the State  
5 standard, attainment for the National standard will be more

6 closely aligned with attainment for the State standard.

7           While we have made substantial progress in most  
8 areas of the State, there are a few areas that have not  
9 responded to our ozone control efforts. This is very evident  
10 in San Joaquin Valley.

11           As you can see, there has been very little change  
12 in the peak values since 1980. There seem to be a number of  
13 reasons for the lack of progress.

14           First, the area has concentrated more on a  
15 hydrocarbon control strategy than dual hydrocarbon and NOx  
16 strategy.

17           A second factor is the physical location of the  
18 area. The Valley location is conducive to stagnant  
19 meteorological conditions.

20           The surrounding mountains serve as a barrier,  
21 favoring the build-up of precursor emissions and pollutants.

22           Finally, many of the Valley areas have experienced  
23 significant growth rates over the past 20 years.

24           For example, between 1980 and 1999, the Statewide  
25 population increased 40 percent. During the same time

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50

1 period, population in the San Joaquin Valley increased nearly  
2 60 percent.

3           We will need to watch this and other similar areas  
4 closely to assure future progress.

5           The last ozone issue I would like to talk about is  
6 meteorological variability. As you all know, meteorology can  
7 have a large impact on air quality.

8           A prime example is the impact of El Nino on ozone  
9 during most of 1997 and early part of 1998.

10           The El Nino weather pattern tends to bring with it  
11 cooler temperatures and better dispersion than we would  
12 normally expect.

13           As a result, we saw ozone concentrations that were  
14 lower than normal. While many people saw this as a great  
15 improvement, it really reflected a change in meteorology  
16 rather than a change in emissions.

17           We are continuing to evaluate methods we can use to  
18 factor out the impact of meteorology. The goal is to better  
19 understand air quality as it relates to emission reductions.

20           This in turn will give us a better understanding of  
21 which control strategies are most effective.

22           The San Francisco Bay Area provides a good example  
23 of the meteorology problem. This graph shows the maximum  
24 one-hour ozone values, measured from 1980 to 1998.

25           There's a substantial amount of variation in these

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51

1 values from one year to the next.

2           Although there are many factors that contribute to  
3 the variability, meteorology is certainly one of them. If we  
4 could factor out the meteorological influence, we would see a  
5 much smoother trend.

6           Furthermore, it would probably alleviate the  
7 problem of areas bouncing in and out of attainment. By  
8 recognizing the influence of meteorology, we can work toward  
9 attaining the standards under all types of meteorological

10 conditions, even those that are adverse.

11 Now, I would like to move on to the next pollutant,  
12 which is particulate matter.

13 In contrast to ozone, particulate matter is not a  
14 single substance but rather a mixture of a variety of  
15 substances. This make the particulate matter very different  
16 from most of the other pollutants we deal with.

17 Some particles are emitted directly into the air.  
18 These are the primary particles. Some of the primary  
19 particles are the very small, or fine particles.

20 Others are the larger or coarse particles. One of  
21 the major contributors to the primary particles is geological  
22 material from activities such as motor vehicle travel,  
23 construction and strong winds; mobile sources, such as  
24 diesel-fueled vehicles also contribute to the primary  
25 particles.

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52

1 In contrast to the primary particles, other  
2 particulate matter results from gases. These gases are  
3 transformed through physical and chemical processes in the  
4 atmosphere. These are the secondary particles.

5 The major precursors for the secondary particles  
6 are hydrocarbons, oxides of nitrogen and oxides of sulfur.

7 The secondary particles tend to be fine particles.  
8 The major contributors are precursor emissions from  
9 combustion processes. These processes include sources such  
10 as motor vehicles and stationary sources.

11 Now, you are probably familiar with the recent

12 increased interest in fine particles. These are the  
13 particles that are less than 2.5 microns in diameter.

14 In the summer of 1997, the U.S. EPA promulgated  
15 National PM 2.5 standards. We are just beginning to deploy  
16 a Statewide PM 2.5 network to collect data that comply with  
17 the new standard.

18 The State standard is based on PM 10. PM 10  
19 comprises all particulate matter of 10 microns diameter or  
20 less. As a result, PM 10 includes both the coarse particles  
21 and the fine, PM 2.5 particles.

22 These maps show the current State and National PM  
23 10 nonattainment areas. Almost the entire State is  
24 designated as nonattainment for the State standards.

25 This contrasts starkly with the smaller number of

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53

1 National nonattainment areas. However, you must keep in mind  
2 that the National 24-hour PM 10 standard is three times the  
3 level of the State standard.

4 So, we would expect fewer National nonattainment  
5 areas.

6 On a nationwide basis, the PM 10 problem is  
7 generally limited to the western states, and we have a large  
8 share of the problem. In fact, four of the six serious  
9 National nonattainment areas are located in California.

10 One of these areas, the Coachella Valley, has  
11 petitioned the U.S. EPA for redesignation as attainment. The  
12 request is awaiting approval.

13 This slide shows the remaining three serious

14 nonattainment areas and their attainment dates. Originally,  
15 these areas had to attain by 2001. However, the Clean Air  
16 Act allows areas that cannot demonstrate attainment by 2001  
17 to petition for a five-year extension.

18 All three of these areas have done so.

19 This slide shows the State PM 10 designation values  
20 for the six most populated air basins. Similar to ozone, the  
21 South Coast is again the worst area.

22 However, the San Joaquin Valley is not far behind.  
23 The remaining areas have designation values that are one and  
24 a half to almost three times the level of the State standard.

25 This illustrates the point that we still have much

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54

1 to do.

2 I would like to emphasize that these values do not  
3 reflect the absolute highest concentrations in California.  
4 Generally, the highest concentrations are measured during  
5 dust storms in desert areas.

6 While these high values are a great concern, they  
7 typically do not reflect the concentrations to which the  
8 majority of people are exposed.

9 There are several points related to particulate  
10 matter that warrant discussion. These are the  
11 characteristics of PM 10, the impact of the ozone precursor  
12 controls, the impact of meteorological variability and,  
13 finally, the problem of regional haze.

14 Let's talk first about PM 10 itself. As you saw on  
15 the designation map, nearly all of California is designated

16 as nonattainment for the State standards.

