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Interim Hearing on Mobile Air Conditioners: CFC Emissions and Environmental Impact, AB 2532

Assembly Committee on Environmental Safety and Toxic Materials

ASSEMBLY COMMITTEE ON ENVIRONMENTAL SAFETY AND TOXIC MATERIALS

INTERIM HEARING ON

MOBILE AIR CONDITIONERS: CFC EMISSIONS AND ENVIRONMENTAL IMPACT AB 2532 (Vasconcellos)

October 24, 1989

Room 444, State Capitol
Sacramento, California

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ENVIRONMENTAL SAFETY & TOXIC MATERIALS COMMITTEE
State Capitol, Room 444
October 4, 1989

Chaired by Assemblywoman Sally Tanner

CHAIRWOMAN SALLY TANNER: ...I intend to read an opening statement regarding this hearing. We will mostly concern ourselves with motor vehicle air conditioners and their impact on the environment. Ozone layer depletion, the warming of the atmosphere and the potentially catastrophic results of these phenomena have become perhaps the most pressing environmental problems facing the world community. Their solution is made all the more difficult because the very compounds that are causing these problems are those upon which we as a society have become so greatly dependent. A case in point is motor vehicle air conditioners a rarity on new cars just 25 years ago, air conditioners, were installed on over 90 percent of all new cars manufactured in the United States this year. What was a luxury in the '60s has become almost a standard piece of equipment on the cars to date. However, these air conditioners emit CFC-12, a substance which both contributes significantly to the "greenhouse effect" and is lethal to our earth's fragile ozone layer. It is clear that these emissions must be reduced or eliminated quickly. National and international actions are now being taken to reduce and eventually stop the production and consumption of CFC-12 and related compounds, and to limit their emission from all sources. Californians are by far the biggest consumers of CFC-12 in this country. There are conservatively 15 million motor vehicles in

this state equipped with air conditioning units which employ this substance. For this reason California needs to address its responsibility to help preserve our earth's vital ozone layer and to reduce the rate of global warming.

The Committee will be hearing testimony today from the very people who are most active in pursuing solutions to the problems caused by motor vehicle air conditioner use. There will be testimony from individuals who are experts on the topic of how CFCs result in ozone layer depletion and greenhouse effect and how to recover and recycle CFC-12 from these air conditioners. The Committee will also hear from representatives of motor vehicle manufacturers, CFC producers, and distributors, shops which service these air conditioners, and the State Air Resources Board which is the agency which could primarily be responsible for administering any state level program to regulate motor vehicle air conditioners.

Assemblyman Vasconcellos is the author of AB 2532 which among other things bans the sale of new motor vehicles equipped with air conditioners which use CFC-12 and requires the recovery and recycling of this substance. The bill was held in this Committee this August and its subject matter was sent to Interim to be discussed in this hearing. Accordingly, we will begin with Assemblyman John Vasconcellos.

ASSEMBLYMAN JOHN VASCONCELLOS: Thank you Chairwoman Sally Tanner, I appreciate your setting this hearing as we had discussed during the hearing on the bill earlier in the fall, and

I appreciate your opening statements -- you've well indicated the primaries of the situation that confronts us. About 15 years ago John (inaudible...) when he was in the senate, did the first legislation in the country to ban aerosol sprays when it was realized by Sherry (inaudible...) in UC Irvine that it was (inaudible...) ozone layer and therefore our lives and we lead the nation in that banning and it now is widely understood that it has to be banned. This is like the second round and it becomes even more evident and compelling to all it was a luxury to have air conditioners in cars in the '60s and while it's standard now, fact is it's a threat to our lives, and those which are threats are luxuries that we can't even afford anymore. So it's time we that figure out not whether we ban CFSs but how soon and how, and what alternatives are available and how we can assure that those alternatives are developed rapidly and effectively. California is a major market, what we do here as a state will affect what people produce and manufacture so we can call the shots and we ought to call wise ones, smart ones, and bold ones to protect our lives and our kids future.

CHAIRWOMAN TANNER: Thank you very much. Our first witness, and I will say that we have a number of witnesses today and we hope to here some of your testimony this morning and some this afternoon. The members of the committee will be asking questions so I'm going to request that the witnesses try to keep their testimony to the point and rather than read pages of testimony, we'd like to hear what your testimony is and try to

keep it to the point.

ASSEMBLYMAN VASCONCELLOS: I would just like to make a comment that along with this important hearing today also the hearing down on the first floor on the Joint Committee on Higher Education will report on legislation for Mr. Hayden which I authored and studied for four years, so I'll be occasionally going there not for any lack of interest in here.

CHAIRWOMAN TANNER: All right, thank you. Our first witness will be Doctor Donald Blake. Doctor Blake is a Research Associate in the Department of Chemistry at the University of California Irvine. He is a member of Professor Sherwood Roland's research group. Professor Roland is famous for discovering the link between CFCs and ozone layer depletion back in 1974. Doctor Blake.

DR. DONALD BLAKE: I will just sort of echo some of the comments that you've made in your opening statement. The the emission of CFCs into the atmosphere play a dual role, one in ozone depletion and a second in the potential for global warming through the greenhouse effect. Back in July we talked mostly about ozone depletion, I can say at this point that the ozone hole that was briefly discussed in July over the south pole is as bad as has ever been observed. 1987 was the worst year up until recently, 1989 is just as bad, so that although 1988 was not as severe as the previous year and led some people to believe that our problems were not as bad as they actually are, in fact it is just as bad this year.

I would actually like to focus a little bit more on the "greenhouse effect". I have asked to have an article passed out to you, it is an article that appeared in (inaudible...) which is a publication of the American Geophysical Union and it has just appeared recently and it is actually about a paper that discusses greenhouse warming. It is highlighted for you, there are two basic points that I would like to make -- that is that in Jim Hansen's computer study he has determined that because of the cutback in CFC emissions in the '70s due in part to the bill that Assemblyman Vasconcellos sponsored that we are now much better off or we will be much better off with regard to the greenhouse effect than had we not had any action at all. Actually, the amount that we cut back if one looks at a total amount that we've produced is significant but it is amazing in a computer run that it would have as big of an effect. He says that the day we are seeing about 25 percent in 1980, the greenhouse forcing is due to CFC emissions. Had we not cut back it would be over fifty percent, so I think that in itself shows that not only are we faced with this tremendous ozone problem but potential greenhouse warming many decades to come are going to be affected by legislation like this.

CHAIRWOMAN TANNER: Why don't you describe for us how the ozone is affected and how the greenhouse warming would occur?

DR. BLAKE: Okay, I will start with the ozone layer. The CFCs are very inert molecules gasses, they were designed this way so that the product that they were supposed to either push out of the aerosol cans or however they were used, were not going to

be affected by the propellant, so that the hair spray or the deodorant that was put in a canister came out smelling and tasting exactly the same way that it went in. It was this inertness, however, that was the downfall of the molecule, once they are put into the atmosphere they are not rained out, there are no known chemical reactions for the actual chlorofluorocarbons, and they slowly move around and defuse throughout the world and eventually filter into the upper atmosphere. And it is up in the upper atmosphere in the ozone and above the ozone layer where energy or radiation from the sun of a high enough energy and then actually break the molecule apart and at that point a chlorine is given off and it is actually the chlorine that is the problem, the CFC itself is not a problem to the ozone layer, it is the fact that the CFC transports the chlorine into the stratosphere where it then can undergo many many destruction of many ozone molecules on the order of a hundred thousand per chlorine, so that is in a nutshell the ozone problem.

The greenhouse problem is, as soon as it becomes an ozone problem it's no longer a greenhouse problem in that these molecules have very long lives, flurocarbon-12 has a lifetime of over a hundred years. So, as its floating around in the atmosphere it can actually absorb outgoing radiation, the earth is giving off radiation, otherwise if we think of it if the sun is beating down on the earth all the time and we're absorbing a tremendous amount of radiation, we would continue to heat up and if you put your hand in front of a bright light bulb your hand

heats up until either you move it away or until your hand starts giving off as much energy as you're receiving and so that's pretty much what we're in, we call that the equilibrium or a steady state condition. So the earth has been in a sort of a quasi-steady state condition for a number of years, on the order of millions of years sort of cycling in and out of glacial/intraglacial periods. But as we add these gases to the atmosphere and as they float around, they're able to absorb some of the radiation that the earth is giving off that would normally let it go into outer space and therefore keep the earth at a constant temperature. Because now we are putting molecules into the atmosphere that can absorb this radiation, it's sort of a trapping type effect and some of the radiation that in the past was able to get out is now trapped and therefore we have this increase in surface temperature.

CHAIRWOMAN TANNER: Okay, any questions from... Ms. Wright.

ASSEMBLYWOMAN CATHIE WRIGHT: This legislation was passed and we reduced the CFC in the state of California. Under the Montreal Agreement, it was signed by these nations, do they not in turn then are they not able to pick up our percentage or whatever it is, so you really aren't affecting the total picture in the world at all by this piece of legislation in California, is that true?

