Proposed Schedule

SOUTHERN CALIFORNIA CONFERENCE ON ELIMINATION OF AIR POLLUTION
Los Angeles Ambassador Hotel - Thursday, November 10, 1955

MORNING SESSION

9:30 a.m. to 12:10 p.m.
Ambassador Room

9:30	Opening remarks by General Chairman Mullendore
9:40	General Chairman introduces Professor Robert L. Daugherty, presiding officer for Morning Session
9:43	Professor Daugherty's opening remarks
9:45	Introduction of Mr. Arthur J. Will
10:00	Introduction of Mr. S. Smith Griswold (Mr. Griswold to introduce Mr. Louis J. Fuller)
10:45	Introduction of Dr. Lester Breslow (Dr. Breslow to introduce Mr. Maga)
11:05	Introduction of Dr. Leslie A. Chambers
11:20	Introduction of Mr. Ed Ainsworth (press panel) (Mr. Ainsworth to introduce members of press panel)
12:10 (approximately)	Professor Daugherty adjourns Morning Session to Cocoanut Grove for Luncheon Session

LUNCHEON SESSION

12:30 p.m. to 2:00 p.m.
Cocoanut Grove

12:15	Waiters will commence serving luncheon
1:10	General Chairman calls Luncheon Session to order and presents head table
1:15	General Chairman introduces Dr. Raymond B. Allen, presiding officer for Luncheon Session
1:17	Dr. Allen introduces Dr. Lauren B. Hitchcock
1:20	Address by Dr. Hitchcock
1:50 (approximately)	General Chairman adjourns Luncheon Session back to Ambassador Room, announcing that Afternoon Session will start promptly at 2 p.m.

AFTERNOON SESSION

2:00 p.m. to 4:00 p.m.
Ambassador Room

2:00	General Chairman introduces Dr. W. Ballentine Henley, presiding officer for Afternoon Session
2:03	Dr. Henley's opening remarks
2:05	Introduction of Mr. Philip S. Magruder
2:20	Introduction of Mr. Loren J. Westhaver
2:35	Introduction of Mr. W. L. Chadwick
2:55	Introduction of Mr. Gerald G. Kelly (for brief report)
3:00	Introduction of Mr. John M. Campbell
3:15	Introduction of Mr. Jose Rodriquez (press panel) (Ask Mr. Rodriquez to introduce members of press panel)
3:45	Dr. Henley turns meeting back to General Chairman
3:46	General Chairman introduces Dr. Lee A. DuBridge (for summation)
4:00 (approximately)	General Chairman's closing remarks and adjournment

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ON THE
ELIMINATION OF AIR POLLUTION

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Summation by Dr. Lee A. DuBridge

Mr. Mullendore, ladies, and gentlemen: My task today is a most difficult one. All of the papers you have heard have themselves been summaries of rather extensive work and of difficult problems. To give a summary of a group of summaries is going to be difficult indeed. If any of you would like to have my job, I would be glad to trade places with you at this moment.

We heard some remarks about miracles just a few minutes ago. Miracles are going to be accomplished in the next fifty years, but I think we need to pause and reflect that if these miracles occur, they will occur only when we get the facts first. Somebody has to make a discovery, get a new idea. Only on the basis of new ideas do miracles transpire. Part of the problem we have been discussing today concerns the new ideas and the new facts on the basis of which one can build the miracle of the solution to the Los Angeles smog problem.

I've thought often that one of the most unfortunate circumstances about our Los Angeles air pollution is the fact that we call it "smog." The term "smog" I think originated in certain midwestern and eastern cities some twenty or thirty years ago where, on damp, foggy days, a

soft coal smoke settled over the city blacking out the sun and literally turning day into night. And I can testify from personal experience it also turned white shirts into black ones. Those black, sulfurous clouds that I have personally lived through, and many of you have too, really were a mixture of coal smoke and fog. So the name "smog" was appropriate.

The cure for that kind of smog, while not easy, was relatively obvious. Simply stop the coal smoke -- that is, stop burning soft coal or install smoke eliminators that take out the carbon particles. And so in St. Louis and Pittsburgh and other eastern cities this was done. Smoke eliminators and better combustion devices were installed in apartment houses, and private homes shifted over to hard coal, oil, or gas. And presto! their smog stopped.