17           Currently over 99 percent of the State's population  
18 is exposed to PM 10 values that exceed the State standards  
19 during at least part of the year.

20           One of the things that makes the particulate matter  
21 problem so difficult is that the emission sources are very  
22 diverse.

23           Furthermore, because of the variety of sources and  
24 the size and chemical make-up of the particles, both the  
25 nature and the causes of the problem can vary considerably

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55

1 from area to area.

2           As a result, two areas with similar concentrations  
3 may have very different PM 10 problems.

4           To add to the complexity, a single area may have a  
5 different type of PM 10 problem during different times of the  
6 year.

7           This slide provides a good illustration. It shows  
8 the seasonal variation in the fine particles, shown as the  
9 yellow bars, and the coarse particles shown as the magenta  
10 bars.

11           It also shows the seasonal variation in the total  
12 PM 10, plotted as a line above the bars.

13           You will notice that the fine particles are highest  
14 during the fall and winter months. During this time,  
15 combustion sources, such as wood stoves, motor vehicles and  
16 stationary sources, contribute to the problem.

17           In contrast, the coarse particles are highest

18 during the summer and fall. This is the time when the ground  
19 is dry and easily disturbed by winds and human activity.

20 You can see that the two size fractions have very  
21 different sources. As a result, they require very different  
22 approaches to control.

23 In the past, we have not made a concerted effort to  
24 control PM 10 for its own sake. However, as I will show you,  
25 our ozone controls have had some impact.

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56

1 You will remember from our earlier discussion that  
2 both oxides of nitrogen and hydrocarbons are precursors to  
3 ozone. They are also both precursors to PM 10. They are  
4 especially important for PM 2.5 because they tend to be very  
5 small in size.

6 As a result, our ozone strategies have had the  
7 added benefit of reducing particulate matter levels.

8 This slide shows how the ozone precursor controls  
9 have already helped. It shows the South Coast annual average  
10 PM 10 trend on top and PM 2.5 on the bottom.

11 Both lines are declining, and they track pretty  
12 well. When you look at them on a percentage basis, we see  
13 that PM 10 decreased about 35 percent over the eight year  
14 period.

15 In contrast, PM 2.5 decreased about 40 percent.  
16 These percentage decreases are fairly close. However, as I  
17 will show you in the next several slides, much of the  
18 decrease in PM 10 is probably due to rainfall.

19 So, in reality, the difference between the two is

20 probably much greater than shown here. Nevertheless, the PM  
21 2.5 reduction represents quite a significant side-benefit  
22 from our ozone control programs.

23           The next point I would like to talk about is  
24 meteorological variability. Similar to most other  
25 pollutants, PM 10 is also sensitive to meteorology.

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57

1           This is particularly true for the coarse particles,  
2 because they tend to settle out first.

3           When we look at improvements in PM 10 over the  
4 years, there is a strong correspondence to rainfall.

5           This graph shows the annual average PM 10 for  
6 Bakersfield, plotted with the annual rainfall. As you can  
7 clearly see, the years with high PM 10 generally had low  
8 rainfall.

9           In contrast, the years with low PM 10 generally had  
10 high rainfall. This means that much of the improvement we  
11 have seen over the last ten years is probably tied to  
12 favorable meteorology.

13           Without additional controls, we could see higher PM  
14 10 levels in future years if we have drought conditions,  
15 similar to those in the mid to late 1980s.

16           The last point I would like to talk about for PM 10  
17 is the issue of regional haze. We have heard a lot about  
18 this in recent years, especially as it relates to visibility  
19 in the Grand Canyon area.

20           Many people use visibility to judge air quality.  
21 They believe if they can see things in the distance, the air

22 must be clean.

23           Particulate matter contributes to poor visibility.  
24 Generally, the particles that are PM 2.5 and smaller are the  
25 major culprits. Reducing these fine particles, which result

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58

1 from soot, oxides of sulfur, hydrocarbons and oxides of  
2 nitrogen, will go a long way toward improving regional haze.

3           Now, I would like to make just a few comments about  
4 carbon monoxide. California's carbon monoxide problem is  
5 largely solved.

6           By 1998, most areas of the State were designated as  
7 attainment for both the State and National standards. At  
8 this point we have only two remaining nonattainment areas,  
9 Los Angeles County and the City of Calexico, in Imperial  
10 County.

11           We are continuing to study the problems in these  
12 areas in an effort to develop locally focused control  
13 strategies.

14           One of the issues stemming from our efforts to  
15 control carbon monoxide emissions is the need for wintertime  
16 oxygenated fuels. Such fuels are no longer required in most  
17 of the attainment areas.

18           One exception is the Lake Tahoe area. However,  
19 next month the staff plans to present an item that would  
20 remove the requirements there as well.

21           We expect that in the future decreasing emissions  
22 from motor vehicles will be adequate to assure continued  
23 maintenance or compliance with the standards.

24           Finally, we come to the summary, and the obvious  
25 question is, where do we go from here?

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59

1           While we have made tremendous strides in improving  
2 California's air quality, despite significant growth, we  
3 still have a long way to go.

4           Currently, we have a large number of nonattainment  
5 areas, and over 90 percent of the State's population breathes  
6 unhealthy air during some part of the year.

7           Our future efforts must be focused on continuing to  
8 improve air quality, with a specific emphasis on ozone,  
9 particulate matter and regional haze.

10           In the past, ozone was our main focus. However,  
11 our ozone control efforts have had the added benefit of also  
12 reducing PM 2.5. In the future, we need to look at the  
13 impacts on all pollutants and develop a more integrated  
14 overall strategy.

15           We must also recognize the need for Statewide  
16 strategies. Multi-pollutant air quality problems are found  
17 throughout the State, making Statewide control strategies  
18 important to address California's air quality goals.

19           This concludes my presentation. However, before we  
20 open it up for questions, I would like to mention that we  
21 have been working to make all of our air quality and  
22 emissions data available to the public.

23           We have a demonstration of some of our tools set up  
24 outside the hearing room. We invite you to stop by and take  
25 a look.

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60

1           Now, if you have any questions, we will be happy to  
2 answer them.

3           CHAIRMAN LLOYD: Thank you very much for the  
4 presentation.

5           Any questions from Members of the Board?

6           Yes, Mr. Calhoun.

7           BOARD MEMBER CALHOUN: You mentioned the workshop  
8 where you are looking at the weekday-weekend differences.