DR. BLAKE: You mean this legislation right here? In other words the amount that would be reduced...

ASSEMBLYWOMAN WRIGHT: The other countries could then go

ahead and use?

DR. BLAKE: Well, there is a plan to relook at the Montreal protocol, the Montreal protocol would have called for a fifty percent reduction in CFCs by the year 2000. It has been pretty well accepted among all countries that this reduction is far too small and in fact the United States and the European community is pushing for a hundred percent reduction. It's certainly the way to move, I can't say how much in theory the CFCs fluorocarbon-12 that would be saved here let's say could in fact be used some place else but I think it will not be long before there is a total phase out anyway.

ASSEMBLYWOMAN WRIGHT: Well, then wouldn't it be better if the direction of this legislation was to pursue this hundred percent with Montreal where you get all the nations or the largest percent of the nations agreeing?

DR. BLAKE: Well certainly that is the (inaudible...) way but I think that from this particular paper that I've passed out, just the legislation from the United States itself the fact that we cut back by a significant amount on a global scale it was not... I don't know somebody is here that I'm sure would know that figure. But the fact that just over the last since 1978 we have had an effect globally just the United States, Canada, and the Scandinavian countries so that amount had an effect now and actually will have an effect many decades in the future.

ASSEMBLYWOMAN WRIGHT: Don't you think then if given that scenario say that we pursued pushing for the United States

request in other words for the hundred percent, if we pursue legislation in supporting that position and then also set up a mechanism by which we helped the businesses in the state of California to gear up and be prepared for that would that be far more effective than trying to set up our own little system here in the state?

DR. BLAKE: Well I think to sort of paraphrase what Assemblyman Vasconcellos...

CHAIRWOMAN TANNER: I think you're asking a policy matter Ms. Wright and I don't think Dr. Blake can respond to that policy.

ASSEMBLYWOMAN WRIGHT: I think he could give it an attempt, I'd like to get the feel of what the scientific community would think about doing something like that rather than pursuing what we're doing here. I'm asking him for his opinion, I'm not asking for him to set policy.

CHAIRWOMAN TANNER: Your question is let's say if we banned CFCs from motor vehicle air conditioners, would that not be picked up in other countries. The other countries if you read the background paper for this hearing, other countries are using considerably less air conditioning than the United States and the state of California uses tremendous amount of CFCs because we have...

ASSEMBLYWOMAN WRIGHT: I understand that Sally but I think what we were pointing to was the fact of one of the questions that arose from the original presentation of the bill

was the fact what good does it do anything California does when because once we get outside of our boundaries we're not changing anything.

CHAIRWOMAN TANNER: If most of the air conditioners are in the United States, the motor vehicle air conditioners, and if a great number of those or a large percentage of those are here in California if we reduce the amount of CFC emission here through our control on motor vehicle air conditioners, then it would make a vast difference it seems to me just by numbers.

ASSEMBLYWOMAN WRIGHT: I guess what I'm looking at when you're talking about...

CHAIRWOMAN TANNER: Other countries are not going to just suddenly decide to put air conditioners in their vehicles and use CFCs since we're not using it, that has no bearing on...

ASSEMBLYWOMAN WRIGHT: Well, what I'm looking at is a situation where if the United States as a whole because we are manufacturing automobiles.

CHAIRWOMAN TANNER: Yes.

ASSEMBLYWOMAN WRIGHT: The United States as a whole is pursing a certain track or program, I think it would be far better if we pursue to follow that and force that issue with the Untied States as a whole rather than just California, because then you have a situation where you're concerned about only automobiles coming into California and not the rest of the United States?

ASSEMBLYMAN VASCONCELLOS: We get what we can and it's just stupid to poison our own lives and if I can stop my poisoning

today I'm smart enough to save my life and make kids lives in the future and their health and I'll go to Nevada and I'll go across the country and I'll go across the world but I won't keep poisoning my own nest stupidly in the meantime Ms. Wright.

ASSEMBLYWOMAN WRIGHT: I think my point Mr. Vasconcellos is that we are not the sole manufacture of automobiles in the state of California.

ASSEMBLYMAN VASCONCELLOS: No, but we are a major market by fifteen percent of the whole country's market and if we say they can't be sold here anymore -- the industry will quickly move to find alternatives so they can make it sellable here, they can't afford to lose our market.

ASSEMBLYWOMAN WRIGHT: I think we would buy cars from out of state.

CHAIRWOMAN TANNER: Members, I'm not going to have a debate between members.

ASSEMBLYWOMAN WRIGHT: I'm noc debating, I'm just discussing the bill.

CHAIRWOMAN TANNER: Are there any questions to Dr. Blake on any scientific questions?

ASSEMBLYMAN CHARLES CALDERON: The ozone... if the effect of CFCs is to in effect form a radiation trap for radiation that would otherwise leave the earth and generated from the earth going into the atmosphere, what is the relationship to this whole over the North Pole is that just a greater trap than exist anywhere else? In other words the notion of a trap is

inconsistent with the concept of a whole and I'm trying to...

DR. BLAKE: Well, I guess I should redefine this, the ozone layer itself is a filter for incoming radiation, the trap that we're talking about here the trapping of outgoing radiation, are the CFCs, methane, carbon dioxide, many of these gases that absorb this radiation that is trying to go out. So the two are tied together, they're two separate but they're tied together in this case by CFCs being both greenhouse gases, in other words they absorb outgoing radiation and they transport chlorine to the upper atmosphere which then destroys the ozone layer.

ASSEMBLYMAN CALDERON: Oh, I see.

DR. BLAKE: So the two are...

CHAIRWOMAN TANNER: Any other questions?

ASSEMBLYMAN CALDERON: The whole which is dramatic is that what happens when all of the CFCs and other constituents combined and are our concentrated in one area or are you confident that there is evidence in our atmosphere no matter where you want to look, the combined effects of CFCs and everything else?

DR. BLAKE: That is the current belief right now. The South Pole is a special system, the meteorology there is different, so that these incredible decreases of more than fifty percent ozone that occur at the South Pole we don't have to worry about that happening above us here in Sacramento because of the extreme cold and the dynamics of the area, it just won't happen. And it's actually not necessarily there's no more chlorine at the South Pole than there is above us right here, it's just that it's

in a different form, it's in the active form. As I said the CFC is very inactive it floats around for as much as a hundred years or more, absolutely causing no problems at all for the ozone layer and once it is finally photolized then it puts the chlorine in the active form. The chlorine then can be in sort of the active form or the reservoir form and it is at the South Pole because of certain chemistry that we remove it from the reservoir and put it in the active form for a month or two and the chemistry is quite involved. But we just have a lot more what we call free chlorine at the South Pole than we have above us here.

ASSEMBLYMAN CALDERON: Now you're saying it congregates there and it can flow away from there as well?

DR. BLAKE: What it does is in the polar night, in other words, at the South Pole the sun goes down for six months. During that time chemistry, different things, take place when there is very little air motion and the air that is trapped there when the sun goes down pretty much stays there the entire six months. When the sun then comes up there are certain chemical reactions that take place that free this chlorine up and the chlorine will then sort of cycle through and destroy tremendous amounts of ozone but then as the sun comes up there is also certain amounts of dynamics. The wind starts and you start having a defused layer there and pretty soon it does, it defuses out over Australia, South America like this, but by the time it actually gets to the equator let's say, the dilution is very very small and only a few percent perhaps is observed as far as depletion.

Now we have a similar problem a bit I guess you could say similar at the North Pole. Although the study was not necessarily terribly conclusive this last February when they went to Norway and they looked for a northern hole because we were seeing levels of ozone during December, January, February which would sort of coincide to when the six months out of phase from the South Pole. We were seeing levels of ozone that were lower than we had seen in the past seasonally speaking, and so there is, I think, a general feeling that there could be an ozone hole in the North, in the Arctic, but maybe a ten or fifteen percent hole rather than a fifty or so percent. And that the lower levels that we're observing is just a dilution sort of a sweeping out of that more depleted air just over the general populous.

ASSEMBLYMAN CALDERON: So we're concerned about that hole because of its implications for the atmosphere for the rest of the world and we're also concerned because of melting glaciers?

DR. BLAKE: Well, no actually the amount of energy that if in fact you visualized this hole, it's just a small amount of ozone that is removed. I mean first of all there is not much ozone there maybe an eighth of an inch or so of ozone is all that is between you and the sun and so part of that is removed. That is not going to allow on an energy scale very much energy at all to hit the south pole and melt the ice caps, that is a totally different phenomena that's with regard to the "greenhouse effect" so the two are once again pulled apart. The ozone hole was something that brought our attention to the potential for ozone

destruction. We're not just seeing an ozone hole, we are seeing, statistically speaking, a general decrease in ozone levels above us here in Sacramento maybe on the order of one or two percent over levels that were here pre-1970, so it's not just the hole that we are worried about it is just the general condition of the ozone layer itself.