I don't mean to deprecate the magnificent efforts back of the civic enterprises in these eastern cities. Their problem, as has been suggested today, wasn't easy. But it was understandable and it turned out to be manageable. Here in Los Angeles we start where Pittsburgh and St. Louis left off. We haven't burned soft coal for fifty years, and our worst smoggy days today are, I assure you, bright, clear sunshine compared to the real, old-fashioned black St. Louis smog. We've never had that kind of smog here at all. Yet, as Mr. Chadwick pointed out today, we still use obsolete coal smoke indicators as a basis for some of our regulations about the emission of pollutants into our atmosphere.

Our air pollution problem is not an easy one. It's serious, not because we are dirtier here than these other cities have been, but only because Mother Nature in supplying us with our nice climate and location just forgot to supply us with adequate ventilation. We have to be several times cleaner than any other city in order to have tolerable atmosphere. As Mr. Will said this morning, it's a very special sort of Los Angeles problem, one that is peculiar to this area.

Because eastern smog was caused essentially by one thing -- soft coal -- so, we too here in the west looked first for a simple, single cause. From 1944 to 1947 everyone thought there was a single, simple cause, namely, the synthetic rubber plants. It was generally assumed, I understand, that they were the major culprits, but as they were cleaned up or closed down, air pollution persisted. Then we went after sulfur. It had been a very bad actor during eastern smog. In St. Louis in 1929 I personally saw nice, bright, shiny silverware turn black in a few days from sulfur corrosion. Sulfur is bad stuff to have in the atmosphere, as we have learned today, and it was thought at one time to be a major, if not a primary source, of the eye-irritating part of our smog because of the formation of sulfuric acid. Expensive plants have been built here to remove sulfur, and we have reduced by very large amounts the sulfur emission from Los Angeles industrial plants. But the problem still persists.

Nor has the elimination of many of the obvious, visible sources of smoke and dust completely solved the problem. Smoke and dust obviously shouldn't go into the atmosphere and sources of black smoke and dust should be

eliminated -- and they are now being rapidly eliminated. Nevertheless, our progress -- and it has been substantial -- has not eliminated our problem. The time finally came a few years ago when some people realized that we really did have a tough problem on our hands -- a problem different from any place else in the country. They decided we had better do some good, solid research to find out just what was going on and what really were the objectionable components of Los Angeles smog.

Accordingly, eight years ago the newly organized Air Pollution Control District began its research program. About the same time, the oil industry, the most frequently blamed culprit, began its program. Right at the start the research of these agencies -- the District and the oil industry -- revealed the complexity of the problem. It soon became evident that there was not one but there were many components to air pollution, and that some of these, at least, had no relation to visible smoke or visible dust. They came from invisible vapors of unburned gasoline and other petroleum products. But these invisible and supposedly innocent vapors, once they got trapped under the Southern California inversion layer, went through some surprising chemical changes -- a complex series of changes, in fact -- in which one of the contributors was, of all things, our good old California sunshine.

Sunshine and gasoline -- are they then the culprits? Well, yes, but as we've heard today, not the only ones. There's also ozone, nitrogen oxides, organic compounds, and their oxides in addition to the usual smoke and dust. So we have seen that air pollution in Los Angeles is many things.

Many things are going into the atmosphere and are reacting with each other, with the air itself, and with our sunshine in complex and complicated ways which are not fully understood.

Now, how do we control such a mess? There are some, of course, who refuse to understand or to believe this complex picture and who keep on shouting for blood: "Shut down the refineries; close the factories; hire more policemen; fire somebody; abolish diesel engines!" Other saner heads, however, have seen that the task of eliminating all the sources that erupt foreign matter into the atmosphere is simply not possible in an area where 5,000,000 people live. Even cigarette smoke, after all, is an air pollutant. The problem boils down to identifying the most critical materials which produce the most objectionable air pollution, and then finding economical methods of reducing the emission of each one of these sources down to levels which are tolerable. (That's a complicated sentence, but it's a complicated problem for there are many unknowns here.)

What is a tolerable level? What, indeed, is the most objectionable effect of our air pollution? Is it eye irritation, bad smell, bad taste, low visibility, rubber cracking? What causes each of these? Many compounds, just a few, or only one? What are the chemical reactions through which the harmful compounds are produced? What are the raw materials from which they are produced? What catalysts, if any, participate in the reaction? How can they be controlled? How much will it cost to reduce the emission of various materials to tolerable levels? To what levels indeed can they be reduced? To what levels must they be reduced to get a tolerable

cleanliness? I'd like to emphasize that the answers to these questions were unknown only a few years ago. Indeed, we didn't even know enough to ask some of these questions. Many of the answers are still unknown, but every one of these questions that I've been talking about today is under intensive study. We've heard something about answers to each of them during today's sessions.