9           Has a notice been sent for that?

10          MR. CROES: June 23.

11          The notice will be sent out tomorrow.

12          CHAIRMAN LLOYD: Any other questions?

13          Any further questions?

14          I presume no written comments.

15          Again, since this is not a regulatory item, there  
16 is no need to close the record, and I would thank the staff  
17 for the presentation and providing the material.

18          At this point, I would like to essentially take a  
19 break here. We are scheduled at this time to see an example  
20 of our Innovative Clean Air Technology Program results.

21          This is a program that is different from the  
22 Research Programs whereby we work with the private sector to  
23 develop the technology needed to attain the standards.

24          Some of you may have seen the results of one of the  
25 participants in the program. We have a hybrid electric LPG

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61

1 bus, on the sidewalk, and we have in the parking lot a hybrid  
2 big rig truck that uses an electric motor coupled with a  
3 compressed natural gas engine.

4 The truck particularly is of great interest. This  
5 is the first time we have seen such a thing and these are  
6 technological breakthroughs as we face the growing challenges  
7 in moving goods and reducing emissions.

8 We will take a 20-minute break to go out to the  
9 parking lot there to hear from the project developers ICE and  
10 Cal Star and Westar.

11 Then we will go promptly to the Board items and the  
12 proposals and the ICAT program.

13 Thank you.

14 (Thereupon a brief recess was taken.)

15 CHAIRMAN LLOYD: I would like to reconvene the  
16 Board meeting. So much for the 20 minutes.

17 I would like to congratulate the staff for the  
18 excellent work in bringing that technology to that status,  
19 and I look forward it to being commercialized and on the  
20 road.

21 We have lost two Board Members, Supervisor Roberts  
22 and Bill Friedman, and it was important for Dr. Friedman for  
23 the Research Proposals, but in his stead, we have six  
24 research proposals brought by the Research Division, and Dr.  
25 Holmes, do you or staff have anything to say about the

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62

1 proposals?

2 DR. HOLMES: No, nothing in particular.

3 We briefed several Board Members and have not heard  
4 any concerns nor received any telephone calls, so I think we  
5 are okay.

6 CHAIRMAN LLOYD: We have no public comments either.  
7 Does the Board have any questions?

8 No questions.

9 BOARD MEMBER RIORDAN: If there are no questions, I  
10 move approval of the items.

11 CHAIRMAN LLOYD: I need to ask a question.

12 BOARD MEMBER RIORDAN: Somebody needs to ask a  
13 question.

14 CHAIRMAN LLOYD: One of the things I am concerned  
15 about is the shrinking research budget, and I want to try to  
16 work with staff to increase that.

17 Another way is to do leveraging of funds. There  
18 are several of the research proposals where there is no  
19 cosponsorship.

20 Is that because staff tried and failed or has not  
21 tried at all?

22 DR. HOLMES: We make an annual visit to our  
23 partners in the South Coast AQMD and make a list of the  
24 proposals that we plan to do, and we have a commonality of  
25 interest, and in those cases we get cofunding, and there are

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63

1 other projects that we have no direct infusion of dollars but  
2 in kind support from agencies or districts interested in the  
3 work.

4 I agree that there is probably more we could do to  
5 seek out cofunding from other government agencies and other  
6 interested parties. That effort continues.

7 CHAIRMAN LLOYD: Thank you, Dr. Holmes.

8 I certainly will join with you in trying to, again,  
9 look for funds from appropriate sources to stretch the  
10 valuable dollars and get more dollars.

11 MS. WALSH: Before you move on to take a vote on  
12 the Resolution, let me clarify for the record, with Mrs.  
13 Riordan, there are six Resolutions in the Research Board  
14 Item, Proposed Resolution 99-16 through 21, and I would like  
15 to clarify that the motion includes all of those?

16 BOARD MEMBER RIORDAN: Thank you. I include all of  
17 those with some specificity.

18 CHAIRMAN LLOYD: We have a motion.

19 BOARD MEMBER PATRICK: Second.

20 CHAIRMAN LLOYD: So, all in favor of adopting all  
21 the Research Proposals, say aye.

22 Opposed, no.

23 Nothing.

24 Okay.

25 BOARD MEMBER RIORDAN: If I might, I know it would

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64

1 be a bit of a stretch, and everyone is competing for these  
2 dollars, in terms of health and health research, you could  
3 make, I think, a case in the right study for some of the  
4 tobacco money.

5 I think you might begin to think about that. I

6 think, I do not know what the State is doing about that  
7 dispersal of money. There might be a case to be made for  
8 some research.

9 I think it correlates, and that may be available to  
10 be made.

11 CHAIRMAN LLOYD: Maybe we could ask staff to look  
12 into that and report back at the next Board meeting.

13 MR. CACKETTE: There has been discussion, and we  
14 will give you the status.

15 CHAIRMAN LLOYD: A crumb from a big amount might be  
16 a lot.

17 BOARD MEMBER RIORDAN: I think that there is  
18 tremendous competition, and I recognize that, but I think you  
19 could really draw some cause-and-effect type of research that  
20 could be useful to the State.

21 MR. CACKETTE: Especially if the mechanism does not  
22 matter, what the particles, but how they get into the body  
23 and through the lungs and things like that.

24 CHAIRMAN LLOYD: Thank you.

25 That is an excellent suggestion.

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65

1 The next item is 99-4-3, the Public Meeting to  
2 Consider Proposals for, as I mentioned, the Innovative Clean  
3 Air Technology, or ICAT program.

4 This is the fifth year of the program and it is  
5 already bearing fruit, as we saw outside there.

6 ARB's ICAT funding supports technologies that not  
7 only have high potential for improving air quality in

8 California but also offer great promise for stimulating the  
9 State's economy through significant commercialization  
10 opportunities.

11 What we just saw outside was an excellent example  
12 of that part.

13 With that, I would like to see if staff has a  
14 presentation or any comments on the proposals before you.

15 MR. CACKETTE: Mr. Kenny is held upstairs in a  
16 conference call.

17 I think you saw the results of one of ICAT programs  
18 outside. We do not need to give the background as to what  
19 the program is about.