ASSEMBLYMAN CALDERON: What I really want to get to is some kind of understanding about whether or not the phenomenon of the north and south pole is a synergistic result or effect of wind patterns which sweep these CFCs and ultimately congregate there and so we're naturally going to see a greater impact there than we might see anywhere else, is this similar to injecting a rat with hundreds and hundreds of CCs of some cancer causing agent and all of a sudden, hah it's cancer? I mean that's really what I'm trying to get to if you understand the question?

DR. BLAKE: There are no more CFCs at the South Pole than there are at the equator. I mean there are no more if you add all the chlorines up there are no more chlorines there than there are let's say above us right here it's just sort of the form that they're in. They're in that form because of the dynamics and the meteorology of the area, but no it's not a localized problem but I mean it's localized in that it happens there but it is not because we are concentrating. In other words things are being sweep out of the air above us and pushed down to the South Pole, that is not the case.

ASSEMBLYMAN CALDERON: So we're really talking about

something that we can see anywhere in the world if we take a look at it, some place more than others?

DR. BLAKE: That's correct.

ASSEMBLYMAN CALDERON: Here in the states industrializations more than others?

DR. BLAKE: No because of the long lifetime of this molecule when we go we have samples from the South Pole and the North Pole we see basically the same level whether if you're in a downtown area, yes -- where you're actually putting out CFCs or if you happen to be standing next to a place that does air conditioning or a refrigerator that's leaking you will see elevated levels but on the whole they have such a long lifetime that they can mix and they can go all over the world and they do.

ASSEMBLYMAN CALDERON: So we're seeing an ozone depletion of about one to two percent anywhere in the world that you look?

DR. BLAKE: Generally speaking, yes. That would be what we would see above us right now.

ASSEMBLYMAN CALDERON: What about the trapping effect, how do you measure that in terms of its severity?

DR. BLAKE: You mean the greenhouse effect?

ASSEMBLYMAN CALDERON: The greenhouse effect.

DR. BLAKE: That's a lot tougher because there will not be an acute problem. We had the ozone hole to all of a sudden focus our attention on this ozone problem, but with the greenhouse effect in 1988 we had very very warm summers. And Jim Hansen came

out and said that he was very confident that this was a result of greenhouse effect and global warming. And then the next time we didn't have such a warm summer and then people have been saying its been a mild and even the winter up in Alaska that was so cold, so the weather and climate change a lot. What we will see if in fact this increase in gases and CFCs included goes unabated it's just a general increase, it's a very slow increase in surface temperature that can throw the climate in very large swings either way so that's going to be a lot tougher.

ASSEMBLYMAN CALDERON: How acute then is the greenhouse?

DR. BLAKE: The greenhouse effect, there will be regional acute problems last summer but there are those who would argue and I cannot say that they're not correct in saying that was not because of greenhouse warming that that was just a swing in climatology and certainly we've had in the 1930's we had very warm temperatures then so the greenhouse effect is something that is a lot tougher to define although it is acceptable among the scientist who are involved in it say we all believe that in fact this is a reality, it's just a matter of how long it takes and we're going through a very slow warming right now the oceans act as a very big heat sink. And I think from Jim Hansen's perspective we're sort of past the point of the heat sink and now the next thirty or forty years we're moving into general global warming.

CHAIRWOMAN TANNER: All right Mr. Statham and then Ms. Wright.

ASSEMBLYMAN STAN STATHAM: Who's Jim Hansen?

DR. BLAKE: Jim Hansen is a scientist at Nassau Goddard.

ASSEMBLYMAN STATHAM: Thank you. Did you say that the ozone layer itself is just one eighth of an inch thick?

DR. BLAKE: The ozone layer is maybe twenty miles thick or ten miles thick but what it is is it's very diluted and so that if you remove the oxygen and the nitrogen and bring it down to an atmosphere pressure there is only three millimeters.

ASSEMBLYMAN STATHAM: With CFCs and other things that we do if we stopped at damaging the ozone layer, does it have the ability to repair itself?

DR. BLAKE: Yes, it does. The chlorine is eventually removed a lot of it in the form of HCL that is eventually rained out but it's a very slow process and you have to remember that with a lifetime of a hundred years we'll say that means that only two thirds of it is gone in one hundred years so we have to wait another hundred years before two thirds of that is gone. So we can go hundreds of years and still have chlorine in the stratosphere that is a result of the CFCs.

ASSEMBLYMAN STATHAM: And do you scientifically know how long man has been damaging the ozone layer unwittingly?

DR. BLAKE: Well, we've only been putting these gases in the atmosphere for...

ASSEMBLYMAN STATHAM: And that's the culprit?

DR. BLAKE: Well, yes that is the only... there is, methalchloride is a gas that is given off in the oceans that is at

about a half of a part per billion in the atmosphere and so that in theory we should have about that much in the stratosphere and we've actually seen much higher levels of chlorine with the CFCs being the only at this point possible source of them.

ASSEMBLYMAN STATHAM: Thank you.

CHAIRWOMAN TANNER: All right Ms. Wright.

ASSEMBLYWOMAN WRIGHT: This hole in the ozone layer, how long has it been there, do you know?

DR. BLAKE: About ten years. It started the observations and certainly there is a certain soft tooth pattern to the ozone levels at the South Pole in October is the month that I am discussing or September.

ASSEMBLYWOMAN WRIGHT: If nothing is done based on and you say it's been there ten years?

DR. BLAKE: Yes.

ASSEMBLYWOMAN WRIGHT: The size of it and how it has progressed, gotten larger in the last ten years?

DR. BLAKE: Yes.

ASSEMBLYWOMAN WRIGHT: Do you project that if nothing is done, how large it will be say in the next thirty or forty years, you're talking about thirty or forty years?

DR. BLAKE: Right. No, I can't, I can say that because of the meteorology which I was explaining here is that if there is sunlight then you have the wind currents and stuff so it really is not going to be able to spread past about maybe 60 degrees or so south so it's not like the ozone hole is going to spread to the

Equator. It can get a bit deeper, in other words instead of 50 percent depletion it could go to 60 or 70. Certainly, there are areas if we look at a profile of the actual ozone content there are times when the ozone level goes almost to zero in the stratosphere, there are big holes eaten out but I think that perhaps a more valid concern is what effect that will have if the CFC emissions go on unabated. What effect will that have on this maybe 15 percent decrease that we're seeing at the north pole because it is 15 percent because of the amount of chlorine in the atmosphere and perhaps because of the meteorology. If we add more chlorine, will that 15 percent go to 20 or 25 percent, the south pole is a place where there are very few people who live there and not to sound callous but Australia is not all that heavily populated. When you go to 60 degrees north, much of Europe is in that region and certainly they can be affected a lot more greatly than somebody 60 degrees south with an ozone hole. So I think the northern arctic is an area that we really need to be concerned with in this regard plus if we right now have three or so parts per billion of total chlorine in the upper atmosphere then if we go on at the rate we're at and we double that amount in the next 30 or 40 years or less than that actually, then we have to worry about is this one or two percent that's above us right here, is that going to be four, five, six or seven percent. I'm not a (inaudible...) so I just...

ASSEMBLYWOMAN WRIGHT: Another question, chlorine is the culprit, what else besides CFCs throw off chlorine in the

atmosphere?

DR. BLAKE: Well, volcanoes give off chlorine, the oceans put off a certain amount of chlorine but what you have to realize is that this is chlorine in a very inert form of CFCs. I mean if you have a swimming pool and you put chlorine in your pool or the chlorine in your water

ASSEMBLYWOMAN WRIGHT: That's what I was thinking of.

DR. BLAKE: That is chlorine that is in the throposphere and that is very easily rained out and so you just don't have this inert transport mechanism to get it into the stratosphere.

ASSEMBLYWOMAN WRIGHT: So, basically you could use the same substance in your air conditioning units if you had some other way of dispersing it?

DR. BLAKE: Well if you didn't emit any of it then there would not be a problem.

CHAIRWOMAN TANNER: All right thank you Dr. Blake.

ASSEMBLYMAN VASCONCELLOS: One question, how long does it take once it's spilled here or made available for it to float up and get to where it kind of sits?

DR. BLAKE: Well that depends on the meteorology but it can take anywhere from I guess in some cases months but it can be hundreds of years. So generally, the average would be ten to fifteen years or so.

ASSEMBLYMAN VASCONCELLOS: So if we stopped today, if we totally ban everything today from the whole world for the next ten years or so it would be getting worse?

DR. BLAKE: It would continue to get worse.

ASSEMBLYMAN VASCONCELLOS: Then it's got this half life of it would take a hundred years for two-thirds of it to deplete. So it sounds like the sooner we start the smarter we are, the safer we are.

CHAIRWOMAN TANNER: Thank you.

ASSEMBLYMAN CALDERON: Can I ask one last question?

CHAIRWOMAN TANNER: Yes, but remember we have a large...

ASSEMBLYMAN CALDERON: I understand, I'll limit my other questions for the other witnesses. It's just that I want to get a sense of the problem and this is the witness to do it with. Why does the hole seem bigger in the South Pole as opposed to the North Pole?