The Air Pollution Foundation was organized two years ago to help carry out some of this research and to get more facts. The aim of that Foundation was to carry on research, to learn how to reduce, or eliminate, this Los Angeles air pollution and then to make the results of this research known to the public and to the Air Pollution Control District which is responsible for enforcing necessary regulations. Today, we have been seeking to find out where we stand. We're still in the stage where progress must be measured, not so much in perceptibly cleaner skies, as in our advance in understanding, our increase in knowledge and our progress in building the organizational structures, the equipment, and the techniques to convert this understanding into action.

This morning Mr. Will, the County Administrator, and Mr. Griswold of the Air Pollution Control District reported that in its eight years of existence the District has instituted controls for sulfur, for dirt, for smoke, and for evaporative losses from liquid fuel storage tanks which, in combination with the voluntary measures industry has taken, have resulted in keeping out of our air something like 1100 tons of pollutants

per day. This has been done at a cost of some 35 million dollars spent by industry on pollution control devices. Now this 1100 tons simply represents 1100 tons of dirt and pollution that we don't have to worry about today. Nevertheless, we do have over three thousand tons left (and it's growing daily!) to which we must devote our attention. The District is also, we heard, exercising inspection control over new industrial construction in such a way as to limit the addition of new sources to our pollution problem. As existing plants continue to undergo their changes and modernization, as new plants continue to be built under new regulations and new conditions, the work of the District will continue to prevent much of the air pollution for which the remedies are presently known. Our task, the task of the District and of everyone else, is to find new remedies which are now unknown.

Los Angeles County, we also learned, has decided that trash disposal must be handled in more modern ways than through the backyard incinerators. We passed laws against spitting on the sidewalks many years ago. Why we haven't passed laws against spitting pollution into the air from backyard incinerators is something I'll never be able to understand. Six million dollars has been appropriated by the County to develop disposal measures which will eliminate backyard incinerators. The strengthening of the Air Pollution Control District is underway, and it is utilizing the help of other agencies, including the government, our universities, and groups like the Air Pollution Foundation. Where other agencies are better equipped to do certain kinds

of work, the County is making appropriate arrangements with them through contracts or grants.

Next, this morning, we heard from the State of California. The State, we find, through the Department of Public Health and the newly established Bureau of Air Sanitation, has provided $250,000 this year primarily for surveying the health effects of air pollution. Early this year the Department published a preliminary report on this subject. So far, we heard, no specific adverse health effects have actually been detected. Nevertheless, potential dangers exist which are very serious, and Dr. Breslow emphasized that we still have much to learn about the health effects of pollutants in our air.

Dr. Chambers reported on the Federal Government's part. Public Law 159 authorized, but did not actually appropriate, a sum not to exceed five million dollars annually for five years to the Department of Health, Education, and Welfare to provide research and technical assistance relating to air pollution. The Surgeon General of the U. S. Public Health Service will direct this program. The Act provides that the Surgeon General may conduct research and develop methods of preventing and abating air pollution through the facilities of the Public Health Service. It may aid state and local governments, private organizations, public organizations and institutions, and individuals in similar activities. Contracts and grants-in-aid will be made for research, training, and demonstration projects. The actual appropriation of Congress for this

year was $1,784,000 of which about a half million will be spent in government departments. About $60,000 has been allocated to California institutions, principally universities, for health studies on air pollution. A total of $120,000 has already been allocated to the State of California to assist in the Southern California air pollution problem, and as Dr. Chambers said, special attention is being focused on the Los Angeles problem since it is a critical one. U. S. Public Health Service studies have already been made in many cities. Those based largely on airborne dirt, smoke, or solid particles as a criterion, show the very wide extent of air pollution problems throughout the cities of the nation. But we are promised that the Public Health Service efforts will be devoted very specifically toward the Los Angeles problem.

We turned then to the press conference and heard the questions which the press presented as representatives of the general public. These included many of the normal questions about smog which have been brought up during recent years. For example, why don't we just set up windmills and blow it away? The answer to that is very simple. There just isn't enough power generated in the entire United States to move the air of the Los Angeles Basin around enough to blow our smog away. Why don't we neutralize it with some brand new chemical element? The answer is the only chemicals that produce any effect are worse than the chemicals they remove. Therefore, no such neutralizer has yet been found, nor has any seeding or meteorological device been discovered. If any of you have one that you are

sure will work, I'm sure the Air Pollution Control District would like to know about it. There is no cheap, magical way of turning off this air pollution. There is no magical device to put on cars which will stop the effect, and there is no magic button that can be pushed in any factory, or in any automobile, or in any bus, or indeed, in any place else.