20 The key focus is to move things out of research and  
21 development stage into commercialization stage and get clean  
22 air technology and get jobs for Californians.

23 We do this every year, and we got 42 pre-proposals,  
24 asking for general ideas, and we went through those and  
25 prioritized them and invited 17 firms to respond with

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□

66

1 details, with costs and objectives, and we got 13 of those  
2 that submitted proposals, and we are recommending that you  
3 consider three for funding today.

4 Many of them had interesting aspects, but these  
5 three are likely prospects of providing a commercial product  
6 for sale and will help California with jobs.

7 The objectives are consistent with the overall  
8 goals and plan of the Board. They meet the technical and  
9 business requirements that we have established for the ICAT

10 program, and they will help the Board meet the clean air  
11 objectives.

12 Tony Andreoni will make the presentation.

13 MR. ANDREONI: Thank you, Chairman Lloyd, Board  
14 Members.

15 This will provide the Board information on the  
16 three ICAT proposals staff is proposing for funding this  
17 year. First, I will review the ICAT program and summarize  
18 the recommendation for funding these proposals, and I will  
19 introduce two speakers to discuss the respective ICAT  
20 projects.

21 As the Chairman mentioned, this is the fifth year  
22 of the ICAT program that provides the funds for the  
23 development and control technology. As shown on the slide,  
24 projects increase the air pollution prevention and control  
25 technology, increase cost effectiveness or develop new cost

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□

67

1 effective alternatives.

2 They must have potential for creating jobs in  
3 California.

4 ICAT funding must be used for projects at the  
5 pilot, prototype or application demonstration stages. Most  
6 of the capital available in the U.S. is for basic research or  
7 commercialization after a full demonstration shown by steps  
8 12 and 6 on the slide.

9 Once through the first two stages, however, some  
10 ideas die from lack of funding and others are commercialized  
11 by other countries. We refer to this as the valley of death.

12           ICAT funds help the business bridge the valley of  
13 death. ICAT provides funding of 50 percent of the project's  
14 total cost. The applicant and partner share the remaining  
15 cost.

16           We were limited to 350,000 per project. ICAT  
17 requests for proposal provides limits on certain costs.

18           Also the contractor must explicitly justify the  
19 costs. These requirements assure us that companies move to  
20 commercialization, thereby recovering expense and making a  
21 profit.

22           To get the word out, we increased our efforts by  
23 attending workshops and conferences and meetings statewide.  
24 We continue to expand the mailing list, focusing on companies  
25 that develop new technology.

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□

68

1           Due to use of the Internet, we've expanded the Web  
2 page to provide additional information, and the results show  
3 an increase in number of visitors. In 1997, close to 300  
4 visitors logged on, and in 1998, 1300 logged on.

5           The number of ICAT Web page visitors in 1999 has  
6 increased four-fold when compared to the same period last  
7 year.

8           We are aware that bidders spend a lot of money and  
9 time preparing their proposals. That is why we begin by  
10 requesting brief pre-proposals.

11           The new solicitation bid package is to encourage  
12 the businesses to participate in the program. Some companies  
13 found that various requirements of the IFP are confusing;

14 therefore, as we have done since 1995, we held a workshop to  
15 assist the companies submitting the proposals.

16 We discussed the overall objectives and  
17 administrative requirements, matching funds, budgets,  
18 confidentiality provisions and participation in Disabled  
19 Veteran Business Enterprises.

20 CHAIRMAN LLOYD: Do you hold it in Sacramento or  
21 other parts of the State?

22 MR. ANDREONI: Just in Sacramento.

23 ICAT proposals are not only evaluated by ARB staff,  
24 but also and advisory committee, consisting of business and  
25 technical reviewers provides evaluation to ARB staff.

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□

69

1 This year, six external advisors participated in  
2 the proposal review process. In addition, the South Coast  
3 Air District Management District and California Energy  
4 Commission staff helped select these ICAT proposals.

5 The ICAT program has funded 11 projects in both the  
6 mobile and stationary sources. Four projects funded in 1995  
7 are completed, and new technologies are entering the market.

8 AVES/ADCO Metal Coating System and Adhesive  
9 developed and demonstrated a metal coating system that  
10 contains zero VOC and no hazardous air pollutants, aerosol  
11 products and chemical water borne resin, and they are  
12 marketing the technology internationally.

13 Other contractors formed a consortium with the  
14 equipment to commercialize the technology.

15 I note that once the ICAT technology is

16 commercialized, the contractors work with the Office of  
17 Environmental Technology for official certification.

18           This voluntary statewide certification process  
19 assists in the permitting of technology while ultimately  
20 increasing the domestic and international use of emerging and  
21 mature technologies.

22           This completes the review of ICAT program. I will  
23 describe the three projects that we recommend for funding  
24 under this year's ICAT program.

25           We selected these three proposals because we

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□

70

1 believe they address important program needs that the ARB  
2 feels are technically feasible, have potential to improve the  
3 market and may be commercialized in a few years.

4           The first proposal is ultralow NOx burner for  
5 process heaters and industrial and utility boilers, by Altex  
6 Technologies Corporation, located in Santa Clara.

7           Boilers and process heaters are a significant  
8 source of NOx emissions. Altex has designed an innovative  
9 burner, ULNB, that provides low NOx emissions.

10           Staff has reviewed the information during the  
11 review process and concluded that the technology is feasible.

12           Pilot scale burner tests have shown that  
13 significantly lower costs compared to post combustion  
14 technologies.

15           Besides reducing emissions, it has lower CO2 and  
16 will help mitigate global warming because it consumes fuel  
17 more efficiently.

18           The second proposal, commercial cooking grease  
19 emissions control, microwave cleaned ceramic filter  
20 technology commercialization was submitted by Industrial  
21 Ceramic Solutions, ICS, in Tennessee, and demonstrated the  
22 proposed technology in California.

23           Commercial broilers, griddles and deep fryers are a  
24 significant source of air borne grease, contributing to air  
25 pollution in urban areas of the State.

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□

71

1           To reduce emissions, ICS has developed a microwave  
2 cleaned filter technique using carbide fibers. The microwave  
3 heats the fibers to high temperatures to oxidize the grease  
4 into water and carbon dioxide, then it regenerates the filter  
5 for use -- downstream to oxide any VOC created during the  
6 filter regeneration.