DR. BLAKE: Well two reasons, it get's colder at the South Pole and the chemistry takes place on these little ice crystals and so because it's colder there are more crystals that form, so that's one reason. Another reason is that in the North because of wind currents and mountain ranges, the air that is trapped there when the sun goes down at Christmas time when there is no sun there's still some currents that sort of sweep that area out so that it does not sit there for six months.

ASSEMBLYMAN CALDERON: I see. Thank you.

CHAIRWOMAN TANNER: Thank you very much. Our next witness is Doctor Kathleen Wolf. Doctor Wolf was here a year ago, I guess it was a year ago when we had a hearing regarding CFCs and she is considered the prominent CFC emissions expert on the West

Coast. Back in 1985 she and her colleagues prepared an exhaustive detailed accounting of CFC emissions by source and examined the means to control those emissions. Doctor Wolf will present information on how mobile air conditioners work, how they emit CFC-12 and how these emissions can be reduced or eliminated. Doctor Wolf, is she here?

DR. KATHLEEN WOLF: It's a pleasure to be here and with your permission I'd like to show some slides. I tried to address several of the questions.

CHAIRWOMAN TANNER: Of course the members in the audience won't be able to see but I apologize for that.

DR. WOLF: I'm just going to briefly talk about some background on ozone depletion, Dr. Blake of course covered that. And I know you've heard a lot about ozone depletion and its consequences in the last several years here. Everyone has been hearing about it in the news and other places and then I'm going to describe what some of the ozone depleting substances are, talk about the regulations that are in place today for controlling these substances. I'm going to then focus in on the automobile air conditioning use of the CFCs and talk about the options in that product area for reducing emissions, and finally I'll address the issue of recycling in the category of automobile air conditioning. As Dr. Blake described it was in 1974 at UC Irvine that Professors Molina and Roland first proposed the theory of ozone depletion. There were these substances called chloroflurocarbons or CFCs that were extremely stable or inert as

Dr. Blake said. They survived for upwards of a hundred years in the atmosphere and ultimately they made their way to the stratosphere or the upper atmosphere, once there ultraviolet light impinges upon them, decomposing them, it liberates the chlorine that they contain, that chlorine is then available to catalitically react with the ozone layer depleting the so called ozone layer which protects us from harmful ultraviolet radiation. Now I've just got a picture of one of the CFCs, one of the chloroflurocarbons here, it's CFC-11 and you see here that the ultraviolet light comes down and it destroys the bond between the carbon atom and the chlorine atom and then this fluorine atom is free to react chemically with the ozone. Now there are a number of substances that affect the ozone in one way or another and Dr. Blake also describe these. There are those substances that lead to a decrease in stratospheric or upper atmospheric ozone and those are the ones we are here to talk about today the fully halogenated chloroflurocarbons or CFCs and they of course contain chlorine. Then we have another class of substances called the halons, those halons contain bromine which is thought to pose an even greater affect on the stratospheric ozone layer than does chlorine. As Dr. Blake mentioned each chlorine atom is capable of destroying about a hundred thousand times its own weight in ozone. In contrast the bromine atoms contained by one of the halons is capable of destroying a million times its own weight in ozone, so its even more potent than the CFCs in destroying ozone.

CHAIRWOMAN TANNER: Doctor, how do we use the halons?

DR. WOLF: The halons are used as fire extinguishers, either in the hand held fire extinguishers or as what are called total flooding systems in computer rooms. They are attractive because they don't destroy electronic equipment if a fire occurs and so we have them in every computer room in the world at this stage. And then there are a variety of other chlorinated species that can have an effect on the ozone layer and Dr. Blake mentioned one that is naturally occurring methylchloride and there are various other ones as well. Then you have a set of substances that increases the ozone in the stratosphere, upper atmosphere and these also contribute to global warming. Carbon dioxide is of course the main contributor to global warming, it comes from the burning of fossil fuel and it contributes about 50 percent of the total contribution to global warming. Another gas that contributes to global warming as well and also increases ozone in the upper atmosphere is methane and the methane comes from ruminant animals, and there is a big debate in the community right now as to whether or not flatulence or exhalation is the major contributor in ruminant animals.

CHAIRWOMAN TANNER: If methane is burned is it still a problem?

DR. WOLF: If it's burned?

CHAIRWOMAN TANNER: Yes. For instance, isn't there a process of burning methane gas?

DR. WOLF: Yes, it would probably create carbon dioxide

in the process.

CHAIRWOMAN TANNER: So that you'd have a problem anywhere?

DR. WOLF: Right. And methane also comes from rice paddies, it comes from a variety of different sources and it contributes perhaps 20 percent to the total global warming problem. And CFCs I believe Dr. Blake mentioned that they contributed roughly 25 percent, the number that I'm familiar with is more like 15 percent and he may have been including other ozone depleting substances in his estimates. And then we have a third class of substances that can either act to increase or decrease the ozone in the upper atmosphere depending upon what else is going on and that would include nitrous oxide.

Now, our focus today is on the substances that deplete the ozone layer in the upper atmosphere or stratosphere and those include the fully halogenated CFSs which are the five I list here; CFC-11, 12, 113, 114 and 115 and the halons that I mentioned that contain bromine which poses a greater threat to the ozone layer than chlorine. And those include three, although 2402 I don't really know where it's manufactured in the United States. I don't believe that it is. Halon 1211 is used in the portable fire extinguishers and Halon 1301 as I mentioned is used in computer rooms, in total flooding and to protect other electronic equipment, telephone switching stations and things like that. Then you have a variety of other chemicals and I've just listed a few here that also contribute to ozone depletion. Now I think

it's important to understand that there have already been world regulations on these substances. And I'm sure you're all familiar with the Montreal Protocol, the agreement that culminated in the Montreal Protocol was reached in Montreal, Canada in September of 1987 and it focused specifically on the fully halogenated chlorofluorocarbons the CFCs and the halons. And what the Montreal Protocol does is it caps the production of CFCs at 1986 levels and this began in July of this last year, this last July. It then calls for a decrease by 50 percent of the 1986 production level of those chemicals by 1998 and as you see there it also caps the production of the halons at 1986 levels and that will become effective in 1992.

Now, there is general agreement that the Montreal Protocol doesn't go far enough but before I get into that I want to mention that EPA has actually promulgated a regulation that mimics the Montreal Protocol and this was in the federal register last August I believe, August of 1988 and it mimics the Montreal Protocol exactly. It phases down the production level of the fully halogenated CFCs to half the 1986 production level by 1998. The idea behind this kind of regulation where you cap the production is that you will cap the production, thus restricting supply, the price will increase and people will seek alternatives and seek ways or recycling the CFCs so that the demand is then reduced. But it's this cap on the supply that increases the price that causes people to look at conservation measures and then they will adopt alternatives. Now as I said there is general agreement

that the Montreal Protocol does not go far enough and I was involved in some of the negotiations for the Montreal Protocol in the very early years and it's extremely difficult to get an international regulation in place to get international agreement on regulations. It's an arduous task and people should be admired who took part in this thing and of course the only long term solution to this problem is to get international agreement and to get everybody to go along with it.

Now there is a group called the Ozone Trends Panel, they looked at ozone layer depletion and they believe that it's more serious than people have thought we promulgated the EPA regulation and when the international agreement was reached. So there is now general agreement that the Montreal Protocol does not go far enough, but we need to go back to the negotiating table and get international agreement and there is a meeting scheduled for next summer I believe in London and at that meeting its expected that the CFCs and the halons will be phased out altogether by the year 2000, and it is expected that this international agreement will be reached and that they maybe phased down to half their 1986 production level by 1993. So that's what we can expect to happen next year.

CHAIRWOMAN TANNER: That's five years earlier than what the cap is now?

DR. WOLF: Well the cap right now it only restricts production to half the 1986 level by 1998 and it's expected that an agreement will be reached to phase out the CFCs altogether by

the year 2000 and that will be great progress if they can achieve that and it is expected that that will happen.

CHAIRWOMAN TANNER: Yes.

DR. WOLF: And then they may also bring in other substances into the purview of the international regulation at that time. Now, I just wanted to list some production levels of the different CFCs and the halons here to give you an idea of their worldwide and U.S. production levels. And as you see here CFC-12 is the CFC that we're going to be most concerned with today, it's the one that's used in automobile air conditioners and it's production level is quite high and it accounts for about 45 percent of U.S. and world production. And then we have the halons which are produced in very small amounts but once again because they contain bromine which is thought to pose an even greater threat to the ozone layer they are being looked at under this regulation. I don't list CFC-114 and 115 here because they are used only in small amounts and CFC-11 of course it's used in certain refrigeration applications and as a foam blowing agent, CFC-113 is used in solvent appliclations.

CHAIRWOMAN TANNER: Mr. Vasconcellos has a question.

ASSEMBLYMAN VASCONCELLOS: So, roughly the U.S. produces about a quarter to a half of the respective depletants.