Newspaper readers understandably are a little tired of philosophy, and they want action. I think they're a little tiredof scientists. Nevertheless, the fact that there are more newspaper readers than scientists doesn't mean the newspaper readers are right. This is not a problem that is going to be solved by a majority vote. It's going to be solved by digging out the facts, developing control mechanisms and instrumentation, and then applying them. The public must understand the problem in order that the necessary money can be appropriated and spent to do the research and to do the control. And so I think the newspapers have recognized -- I hope they have recognized -- their obligation, that as they listen to the questions of their readers, they convey back to their readers the facts which they have learned today.

At the luncheon session we heard Dr. L. B. Hitchcock, President of the Air Pollution Foundation, deliver his annual report. We heard that the work of the Foundation has resulted in the publication of 12 technical reports which reflect our growing understanding and information on the problem. A broad program of public information has been based on these Air Pollution Foundation reports. The Foundation has made progress in the development

and the evaluation of workable remedies for air pollution, and it has brought improved scientific technology and instrumentation to bear on the problem and in acquiring information. The Foundation's job is to help to unite the efforts of industry, the government, and the public, both here and elsewhere, in ways in which a private organization can function and which are not always available to public or governmental organizations. Through technical conferences and public information, the Foundation attempts to exert a stimulating and constructive influence on the course of air pollution work, primarily, of course, in the Los Angeles area.

Dr. Hitchcock emphasized again that all the major sources of organic pollutants in the air must eventually be brought under control. All sources which emit hydrocarbons of any sort, whether backyard incinerators, automobiles, busses, power plants, or heaters of any sort burning oil or gas, these must eventually be brought under a substantial degree of control. And he brought out, what I think hasn't been realized by many before, the importance of nitrogen oxides in the Los Angeles air, and that we must find out how to control their emission. And this is a problem on which control mechanisms are almost completely unknown.

We simply do not know how to provide the Southern California Edison Company or anyone else with a device to put on the stack which will have any effect on nitrogen oxides. And here's a real problem where engineering research is required.

During this afternoon's session, industry has been reporting its

progress in smog control and the techniques which they have been developing. I think that the concrete progress which we have heard this afternoon is a very impressive and inspiring story. Although industry has been a major target of air pollution regulation, it has also been the only voluntary contributor to the reduction of air pollution. By no means all of the 1400 tons per day in the reduction of pollution in Los Angeles County has been a direct consequence of enforced regulation. Very much of it has resulted in voluntary action on the part of industry. And for this, we should give them credit. The fact that much more reduction must be accomplished in the future, and that it has not been accomplished, is partly because the necessary controlling mechanisms simply are not known.

The question was asked a few moments ago as to what kind of a smoke eliminator was on the stacks of the Southern California Edison's plants. There are none because we do not know of any eliminator to put in the stack of a plant which will substantially reduce the amount of solid particles coming out of an oil-burning plant below the levels which are already existing. These levels are from five to maybe a hundred times less than the smoke levels coming out of coal-burning plants, and it's down to such a low level that the ordinary precipitating mechanisms are no longer applicable. Some new devices must be found to take the levels further down. This is just an example again where Los Angeles must be ten times cleaner than any other place in order to solve its problem.

The petroleum industry, as I have said, supplies a product which is absolutely vital to the economy of Southern California. I wonder if you have

ever realized that oil and gas are really the basic elements underlying the economy of our area here. Without oil and gas we would have practically no other sources of energy or heat. We get a small amount of hydroelectric power, but nearly all of our energy for heating our homes, for running our factories, for operating our toasters, for running our automobiles and other means of transportation, are hydrocarbon sources of energy.

We heard about the basic metals industry and how it has spent several million dollars for precipitators and other fume and dust controls at various plants in Southern California. And it was most encouraging to hear, I think, that the precipitating systems for removing steel mill dust are now averaging from 92 to 99 per cent efficient for this purpose. The chemical industry has spent a great deal of money in this area and one new plant, not yet opened, has already installed a half-million-dollars-worth of control equipment.