7           The fully developed ICS filter system seems to have  
8 a high particulate efficiency, much less than existing  
9 electrostatic precipitators for regeneration.

10           The final project is advanced zeolite concentrator  
11 for control of VOC emissions, by the Alzeta Corporation, in  
12 Santa Clara.

13           VOCs from industrial sources is by thermal or  
14 catalytic oxidation. If there are large flows of VOC before  
15 oxidation, they make a system, an absorber wheel to  
16 concentrate VOCs before oxidation.

17           This picture shows how currently they are able to  
18 absorb double the capability. The proposed system will be  
19 saving fuel, cost and capital cost for semiconductor and

20 eliminate VOCs each year. The reductions will reduce green  
21 house emissions.

22 Other potential applications may be in the printing  
23 and coating industries.

24 To summarize, the ICAT program is providing vital  
25 funding for projects and technologies in California and helps

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□

72

1 the economy to grow.

2 The success of zero VOC coating can play a role to  
3 help the businesses bridge the gap between research and  
4 commercialization.

5 We believe that we have three promising proposals  
6 for projects that help us meet the goals and objectives for  
7 healthier air while strengthening the economy in California.

8 Before you consider the ICAT proposal funding, two  
9 contractors close to finishing projects will provide you with  
10 a short update, the Reynolds Group, Orange County, and ISE  
11 Research Group, in San Diego.

12 First, Ed Reynolds, from the Reynolds Group, dual  
13 stage biofilter to reduce ozone precursors and odorous sulfur  
14 compounds for sewage plants.

15 They are using the funding to demonstrate the pre  
16 filter that deals with the acids. It is used in conjunction  
17 with the biofilter, extending the life of making it a more  
18 viable emissions control technology.

19 Mr. Reynolds has a Masters degree in Civil  
20 Engineering, from the University of Houston and Masters in  
21 Business from Harvard.

22           Mr. Reynolds has been involved in biofilters with  
23 the University of California, who has cosponsored  
24 biofiltration.

25           Mr. Ed Reynolds.

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□

73

1           MR. REYNOLDS: Mr. Chairman and Board Members,  
2 thank you for the opportunity to come up from Orange County  
3 and make the presentation to you.

4           Our presentation is on the biofilter technology,  
5 not a priority technology, but originated here in Orange  
6 County, and with the help of your funding, we have  
7 jump-started, so we think it has great promise for commercial  
8 success.

9           The actual title of thea project which you funded  
10 the application demonstration of is the dual stage biofilter  
11 for publicly owned treatment works.

12           It is a biological filter device that treats air  
13 pollution biologically. It has ideal flow rates to show and  
14 prove that the technology works.

15           This technology was demonstrated at a public-owned  
16 treatment works. You see two participants looking from the  
17 works to the biofilter.

18           The biofilter collected air from the head works  
19 where the odorous and VOCs were selected and passed those  
20 into the biofilter bed that you see in the foreground.

21           The technology that you sponsored was the  
22 pretreatment, the three containers at the fronts edge of the  
23 biofilter.

24           Conventional biofilters in this case contain wood  
25 chips as active medium. The bacteria grow and consume the

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□

74

1 contamination that pass over. Hydrogen sulfide at POTW or  
2 pulp and paper plants passes over the wood chips. They  
3 degrade.

4           These two are inspecting the wood chips that was  
5 not pretreated has severely degraded. This is the  
6 pretreatment, was built in three tanks, full of lava rock and  
7 included in the yellow container are computer controls  
8 devised to control and measure all the parameters of the  
9 system via the Internet now.

10           Looking at the tank, you can see inside that the  
11 air flows in the right and goes through the belt and passes  
12 over and exits into the second stage on the bottom.

13           A significant amount of literature has been  
14 published regarding how biofiltration works, microbes act on  
15 the contaminant medium.

16           We had three tanks so that we could vary the three  
17 put time. We added hydrogen sulfide, such as benzine,  
18 toluylene, ethylene and chloroform and measured the results  
19 after a series of tests.

20           There was excellent hydrogen sulfide removal and  
21 very good biological destruction.

22           We calculated that we ran that 1430 pounds of  
23 hydrogen sulfide and 50 of VOC to prove there were active  
24 bacteria, you see these are what act to treat the  
25 contaminants in the pretreatment tank.

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□

75

1           There are several key factors to make it  
2 successful. One is the biodegradability of the contamination  
3 and the in flow of the waste treatment that requires  
4 reactivity and the size of the reactor.

5           Your funding helped us to do sizing and proper  
6 characterization so that when we commercialize as a company  
7 and as an industry based in California, we know what we are  
8 doing with a lot more certainty.

9           As has been mentioned earlier, there are several  
10 conventional treatment methods, carbon absorption, oxidation,  
11 or burning, catalytic reduction and chemical processes.

12           The primary advantage of biofilters is that it is a  
13 natural method of treatment, no hazardous waste created, low  
14 natural resource use, little power is needed to power, to  
15 push the air and water and nutrients to make the bugs happy.

16           Maintenance is very low, which will result in  
17 conducting great results for commercialization.

18           Some of the disadvantages are that they cannot  
19 treat high concentrations of waste air streams. There is  
20 difficulty handling loads.

21           The funding helps us solve these dilemmas. As you  
22 saw with the three tank system, we have treatment through a  
23 smaller area.

24           In the United States, there are 52,000 waste water  
25 facilities, 500,000 pump stations, and hydrogen sulfide is

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□

76

1 becoming a nuisance and associated with the waste water  
2 treatment is a number of different VOC.

3           What we have seen from the demonstration is there  
4 are a number of industrial applications in small and medium  
5 sized businesses.

6           We intend to start selling biofilters. We will  
7 provide a niche in engineering and design of systems. We  
8 have been able to establish a website.

9           What you have helped us do is help us overcome the  
10 chicken and egg dilemma. Engineers will not use the  
11 technology until proven, and engineers have not tried it, so  
12 how can it be proven, and you significantly helped us  
13 overcome that barrier.

14           It has been a good demonstration. As in  
15 everything, the risk of acceptance is by proof.

16           We are thankful that you supported the technology  
17 and staff helped us identify commercialization opportunities  
18 which we explored and have proven that biofilters do work.