DR. WOLF: That's correct and as Dr. Blake mentioned when we cut out the aerosol propellant application of CFCs at that time it represented about a third of the world production of CFCs that's why it had a dramatic effect.

ASSEMBLYMAN VASCONCELLOS: Okay, and California consumes about what percentage say of the CFC-12?

DR. WOLF: Actually, I have some numbers later but the way I would estimate that, California has about 11 percent of the nation's population (inaudible...) would take 11 to 15 percent of that and say that that's what's used in California roughly. We tend to be a little more consumptive in certain areas and a little less so perhaps in others. I've some estimates.

ASSEMBLYMAN VASCONCELLOS: Okay, thank you.

DR. WOLF: Okay, then this chart just compares the uses of the CFCs for the U.S. and the world. And you'll note that there are two differences in aerosol propellant uses of course, we ban the use of CFCs in those applications in 1978 except for various exemptive products and Europe and the rest of the world did not ban them for such uses and so they account for about a third of world use. Then there's so much large difference in the use of CFCs for refrigerants in the U.S., it's much larger here and that arises because we use more of the CFCs in automobile air conditioning and the rest of the world does not, and we use more of it also in retail food refrigeration. In Europe they tend to go every day and purchase food rather than to have grocery stores that have large frozen food sections, so that is the difference between the U.S. and Europe. We felt as if we did this very moral thing by banning aerosol applications of CFCs but the Europeans feel that that is an essential use and they claim that we are profligate because we use it in automobile air conditioning. Of

course it is somewhat cooler in Europe and I don't know how they would fare if they lived in Dallas, Texas in the summer without automobile air conditioning either.

Now, just to talk a little about the environmental characteristics and I do want to stress that these things are very squishy numbers and they're not by any means certain, so take with a grain of salt what I say. I have two numbers here for each of these substances, the ozone depletion potential, and you've heard a lot about that. The ozone depletion potential of a particular chemical depends on two factors, its atmospheric lifetime and its chlorine or bromine content. The longer the atmospheric lifetime and the more chlorine or bromine it contains the higher the ozone depletion potential. And as you see we have defined the ozone depletion potential for CFC-11 and 12 at (inaudible...) and all other substances then have ozone depletion potentials that are relative to that. CFC-113 is about eighty percent that of CFC-11 and 12 and the halons which contain bromine are much higher. As you see halon 1301 has an ozone depletion potential of about ten. Then I show another factor here and it's called the greenhouse potential, that reflects the global warming capability and those are much less certain even in the ozone depletion potential. And once again they depend on two factor's in this case as Dr. Blake said, one is the atmospheric lifetime of the substance again, but the other is its ability to absorb heat in the infrared radiation region. And chemicals that contain halogens of any kind whether it be chlorine or bromine or also fluorine, can absorb that

radiation and trap that heat next to the earth. And we again set CFC-12 as a standard there with a greenhouse potential of one and put all other chemicals relative to that. I was unable to find a factor for halon 1211 I don't know that anybody knows what it is and CFC 113 is very uncertain and it's not very clear, it's in the range from point 3 to point A.

I wanted to focus in a little more on CFC-12 and talk about how its use in automobile air conditioning accounts for a major fraction of the total CFC-12 that is used. On it's use in various other applications in foam blowing, various kinds of foam packaging foam and frothing applications in insulating foam, it's use for various other refrigeration capacities that's used in retail food stores and of course in the refrigerators that are in our homes to some extent. It's also used in aerosol applications and you'll note that of course the use in aerosol applications is much larger in the rest of the world than it is in the U.S. And then I was responsible for doing calculations that would look from the top down from the bottom up of these CFCs. You have total production numbers in the U.S. and then you try to allocate those numbers to the different uses and then in each of the different uses if you understand the way it's used and you can multiply by the number of refrigerators, or so the number of pounds of foam or something like that you can come up with numbers. We found a huge shortfall of course when we did that and as you see it's very large here, it can't account for one third of the world production and no one really knows where that goes.

I just want to briefly describe although...

CHAIRWOMAN TANNER: I would like for you to go back to that slide because I think it's worth noting the high percentage from the automobile air conditioner and I think you might comment.

DR. WOLF: That's right it is extremely higher. In the U.S., of course, it's a much higher percentage than it is worldwide again, because we use most of the CFC-12 in automobile air conditioning here and I was going into more detail into the automobile air conditioning factors.

This slide just describes the operation of an automobile air conditioner which was done very well in the background papers so I'm sure you already know how this is done but in principle, what happens is that you take this CFC-12, it's called R-12 in refrigeration applications, it just means refrigerant and it comes through the compressor to increase the pressure and at that stage it's a gas and it's at much higher temperature than the outside air, it flows from the compressor to the condenser where the outside air cools it and it condenses it and it becomes a liquid giving up its heat to the outside air. It flows through the expansion valve from the condenser to the evaporator and at that stage there are lower pressure conditions so the refrigerant becomes a gas at that stage or it vaporizes, its temperature drops, and then you blow air across the cool refrigerant tubes of the evaporator and that's what cools the person sitting in the automobile compartment, it enters the passenger compartment and causes cool.

So that's how it works, I know no one really cares that much about how it works and now R-12 proved to be an excellent refrigerant for automobile air conditioning applications. First of course it's stable which is also the reason that it depletes the ozone layer and contributes to global warming, but nevertheless when these substances were first discovered their stability made them very promising as for uses in a variety of applications so they wouldn't decompose. It's also a gas at room temperature which gives it a good advantage, it has excellent pressure characteristics. It's not too high pressure of a refrigerant so it requires only light materials to be made in automobiles which is good for fuel economy, it's compatible with the (inaudible...).

I tried to look at emissions from automobile air conditioning applications and here's what I came up with, this sort of distribution right here. The total amount of emissions on an annual basis are roughly 33 thousand metro tons and emissions occur during the manufacturing stage when automobile air conditioner manufacturers manufacture these air conditioners they test them, they weak test them, they try to make sure they don't leak. In years past they use to use R-12 quite a bit for that purpose and they've moved away from it now, they use helium and air and various other gases for that purpose. So, actually you see the manufacturing emissions represent only three percent of total emissions. We have some leakage that occurred and it's worth noting here that in your home refrigerator the refrigerant

12 in the unit is in what's called a hermetically sealed unit and that means sort of self standing so that it's not open to the outside air. Automobile air conditioners cannot be made to be hermetic for two reasons: first you have to get the power to the compressor through a belt from the crank shaft, so you have to have an opening to accomplish that; and second you need flexible hoses that will vibrate with the automobile, the vibration would cause rigid hoses to break. So, for two reasons you can't have a hermetically sealed unit, that suggests that that unit will leak to some extent and this will be through improper fittings or the air conditioner itself or compressor and seal such things as that and that, accounts for about one third of total emissions.

When your unit stops cooling in your car you add some refrigerant or you go to a service station and they add some refrigerant for you, that's recharging. Frequently when they do that they vent the unit before they do that and in the past that was common practice because you wanted to make sure that there was no acid or moisture in the refrigerant so venting it helped you to accomplish that. The same holds true with servicing, they would routinely vent the unit and then add new refrigerant and the refrigerant that was vented then made its way to the stratosphere where it was disposed of.

CHAIRWOMAN TANNER: You say that's not being done as much now?

DR. WOLF: It's not being done as much now, that's right. And of course recharging servicing accounts for nearly

fifty percent of totally measuring, so those two together account for about that. Then, of course, the automobile air conditioner has to be located just behind the radiator so that you can have the cool air flowing across it into the passenger compartment and as a result it's affected when you have a front end accident. So some of the accidents occur and spew the CFCs out and that accounts for about eleven percent of the measure. Finally, you have and these numbers I noticed that the background paper had disposal emissions placed at a much higher fraction. It's not really clear what disposal emissions are, the thing is that many automobiles arrive at the scrapping places without a charge in the air conditioner at all for whatever reason. Some have a little bit of a charge and some do not so it may represent actually quite a small fraction of totally measure.

Now, I tried to estimate the emissions in California using the technique that I just described, I assume that California accounts for about eleven percent of the population. I said that it might be somewhat warmer than average although I don't know whether that's true really, I suspect that the south would have more of them. So then I said, maximum probably California accounts for fifteen percent of the automobile air conditioning emissions which may represent about five thousand metric tons, remember there were about thirty-three thousand metric tons total emissions in the USA. So at most there would be five thousand and this would only represent 1.3 percent of the world CFC-12 emissions because of course CFC-12 is used in other

applications not just automobile air conditioning as well so that's what you would be affecting.

Now there are a whole range of options of course that one could consider in reducing emissions from automobile air conditioners. Now as these substances are phased out, which they will be by the end of the century, there are only two things that you can do you can either substitute for them chemically and still use the same kind of air conditioners that you have today, or if you could look at alternative refrigeration cycles and substitute them for ones that use chemicals that's a possibility as well. Both of those options will allow you to get rid of all the CFCs. Then you have four other options that you could exercise between now and the end of the century before these CFCs are banned entirely. You could recover the CFC servicing or at disposal and as we noted recovery of servicing and recharge would be better because it represents a much larger fraction of total emissions than does the disposal emissions. And then of course another thing that people have talked about is you could ban the sale of the small cans of refrigerant that consumers and service outlets use. And then of course you could look at better engineering where you make the hoses and seals better so that as much leakage does not occur. But as I mentioned that I want to stress these are only interim measures because the CFCs are going to be phased out altogether so you can only do these over the next ten years and then you have to do one of these.