One of the most interesting and, I think, exciting reports was Mr. Campbell's report about the automobile industry and what it is doing. It has been a highly organized and highly efficient industry-wide effort. The industry is spending over a million dollars a year in seeking to perfect remedies for the auto exhaust problem. They are investigating fuel cutoff devices, as well as afterburners and other converters. Someone asked the automobile people whether they were doing this to make money or to solve the smog problem. I hope they make money out of it because, if they introduce a device which makes the automobile engine more efficient, it'll burn up more of its hydrocarbons, and cars will then be worth more. This indeed is one of the hopeful

aspects of the problem. By reducing the hydrocarbons going into the atmosphere, presumably they can be burned and their energy can be used. We'll be better off as far as efficiency is concerned as well as having reduced our air pollution control problem.

Moreover, the automobile industry is investigating afterburners to be put on the exhaust to remove such hydrocarbons as still escape from even the efficient engine. The industry, we have learned, is well along on this problem and is undertaking to develop and test devices which will assure us satisfactory performance. We hear that they hope to have a successful device ready for Los Angeles authorities to test and approve or disapprove by early 1957. This morning Mr. Will expressed the hope that this could be advanced one year to 1956. This would be going pretty fast, but I'm sure the automobile industry, from what we have heard today, will accelerate its schedule if it possibly can. Engineering problems, however, are serious and cannot be solved in a month or a year. It is encouraging today to learn that a full-scale enterprise on the part of the automobile industry is underway tackling this problem. From the achievements of this industry in the past, I think we can be optimistic in hoping for good results. However, equipping two and one-half million automobiles in this area with pollutant-eliminating devices is not going to be a simple job. Replacing them when they are worn out, keeping them maintained and in proper operation is going to be a very large undertaking. We should realize that we are getting into a large and possibly expensive job when such devices are available.

We've heard from the public utilities also about their problem in eliminating air pollution. They, of course, are by far the largest

burners of hydrocarbons of any industry in the area because they supply such colossal amounts of electrical energy much of which must come from heat supplied by the burning of oil and gas. Again the gas-and-oil-burning plants must emit far less pollution than the coal-burning plants in the east in order to satisfy our problems here. The public utilities realize that under the restricted atmospheric conditions in Los Angeles even "clean power" may have to be made even cleaner if public utilities are going to do their full share in the air pollution problem. I think we should remember what Mr. Chadwick said, however, that in the present state of our knowledge, the combustion in their plants is as complete as engineering sciences knows how to make it. Engineering science, in other words, has to make some further advances.

Just now we heard the press conference on the afternoon session and it brought out some additional points in which newspaper readers are interested. I think this emphasized again how important it is that the newspapers assume the responsibility of carrying back to their readers the facts that are brought out by the careful study, research, and scientific investigations which are going forward in this field. Oil is one hundred times cleaner than coal as far as polluting the air with solid particles is concerned, but no adequate eliminators have yet been developed which reduce still further the particulate emissions from oil-burning furnaces.

The problem of busses was mentioned and discussed. It is obvious that if all the passengers who ride in private cars ride on city busses, there would be a substantial reduction in our air pollution problem from automobiles.

We should, therefore, think of the bus as a possible rescuer from this problem rather than as a major contributor. The total number of busses in this whole area compared with the number of cars is now very, very small and certainly not one per cent of the present contamination can be attributed to present bus operation.

And so we come to the hard, cruel facts that there are three classes of air pollution in the Los Angeles area: (1) organic pollutants from all processes in which there is combustion of oil or gas or other organic materials, including wood and plastics; (2) sources of pollution which emit nitrogen oxides; (3) and sources of pollution which emit particulate matter, dust, and smoke. No one of these can be blamed for the whole problem; all three of them together must be brought under control. Only when all of these pollutants are reduced to tolerable limits will the chemical reactions which cause our eye-smarting smog be reduced to a level where we can say Los Angeles air is clear again. Much has been learned, much progress has been made, but there is still much research, much control, and much development yet to be done.

The results of today's conference -- the first well-organized and really comprehensive conference on this problem of reporting to the public -- I think must be carefully considered by every citizen of this area. I think we need meetings of this sort in the future, possibly next year. For we have been told many times today that understanding of the problem by the public must ultimately be accomplished if we are to use the remedies which will be made

available by our research. Only when the public understands and is willing to back up the actions of the Air Pollution Control District can we bring our air pollution problem under control. And I'd like to quote a sentence from one of the papers today. "Because this is a community problem in which every citizen is involved, both as a contributor and a sufferer, public information as to what has been done, is being done, and will be done and what is required of each of us as citizens in that doing, is perhaps the most important single phase of the entire air pollution situation."