19           You helped us jump start it, and we think these can  
20 be a commercial success.

21           We thank you very much.

22           CHAIRMAN LLOYD: Thank you for the presentation.

23           Do any Board Members have questions?

24           BOARD MEMBER CALHOUN: I have one.

25           I think you mentioned the fact that the wood chips

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□

77

1 were pretreated.

2           What do you use to pretreat the wood chips?

3           MR. REYNOLDS: The three tanks were the pretreated  
4 with lava rock, and we passed the air over the lava rock.

5           These three tanks are the pretreatment for the  
6 entire biofilter, which takes up an area of 2,500 to treat  
7 3,000 CNM of air.

8           We demonstrated on the higher unit by treating the  
9 hydrogen sulfide that they last a longer time. They take up  
10 less space at a pumping station to pump the sewage to get it  
11 to the POTW, and a number of those in San Diego, there are  
12 foul odors.

13           The sizing problem is overcome by being able to  
14 pretreat. The treatment efficiency was so good, we may not  
15 need post treatment because of the results.

16           Did I answer the question, Mr. Calhoun?

17           BOARD MEMBER CALHOUN: I'm not sure.

18           MR. REYNOLDS: You asked what the pretreatment was  
19 and that occurred.

20           BOARD MEMBER CALHOUN: What is involved in the  
21 pretreatment?

22           MR. REYNOLDS: Passing the air over a lava rock  
23 medium.

24           The air that comes out of the head works contains a  
25 lot of hydrogen sulfide and VOC. The pretreatment is so that

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78

1 does not have to pass through the second stage.

2           DR. HOLMES: The hydrogen sulfide converts, kills  
3 the bugs and cause the wood chips to deteriorate.

4 The pretreatment avoids the problem.

5 BOARD MEMBER EDGERTON: I was interested.

6 It was an excellent presentation. Thank you, Mr.  
7 Reynolds.

8 In Southern California, and one of the things that  
9 you are going to be working toward to market in California to  
10 POTWs where we have primary secondary treatment, is that the  
11 odor, even though the gray water treatment and some of the  
12 odor issues, is this at the time that it removes air  
13 pollutants, is it removing the odor?

14 MR. REYNOLDS: Our nose detects hydrogen sulfide at  
15 one PPM, and we are pretreating at 250 PPM.

16 This is an odor control that is exactly the intent  
17 or the purpose.

18 BOARD MEMBER EDGERTON: Thank you.

19 Will it be equally useful and necessary as primary  
20 and secondary tertiary POTW or not?

21 MR. REYNOLDS: You are performing less and less  
22 treatment, and the odors, you have no odors off a tertiary,  
23 process, it depends where the odors are occurring, and what  
24 stage in the process you are, up stage, there is more  
25 potential than down stage.

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□

79

1 BOARD MEMBER EDGERTON: What size market is there  
2 for that?

3 MR. REYNOLDS: How do you quantify, in unit sales  
4 or dollars?

5 BOARD MEMBER EDGERTON: Dollars.

6 MR. REYNOLDS: We believe that the total scrubber  
7 is \$25 million a year, we are projecting over the next couple  
8 of years \$30 million to \$150 million in sales for overall  
9 market in the United States.

10 BOARD MEMBER EDGERTON: That is excellent.

11 Thank you.

12 MR. ANDREONI: Thank you, Mr. Reynolds.

13 Our second speaker is Mike Simon for ISE Research  
14 Corporation. Mike talked to us outside, but he will discuss  
15 the development of the two hybrid vehicles.

16 These vehicles use relatively small engines to  
17 charge the batteries for a period, as all electric motors  
18 have engines to provide supplemental power and combine the  
19 use of batteries to help to reduce gas consumption and  
20 emissions.

21 Mr. Simon has a Masters in Energy Systems from  
22 Stanford, and he oversees the strategic development.

23 MR. SIMON: I would like to begin by thanking the  
24 Chairman and Board for your flexibility and indulgence.

25 I understand that you had to interrupt the meeting

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□

80

1 to go outside for our demonstration.

2 It is a pleasure to be here. This ICAT proposal is  
3 one of the most rigorous that we have gone through. The team  
4 is very thorough, and the process of down selecting and  
5 interviewing was very extensive, and at the same time, we  
6 found them to be pleasant to work with, flexible and  
7 understanding the nuance of technology and development, and

8 the success of this program reflects well on your staff as it  
9 does on our company and the other team members.

10 The five vehicles that you see, the center is the  
11 Kenworth truck that you saw upstairs, and the vehicle on the  
12 right is the 32 foot bus.

13 I would mention that there are other vehicles that  
14 we have built with the technology, electric tow tractor, used  
15 for the past year by United Airlines, the most reliable in  
16 the fleet.

17 The vehicle to the left of that is an electric  
18 water truck and has been operating in Southern California for  
19 Sparklets, and they are talking about 50 of these trucks.

20 The vehicle between the Kenworth and the bus is the  
21 most recent we have, a hybrid electric military tractor, used  
22 by the military going through operations at North Island  
23 Naval Air Station.

24 We are inserting the technology into vehicles all  
25 over the country and having an impact on the

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□

81

1 commercialization of the technology.

2 ICAT helped us make the trend and is helping get us  
3 through the valley of death that you saw.

4 National Space Enterprises, the precursor company  
5 formed by individuals who, myself and two others, worked for  
6 General Dynamics, in San Diego, and were cut in the prime of  
7 life by budget cuts at the Federal level, forcing the space  
8 program and General Dynamics into down sizing and selling to  
9 Martin Muerto, and we formed this enterprise with the South

10 Coast Air Quality District, followed in short by Cal Star and  
11 Air Resources Board, we were able to branch and use the  
12 aerospace exposure from General Dynamics, the basic systems,  
13 engineering skills that we had learned in the defense  
14 industry, where the high expectation for rapid prototyping  
15 and high quality not only build unique, economic, potentially  
16 commercialized product.

17           We are not a company content to build cute vehicles  
18 to show that we build them. We are not satisfied until we  
19 put thousands on the road of the country.