I was just going to talk about some of the alternatives,

and I know that others are here to talk about these later in the day so I'll go over them just briefly. One of the proposed alternatives is R-22 which has been produced for years in this country and it's used primarily in home air conditioning units whether they be central or window air conditioning. Now the industry is familiar with R-22 because it has been around for a number of years and the automotive manufacturers do not like it, it has higher operating pressures, it's not a forgiving refrigerant and it causes more leakage from the hose material, it permeates the hose material more readily and you have to completely retool everything in order to design these systems for R-22. It also uses a little bit more energy which can of course exacerbate with the warming in the final analysis. Then there are some blends that are being proposed and I suppose the people from Du Pont will talk about these. The one that's most commonly mentioned is a 40 percent R-22, 40 percent 152A which contains no chlorine also so it's a very good refrigerant and 20 percent R-124, which is a new CFC that isn't yet produced. And the beauty of these blends is that they contain flammable components which is not a good thing for automobile air conditioners but if you have that flammable component with a boiling point in the middle of the other two it never becomes rich in that flammable component so it can actually function well without becoming flammable in an automobile air conditioner.

The other it involves as I said a new CFC that isn't yet produced this particular blend...

CHAIRWOMAN TANNER: On that one would there be retooling necessary retrofitting (inaudible...).

DR. WOLF: No and the beauty of these is that it exactly mimics properties of R-12, they are great, what people are referring to as bridging chemicals. You see eventually well I'm going to get to R-134a which I think is the best ultimate alternative and I'll talk about that in a minute. But you see eventually the new systems will be redesigned to put in R-134a but in the meantime you'll have all these old automobile air conditioners that were designed for R-12 out there and they still need to be serviced and everything. Now in order to reduce the ozone depleting potential of the substances in them you could substitute this blend over the next several years until both cars are phased out of the economy. So I think that these blends are very clever inventions that conserve really good bridging capabilities over time as you phase out and into the new automobile air conditioning.

CHAIRWOMAN TANNER: There is one substance there that you say has not been developed, is that what you're saying?

DR. WOLF: That's correct. It's not produced currently and...

CHAIRWOMAN TANNER: But it can be?

DR. WOLF: Yes, it can be produced and plants will be built.

ASSEMBLYMAN VASCONCELLOS: How long will it take to produce that?

DR. WOLF: 124 it probably won't be available until the '93-'94 and I'm sure the Du Pont people can address that better, but I wouldn't say before the '93-'94 time frame.

ASSEMBLYMAN VASCONCELLOS: What's it take to produce it, what's it take to make it available, is it chemically producible now? Apparently somebody knows what it is.

DR. WOLF: Yes in principle these can be produced, it's been a trial. I'd like to talk about the production difficulties with regard to R-134a.

CHAIRWOMAN TANNER: All right then we will discuss the other with Du Pont.

DR. WOLF: Well yes, I mean I can bring it up.

CHAIRWOMAN TANNER: Okay.

DR. WOLF: I mean I can bring it up and talk about the other two. R-134a is the most promising long term substitute, it contains no chlorine, whatsoever, so it does not contribute to ozone depletion at all. Now, this substance has never been produced yet and Du Pont is building a plant presently in Texas and ICI has recently announced a plant that they will build in Louisiana and this substance is pretty similar to R-12 that's why it really does pose an attractive alternative. There's minimum redesign in retooling of the automobile air conditioners which is required. And by the way the producers of the automobile air conditioning unit really favor this one as well, it requires the new oil and they haven't found a great oil yet. Yet also have higher energy requirements as does by the way R-22 and it is an

excellent permanent solution. Now they do not produce HFC-134A today and it is in animal testing currently, a consortium of world-wide CFC producers are testing that substance in animals as they probably will test R-124 the other one that I mentioned that's in the blend that will ultimately be available. And we cannot really hope to use the substance on a wide spread basis until the animal tests are complete and it will be 1993 or '94 before these substances are available to supply the whole market. So, in the meantime we may have to take other measures.

CHAIRWOMAN TANNER: That's the blends as well as the...?

DR. WOLF: One of the components of the blend R-124 will probably not be available on a wide scale until '93-'94. Now you can substitute other components for that new one but they will still have some ozone depleting potential, that's the thing that's good about R-124, it's quite a low ozone depletion substance.

DR. WOLF: Now, I just thought I would put down the ozone depletion estimate,the ozone depletion potential, and the greenhouse potential for a couple of the alternatives and this is a mistake, this should be 1.0 here. R-22 as you see is only 5 percent as much of an ozone depleter as is R-12 and as I mentioned R-134a is excellent, it contains no chlorines so it does not deplete the ozone. Now in terms of greenhouse potential R-22 has (inaudible...) about 7 percent that of CFC-12 and 134A, this should be less than .01, it's very inexact at the moment, it may be less however than R-22.

CHAIRWOMAN TANNER: Are we concerned about possible

toxicity or what on the third one?

DR. WOLF: The third one looks very clean, it has an internal threshold limit value of a thousand parts per million which is the highest value assigned to any chemical, it looks very nontoxic but of course you can't know until it goes through lifetime animal tests. I believe they're through the 90 day chronic testing and it looks very clean, it's my belief that it will emerge clean from the test but it must undergo the two-year animal test before we can see that with certainty. Now just to talk about whether or not we should recycle in the meantime until the best alternative R-134a is available. By the way those mixtures of three substances they're not things that you want to use forever in an automobile air conditioner, they're just bridging chemicals, you don't want a three component substance when you can have a one component one and ultimately the auto industry would feel much more comfortable with redesigning the entire system to accommodate R-134a than to use the three component mixture forever it's rather just a bridging mixture.

Remember that servicing the recharging emissions accounted for maybe half the total emissions of R-12. In the beginning people were concerned about liability, say you have this device that you said could recycle the refrigerant, you pulled out the refrigerant, you put it through this device, you put it back into the automobile air conditioner and your automobile air conditioner failed that would be a bad problem. The Motor Vehicle Manufacturer's Association has now decided that it will provide

warranty for units if the refrigerant is recycled by an approved unit, a unit that is approved by the underwriter's laboratory and if it's the refrigerant that you clean out meet certain characteristics set by the Society of the Automotive Engineers, so there is a mechanism in place now to not face that liability issue. There have been three recycling units that have been approved by the Underwriter Laboratories at this moment and I'm sure subsequent speakers can talk about that more. One of them is a White Industry unit, another is a Robinaire and they basically all work in the same manner. You connect them to the automobile air conditioner, they pull out the refrigerant and the oil, the first step is to separate the oil from the refrigerant, they then move the refrigerant through a filter to take out particulants and then through a dryer or a desiccant, a so called desiccant to remove the moisture.

Now one of the things that arises in California that won't arise other places, is that you have the oil that you removed from the refrigerant and that's a hazardous waste at service stations, that is definitely a hazardous waste and they will have to treat it as such. In the rest of the nation, used oil is not necessarily classified as hazardous but that will be a thing that they have to pay attention to here.

So these three recycling units are approved by the Underwriter Laboratories and ultimately when you adopt the alternative like R-134a for instance you may have to actually redesign these recycling units. Although the price of the new

refrigerant will be much higher and it will probably be cost effective to recycle it you may have to redesign it. Right now there is no oil and you need a new desiccant for R-134a, so you will actually have to redesign the desiccant or drying unit in these units as well. Now it's a problem with requiring recycling of refrigerant and as the background document showed there are 300,000 outlets roughly in this country that service automobile air conditioners and if we use the population estimate again perhaps there are 30,000 of those in California. If you really want to mandate recycling and it's not cost effective let's say at the moment you're going to have to have an immense enforcement structure, you're going to have to go to every service station all the time, it will take immense resources to actually enforce such a thing. And you see the whole idea behind the EPA regulation where you cap production and then gradually phase it down is that that reduces the availability, increases the price, and as the prices goes up it becomes cost effective to recycle and at that stage people will do it voluntarily so you don't have to enforce it. And I believe that actually the prices will increase enough so that that will occur sometime in the near feature otherwise you're really going to have to put a lot of money to enforce it.

Now I just decided to put down a few of the factors that you might want to consider if you want to regulate here in California. As this point was made earlier, in fact regulating in California and not in the rest of the nation or in the rest of the world will really not reduce ozone depletion at all, and you

should be aware of that. Right now production is capped, this went into effect in July, it's capped at the 1986 level. People weren't notified by their suppliers that they would have to cut back this year by 15 to 20 percent on the CFC they could purchase, they were just told they'd have to cut back. Now demand at the moment, therefore, exceed supply of the CFCs, that's if you do not use and emit the CFCs here in California they will be purchased and emitted somewhere else, either in the United States or in the rest of the world. So you simply cannot lower ozone depletion by regulating here in California right now, it's just not possible to do that. In the future as demand declines...