20           In the span of two and a half years, we've shown  
21 this is a virtual driven system that we put on the front  
22 page, plus the next to last, we have funded to do a 40 foot  
23 transit bus, with Niemeier of America Corporation, one of the  
24 bus manufacturers and the Air Force to do a design of a cargo  
25 loader.

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□

82

1           These are vehicles with high fluctuating duty  
2 cycles in terms of power. They consume high amounts of  
3 hours, start and stop, and create lots of emissions in the  
4 process.

5           They are targets for air quality regulations, and  
6 they are targets for technology, because they are expensive  
7 vehicles. They range in price for a standard 50,000 to  
8 60,000 up to 350,000 for CNG bus.

9           Some of the cargo loaders go for half a million  
10 dollars or more, that the military buys. The high cost of  
11 components, as long as we stay small quantity is exorbitant.

12           We selected this product line other than passenger  
13 cars, you have seen the class 8 truck. I will not go in  
14 detail, but I point out the hybrid is that specific  
15 technology that we developed with the ICAT funding was a  
16 computer system that controls the whole truck.

17           The hybrid, it runs, is the electric motor. It is  
18 an electric vehicle, AC induction and large battery pack to  
19 have to power. The truck can go 10 or 20 miles on battery  
20 power.

21           Most vehicles, commercial vehicles, need to go more  
22 than that. That is why we have a hybrid.

23           We have a small engine that burns and recharges the  
24 batteries. It enables us to develop the computer program and  
25 network to check, that detects what the power is and measures

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□

83

1 automatically when the engine needs to be turned on to  
2 recharge.

3           No other hybrid in the world does this. It is not  
4 only big. It is smart.

5           Some of the specifications for the vehicle are  
6 shown here. We learned that motor technology from the  
7 defense, and adapted it for the Sparklets truck.

8           We got the motor working before the defense got it  
9 working. In fact, I don't think they have it working yet.

10           That gets back to the comments about small  
11 businesses and sometimes the advantage they have in doing  
12 things quickly.

13           The vehicle has no transmission, but goes 75 miles

14 an hour. We have done preliminary testing. We do not have a  
15 large budget to do extensive testing, but we have done some  
16 initial testing with our clean air partners in San Diego and  
17 have the data from the general manufacturers.

18           When it is running, it is running at the sweet  
19 spot, not revving up and down. The batteries are one. You  
20 pull from the power, you put it back into the batteries.

21           The battery is load level, unless the engine  
22 operates at the sweet spot.

23           What you see there is R and D prototype. We  
24 believe we are able to expand to two trucks, the second  
25 truck, the chassis is being built and shipped next week.

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□

84

1           That is custom. Long-term production vehicles  
2 using a chassis to take advantage of the hybrid, you put the  
3 components in the vehicle, to make it fuel efficient for  
4 economic benefits.

5           You saw the bus out there. Similar to the hybrid  
6 truck, has an operating range 10 to 20 miles. You could  
7 drive 200 miles a day.

8           We were actually pleasantly surprised how well it  
9 performed. The first was placed in service March first, and  
10 we have put 4,000 miles on it, and invite you after the  
11 hearing to take a ride.

12           I believe you will see for yourself, it really is a  
13 pleasure. It rides faster, smoother and quieter than any bus  
14 I have been on.

15           The feed back is they were fighting over who gets

16 to drive it. The drive motor for the bus is smaller than the  
17 one in the truck and has not nearly the demand sequence.

18 One of the other features of the vehicle is we have  
19 technology to control and make them smart. We rely on  
20 off-the-shelf parts to keep the cost down.

21 In fact, the whole entire system for drive cost us  
22 less than 100,000 for everything. That is remarkable. There  
23 are buses out there selling for 500,000 each with fuel cells  
24 and other things.

25 Our sticker price is 369,000 for the 30 foot bus,

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□

85

1 and for the 40 footer, we are starting in the mid 400's.

2 Both those prices will come down as quantities go up.

3 The ICAT funding played a pivotal role in the  
4 programs. The basic control were put in the bus. We used  
5 the control system in the bus, as we did in the truck, and  
6 the same in the military tractor.

7 We got direct financial assistance, jointly, half a  
8 million, the State kicked in 180 through the Office of  
9 Strategic Technology, and that was the bulk of the funding,  
10 and the other was a 250 grant from DARBA.

11 ARB funding provided credibility for outside  
12 customers and potential customers. This, I believe,  
13 successful demonstration that we had this morning, this was  
14 the first public unveiling of either of these vehicles.

15 I believe that will go on a long way based on the  
16 feedback upstairs, and thank you for helping us do this.

17 I'm prepared to answer any questions you might have

18 at this time, and thank you, once again for your support.

19 CHAIRMAN LLOYD: Thank you, Mr. Simon.

20 Any questions?

21 BOARD MEMBER EDGERTON: You may not be able to  
22 answer this.

23 Thank you for the excellent presentation. But I do  
24 want to ask you if you could help me sort out comparisons of  
25 some of the different types of advanced buses in terms of

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86

1 emissions?

2 Let's say, could you compare, you have thought  
3 about it, because this is your business, you are trying to  
4 figure out how to sell your own buses, so you have  
5 considerations there.

6 The hybrid electric 30 foot transit bus, which you  
7 have running on propane, how would that compare with a fully  
8 operational natural gas 30 foot transit bus?

9 MR. SIMON: I have been advised by people, more  
10 experts in atmosphere mix, that propane produces NOx or  
11 particulate matter, somewhere in the general range of  
12 compressed natural gas, higher or near.

13 We did the propane using a mobile gases analyzer.  
14 Based on what we put the catalyst, we measured no NOx. We  
15 extrapolated less than a gram per brake hours, power hours.

16 So, we hope to verify that finding with the  
17 cooperation of the staff. We do feel that the propane  
18 versions will be also equally attractive from an emissions  
19 standpoint, in terms of 30 to 40 feet, we do not see

20 emissions increasing.

21 We are going to use similar engines, same in the 40  
22 foot bus. The major interest we are seeing now is in using  
23 the turbine.

24 The cap zone turbine, we are going to use with the  
25 City of LA. I failed to mention, we have an order of 12

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87

1 buses right now, and another order for 19 pending in a couple  
2 weeks.

3 We have prospect of the 30 buses on the road by  
4 this time, before San Diego catches up in their own back  
5 yard. The ancillary power unit is shifting to turbine.