CHAIRWOMAN TANNER: Mr. Caldron.

ASSEMBLYMAN CALDERON: But if we tried and showed that there were alternatives and established a model in California that could be followed else where if the inclination exists, wouldn't that have some value in terms of addressing the problem that you're identifying here?

DR. WOLF: By alternatives do you mean recycling because the alternatives are not available yet and they won't be no matter what we do because they're not finished being tested in animals and they can't be available until... I don't them to be available until we see whether they're nontoxic. As I mentioned the enforcement will require resources and it will simply be an extra cost, an additional cost to the people of California to pay the higher cost for conducting this recycling operation at these service stations. Now I do want to mention, I mean your point is

well taken about California being a leader, et cetera, and EPA has recently been petitioned by the Alliance for Responsible CFC policy and it's not official yet but EPA is probably going to promulgate regulations in the refrigeration and air conditioning areas.

ASSEMBLYMAN VASCONCELLOS: Who is that Alliance, who constitutes that Alliance?

DR. WOLF: It's called the Alliance for Responsible CFC Policy.

ASSEMBLYMAN VASCONCELLOS: And who constitutes that Alliance?

DR. WOLF: CFC producers primarily and a number of users as well.

ASSEMBLYMAN VASCONCELLOS: I see, I see, it figures.

DR. WOLF: And they partitioned EPA to preempt and pass regulations on refrigeration and air conditioning because they were concerned about all the different local regulations that might be passed requiring different things of different people.

ASSEMBLYMAN VASCONCELLOS: That's one argument, (inaudible...) that they don't want any regulation.

DR. WOLF: Well, they've asked EPA to regulate.

ASSEMBLYMAN VASCONCELLOS: Yes, but I mean your statement is so flat that I really have to challenge it. Of course they don't want different kinds of rules but they also would like probably the least rule they can get.

DR. WOLF: No, they've actually asked for recycling to

be mandated and that's as extreme as anyone has suggested I believe. And EPA actually is right now even as we speak negotiating with environmental activist groups, Motor Vehicle Manufacturers Association, and all the parties involved to promulgate a regulation. And once they do that, if they promulgate regulations on the refrigeration and air conditioning area then nobody at the state or local level will be able to promulgate one. And so we'll have to see in the next few months this is unofficial right now I just happen to have heard about the meeting, I know some people who went to one of the first meetings. So that's really all I wanted to say, I have one more remark to make. There was a question that I didn't prepare a slide for and that is on whether or not these refrigerants could be destroyed if we remove them from automobile air conditioners. And as I'm sure you know right now, we routinely as I mentioned earlier use CFC-113 as a solvent primarily in the electronics industry and that CFC-113 is generally sent to recyclers, the CFC-113 is cleaned up and sold back onto the market and there's a sludge generated that has a small amount CFC in it, that sludge is usually blended with high fuel value material and sent to the cement kiln in LeBeck. Now we routinely burn CFC-113 either in cement kilns which are used to make a product, used as a supplemental fuel or in destructive incinerators that are in other parts of the country. One of the problems I don't think we could remove all the R-12 from all automobile air conditioners tomorrow and incinerate it in those incinerators because chlorine and

chlorine reek havoc on the refractory material in incinerators, nevertheless, it would be possible with blending and over a period of time to incinerate the R-12 if we were to pull it out of air conditioners.

CHAIRWOMAN TANNER: There are tons and tons of R-12 in automobile air conditioners right now!

DR. WOLF: Yes.

CHAIRWOMAN TANNER: And if we were to require that those be disposed of, you're suggesting that we don't have the facilities?

DR. WOLF: No, I think we actually could do it over a period of time. The thing that I would like to see done with that R-12 instead though, I don't think that incineration is a good option really in this case, because I think I would like to see the R-12 used in places where there are no substitutes yet to substitute for virgin production. Virgin production will all ultimately be emitted so if you can reduce that virgin production by substituting R-12 that's taken out of an automobile air conditioner then you will have less emissions that ultimately occur, you'll be reusing it in another capacity, you know in the phone industry or in other applications like home refrigerators.

CHAIRWOMAN TANNER: Where it is not necessarily emitted then?

DR. WOLF: Well it is emitted ultimately but it substitutes for what you would have to produce otherwise for those purposes you see, so you're really recycling it instead, that's

better than destruction actually. I don't know why you would pull it out because you can't put anything else in right now, there are no alternatives and until we have some of these bridging compounds available then you might want to pull it out.

ASSEMBLYMAN VASCONCELLOS: And we simply can't live without them is your assumption and implicitly in all you're saying we just simply can't do without them.

DR. WOLF: No, I didn't say that.

ASSEMBLYMAN VASCONCELLOS: You said there was no alternatives so we can't pull it out so why would we pull it out.

DR. WOLF: You can live without air conditioning?

ASSEMBLYMAN VASCONCELLOS: Yes we can.

DR. WOLF: Are we air conditioned in this building, why?

ASSEMBLYMAN VASCONCELLOS: Beats me. I could do well without it.

DR. WOLF: I do not have automobile air conditioning, however, I have been in Dallas Texas in the summer and I don't think we would have populated a lot of this country if we had not had air conditioning available whether it was automobile or chillier in buildings and I don't think people or willing to go without it. I mean we can all protest and go home and turn off our air conditioners and sit there and work, you know we can do that if we feel strongly about it and we should, I mean I'm not saying that it's not an option, it certainly is an option, I just don't believe it's one that people want to exercise.

CHAIRWOMAN TANNER: Any further questions?

ASSEMBLYWOMAN WRIGHT: I think she's pretty good.

CHAIRWOMAN TANNER: Yes she is and that's why we asked Dr. Wolf to...

ASSEMBLYMAN VASCONCELLOS: What good to do with poisoning if you like that so you'd think she's fine. She supports (342) with poisoning you'd like that then you'll admire her.

CHAIRWOMAN TANNER: I don't think she does support...

DR. WOLF: I've been working since 1976 on reducing the use in emissions of ozone depleting substances and I do technical assistance for small and medium size people in the field to help them convert away from CFCs.

ASSEMBLYMAN VASCONCELLOS: So you'd recommend that we would do that as fast as possible?

DR. WOLF: I think we'd have to have an orderly phase out where we... one of my major concerns not in the automobile air conditioning area because the substances are being tested in animals, but in the solvent application is that we will precipitously force people to adopt substances that are dangerous in a different way without understanding what those dangers are. Many of the alternatives that are being proposed are going to pose great danger, some of them have caused cancer in laboratory animals and they are still being marketed by people as alternatives and endorsed. People are recommending illegal disposal procedures for them and I'm terribly concerned that small and medium sized people will adopt them before they've been

adequately tested and adequately examined as to the consequences.

ASSEMBLYMAN VASCONCELLOS: Are there other non chemical substitutes like solar or electrical (364) coolers that are at all viable or feasible?

DR. WOLF: There are other cycles that are available. I can tell you a story, there is a company called Rovax that's been looking at alternative cycles for a number of years and perhaps Gerald Stofflet who is speaking later from GM can address this better than I. They've proposed a variety of cycles and one of the people that I work with went to look at the cycle at one stage he rode in the automobile air conditioner and it dripped on his foot and it performed better the more CFC you added, it just turns out that there are alternative cycles that will require a great deal of redesign and they're much more expensive and they're less efficient than the compression cycle. Now I'm not an expert in refrigeration cycles and perhaps the GM people can talk more about that, but nothing has proven to be as good an alternative although things are being looked at. Another firm called Croyo Dynamics is looking at I think it's a modified stirling cycle that uses helium, but in general these have not proven to be as efficient and they will require immense redesign and we all pay for that and perhaps we should be willing to do that.

ASSEMBLYMAN VASCONCELLOS: Perhaps.

CHAIRWOMAN TANNER: Thank you very much. We really appreciated your testimony. Our next witiness is John Bray. John Bray is with Du Pont's Coolant Marketing Division based in

Delaware. He is an expert in the development of ozone safe coolant substitutes.

Mr. Bray will update the Committee on the development of safe coolant substitutes, the continued production of CFC-12 and ways of eliminating, disposing of CFC-12 and the development of a dropin substance, all of that.

MR. JOHN BRAY: Sounds like a big order. Good morning, I'm pleased to be here and have an opportunity to speak to your Committee on the development of alternative refrigerants specifically for the automotive air conditioner. Du Pont is keenly aware of the public interest in environmental need to transition away from the use of CFCs as soon as possible. Our goal and it's been publicly stated is to phase out production of fully halogenated CFCs and halons as soon as possible but no later than the turn of the century. However, this needs to be done through aN orderly and safe transition to alternative products. We plan to commercialize a series of alternatives over a three to five year period beginning IN 1990, next year. This schedule assumes favorable toxicity, favorable process development, favorable receipt of permits from states to build and local communities to build the plants and favorable plant design. However, we advocate further global limitations. We think that the Montreal protocol and its reassessment process is an appropriate means to see that this becomes a worldwide process and worldwide policy makers need to agree with each other in order to see that a worldwide solution is provided.