6 We have seen turbine like Allied Signal and Caps  
7 and others suggest six or seven parts per million nitrous  
8 oxide.

9 If these translate, we are talking trucks of a gram  
10 per mile per brake hours, no NOx for these systems operating  
11 on vehicles.

12 BOARD MEMBER EDGERTON: That is very exciting, and  
13 I would ask staff if you want to make comments in terms of  
14 the competition, and you may want to do the different sorts  
15 of buses.

16 How I would feel if I were in charge of buying  
17 buses at the MTA and transit authority and trying to do the  
18 right thing for buying, we have the following information.

19 MR. SIMON: May I address that first?

20 I have not met a driver that is entirely happy with  
21 a vehicle from the driver's standpoint, for maintenance, or

22 there are a few isolated and some success CNG buses, but they  
23 generally, performance wise, have no compelling reason over  
24 diesel.

25 In fact, the performance between CNG and straight

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88

1 propane, acceleration is less than diesel. If the engines  
2 are not kept perfectly tuned, the emissions go up, and if you  
3 are not careful and pay strict attention how the engine is  
4 running, you can have problems.

5 The hybrid, because the electric motor is driving  
6 the wheels not the general, gives you superior performance  
7 off the bat. It can climb the hills.

8 The first time on a route in Los Angeles, there is  
9 a steep hill with a stop sign at the top of the hill. The  
10 conventional bus, because they stop on the hill, they cannot  
11 get it started again.

12 We took our bus, they came to the stop and went on,  
13 no problem. They even said based on that, go to the other  
14 hill, not on the route, because they cannot get up the hill  
15 and the people have been clamoring for a bus stop because  
16 they have to walk, and they took the bus and went up the  
17 hill.

18 By the time it got up, it was accelerating.

19 You would not see that in a CNG bus. Between the  
20 electric type of technology and secondly because of the  
21 general operation constraint, it is in the sweet spot.

22 The problem about tuning is less an issue, because  
23 you set it to rpm and not stressing the issue like you are in

24 heavy duty cycles. We think those are fundamental.

25 This technology enhances our competitive position.

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89

1 CHAIRMAN LLOYD: Any others?

2 BOARD MEMBER EDGERTON: Staff, any comment or any  
3 further comment on that in terms of the line up of the  
4 record?

5 That was an excellent response and goes into the  
6 transcript on the Net, so people might have the opportunity  
7 to learn from what you have to say.

8 MR. CACKETTE: What is exciting is that they offer  
9 greater potential than the comparable diesel.

10 They are tapped on the bottom end and after  
11 treatment, until we get cleaner diesel fuel, to allow the  
12 treatment to work, which are potentially a ways off.

13 This technology has the chance to get the lower  
14 emissions right away. It is not a competition between the  
15 various technology, both the natural gas offer attributes.

16 They are on the road. We have 150 in the fleet, 50  
17 percent of the fleet seem to operate well.

18 Growing up in Seattle, the electric trolley buses,  
19 you know when they snap in, the torque feels good in low  
20 speed and really climbs the hill.

21 The hybrid design, depending on the design of the  
22 internal combustion, you can design for low emissions. All  
23 the competition is not natural gas versus hybrid, it is both  
24 of those, both conventional, diesel --

25 BOARD MEMBER RAKOW: I have a quick question.

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90

1 I think the hybrid heavy duty truck is very  
2 exciting.

3 Have you projected the cost when it goes commercial  
4 per unit?

5 MR. SIMON: We have done a number of cost  
6 projections and get better with experience.

7 In reasonable production quantities of a few  
8 hundred a year, that we can get within 50,000 of the price of  
9 a conventional truck. That is without getting into large,  
10 many of thousands of units, where there would be a greater  
11 convergence, the near term goal is 50,000.

12 The price difference is still in the hundred  
13 thousand plus range across the board for the vehicles. One  
14 of advantages is that we are not dependent on a market niche.

15 We can collect the orders from tractor operators  
16 and civil and military combined to get to a higher level  
17 faster. That is why we adopted the philosophy of  
18 off-the-shelf for the vehicles.

19 CHAIRMAN LLOYD: Any other questions?

20 BOARD MEMBER EDGERTON: I see the fuel cell bus.

21 Do you have any comments on the fuel cell?

22 MR. SIMON: Our plan has been from conventional to  
23 turbines and eventually fuel cells to generate, and as they  
24 are affordable, we plan to use them.

25 In fact, we have interest in them in some of the

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91

1 vehicle manufacturers that we are working with, and we  
2 believe that we will have one sooner, but I'm not prepared to  
3 comment specifically, and I agree we are not in competition  
4 with CNG, but we are at an advantage.

5 We see CNG is out there.

6 CHAIRMAN LLOYD: Thank you very much.

7 Again, I think it was a good comment, Mr. Cackette,  
8 the real competition, and I encourage you to finalize the  
9 tests to find out what is really going on on the road.

10 If there are any other questions from staff --

11 MR. ANDREONI: That concludes the presentation.

12 CHAIRMAN LLOYD: Thank you again.

13 I thank the staff and both the speakers for  
14 excellent comments.

15 I guess there appear to be no written comments.

16 Do I have a motion to include all three  
17 Resolutions?

18 BOARD MEMBER EDGERTON: I so move.

19 BOARD MEMBER RAKOW: Second.

20 CHAIRMAN LLOYD: Moved and seconded.

21 All voting in favor, say aye.

22 Against?

23 It is passed unanimously.

24 That brings us to open comment period, and we do  
25 have one speaker for the open comment period.

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92

1 MS. HUTCHENS: He has said he does not wish to

2 testify.

3 CHAIRMAN LLOYD: We have no speakers.

4 Before anyone gets the chance to raise any more  
5 issues, we will adjourn, and thank you.

6 The meeting is officially adjourned.

7 (Thereupon the Air Resources Board Meeting  
8 was adjourned at 12:45 p.m.)

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93

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3 I, VICKI L. OGELVIE, a Certified Shorthand

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5 That I am a disinterested person herein; that the  
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9 I further certify that I am not of counsel or  
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11 way interested in the outcome of said hearing.

12 IN WITNESS WHEREOF, I have hereunto set my hand  
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