I think one of the great fears is that the developed countries will take action and that the underdeveloped countries will not feel motivated to follow the developed country's needs. They'll want more time, they'll want to build flurocarbon plants, they won't have the resources to build the alternatives plants nor the technology. And without a worldwide agreement that assures participation by underdeveloped countries their growth can continue to increase chlorine into the atmosphere and we will not solve the problem by unilateral or just developed country action.

ASSEMBLYMAN VASCONCELLOS: So, if everyone else agrees to stop, we should not stop is that what you're saying?

MR. BRAY: Pardon me?

ASSEMBLYMAN VASCONCELLOS: Until everybody else agrees to stop we shouldn't stop?

MR. BRAY: No I didn't say that.

ASSEMBLYMAN VASCONCELLOS: You didn't, what did you say then?

MR. BRAY: What we need is all developed countries through the Montreal Protocol agree to phase out and bring the underdeveloped countries along with that process.

Let me talk a little bit about 134A which is the primary candidate to replace the Freon-12, 134A was identified in the '70s as a likely candidate, it had pressure temperature characteristics and thermodynamic properties which were very close to Freon-12 and it had no chlorine, therefore, no ozone depletion, and that was our driving force. In the '70s people did early

process work, early application work, one of the things we found out is that it's much more difficult to make. Making Freon-12 by comparison is a relatively simple one step process, you react carbon tetrachloride with HF in the presence of a catalyst and out comes in this case two products Freon-11 and Freon-12 which you separate through columns and then purify with various cleanup procedures. In order to make 134A we have at least a three step process, you have to make intermediate chemicals, it means building three plants instead of one or two plants instead of one. There are probably a dozen viable roots to possibly manufacturing 134A depending upon the starting material that you start with. So that a responsible chemical manufacturer in order to assure his end user that we're trying to find or that we will be able to provide the lowest cost process has to investigate all of those potential routes. You can't choose the high cost route and expect your customer to be competitive worldwide. It took a great deal of process development in order to identify the best processes which should be put in place. Because it's more expensive or because it's more complex the manufacture of this compound will cost more and I guess we've publicly said it will be three to five times the traditional price of twelve but that's when it's made in quantities comparable to Freon-12. Right now we make Freon-12 in one or two million pound plants, that's a typical world scale plant. If you look at the way 134A will start it, will be starting out in much smaller plants perhaps probably less than fifteen million pounds so that the long term costs that have been

talked about are probably in the late '90s.

The other thing that was done was to identify some of the technical aspects of applying it, we found out that the technology was different, people will have to redesign systems. In the early '70s there was very little interest on the part of users to pursue that technical redesign. In the mid '80s I think science led to recognition that we need to limit world growth of chlorine and world growth of CFCs. This really led to (inaudible...) which effectively will cut the use more than fifty percent, initially twenty percent to get the 86 levels and another fifty percent to get fifty percent below the 86 levels. It also led to renewed R & D both on a process and application standpoint, one of the problems that we found in using 134 is that it is not compatible with the traditionally used paraffinic and affinic oils. Paraffin, these are natural oils that come from oil, 134A isn't soluble in those, and the oil refrigerant mixture has to be soluble in order to assure that the oil comes back to the compressor where it does it lubricating job and doesn't get hung up in some part of the system and not be available to lubricate. So, this solubility or misability is needed, the PAGs were identified as a class of chemicals which would provide at least limited solubility although they don't really solve the problem at the high temperature end of the scale, they're not totally miscible but a number of companies have continued to work on trying to improve PAGs the candidate oils to go with the candidate 134A. PAG still has some problems, not fully soluble, it's

hydroscopic, means that it tends to pick oil, this tends to lead to chemical instability in the system, it's much thermally sensitive -- in other words at high temperature PAGs tend to decompose and so there's some concern about long term system life. They generally are not as good lubricants as the paraffinic and affinic oils which we're used to. And bottom line is there's a real concern about the durability of the sytems that will go into effect when the 134A and the PAG oils are used.

We're continually looking to try to either improve PAG oils and Du Pont for one has a major R&D project involving a number of scientists trying to invent new chemicals non PAGs which will do a better job in serving the refrigerant needs or the needs of a lubricant to go with these highly fluoronated compounds. As a refrigerant by the way 134A is not as good as 12, it's going to need perhaps a larger compressor, it may use somewhat more energy, it may need a larger condensor or more air flow across that condensor. Some auto companies are concerned that it will require greater grill openings, those big openings in the front of your car and destroy some of aerodynamics which is also a concern from an energy standpoint, so there's some problems in using 134A.

ASSEMBLYMAN CALDERON: Aerodynamics to the car?

MR. BRAY: Yes.

ASSEMBLYMAN CALDERON: At fifty five miles an hour?

MR. BRAY: Well, that all contributes to gas mileage, I don't know, I can't tell you, I'm no expert in design but what it says it's not a simple move and it will require I think continuing

improvement of lubricants, certainly a redesign in the mobile air conditioning MAC system and perhaps some exterior redesign of the automobile.

Du Pont has spent nearly a 100 million dollars on alternative design (100) to date and probably 45 million this year and that does not include...

ASSEMBLYMAN CALDERON: How much total R&D expenditure in the area since you started...?

MR. BRAY: By roughly 100 million dollars.

ASSEMBLYMAN CALDERON: It was a 100 million dollars?

MR. BRAY: And probably 45 million this year or close to it. In other words we're really escalating where we're going and the more you try to work with more customers to apply what you've learned the more cost you have in making it happen.

ASSEMBLYMAN CALDERON: From DuPont standpoint what is your reality in terms of future Feron-11 and 12, I mean are you a part of an opinion that that's just not a viable alternative over the next fifteen year?

MR. BRAY: Our intention is to phase out of fully halogenated compounds 11 and 12 by the turn of the century or sooner if alternatives are available.

CHAIRWOMAN TANNER: Mr. Caldron use your microphone would you please.

MR. BRAY: We feel that alternatives can be developed for many application and that's really where we're spending our money, we're attempting to define those compounds which can fill

the needs which have previously been satisfied by CFCs.

ASSEMBLYMAN CALDERON: Is that (inaudible...) business judgment or is this sort of a business political judgment? I'm trying to get a sense of what your reality is here in terms of...

MR. BRAY: I think this is a business that we've been a leader in, we started the CFC business back when they were invented, actually we jointly started with General Motors. The inventor was actually an employee of General Motors and Du Pont became the first producer because General Motors did not have the chemical expertise. I think we feel a responsibility as a leader in this industry, to be a leader in finding solutions, I think we feel that we have an obligation to our customers, we try to find compounds which fit their needs. I'm sure if there wasn't some business opportunity associated with it, we couldn't convince our people to spend the money to do it but I think we're in a position to make a contribution and I think that's what we'd like to do.

Beyond the 100 million dollars that we've spent on R&D we have capital investment, we're running two pilot plants in 134A which apparently produce product for testing by customers, development by customers, and some toxicity work. We've announced that we're building a plant in Corpus which is a very small commerical plant at something over 25 million dollars. Our intent in building that plant which will start up in late 1990 and really have commercial product available in '91 is that we didn't want availability to slow down the development or to stop the initial commercialization or field introduction by our customers. This

plant is not designed to supply enough products so that everybody could convert or even though a substantial portion of the industry could convert but it will produce several million pounds a year for introduction or beginnning commercialization.

CHAIRWOMAN TANNER: All right now on that point what about the automobile manufacturers, are they prepared to change or retool their air conditioners? Isn't that a problem?

MR. BRAY: It's a major problem. I think as I alluded to earlier the technical problems of converting to 134A are significant, they haven't all been solved. The automotive manufacturers have talked in general of converting with the 1994 model year in any substantial quantity.

CHAIRWOMAN TANNER: And they have to know that you will be prepared...

MR. BRAY: They want to know that they've got some product. Certainly our plant coming on stream in the late '90 says yes you'll have some product that you can get started with. Typically, and I don't want to steal Jerry Stofflet's talk, but I think the automotive manufacturers would typically phase in a change of this magnitude over a seven year period which is typical of their model renewal and anything beyond that requires a lot of additional expenditure and forces much faster essentially model change. Because they have to change a lot of not only the system where it is in the automobile but perhaps as I said the exterior of the automobile.

CHAIRWOMAN TANNER: In the meantime the blend will be

available?

MR. BRAY: Let me talk a little about the blend.

CHAIRWOMAN TANNER: Okay.

MR. BRAY: So anyway we will have 134A but not enough to let people totally convert. Certainly EPA has played an active role in...

ASSEMBLYMAN VASCONCELLOS: The reason that you have chosen not to have enough for total conversion is what?

MR. BRAY: What we really did is we build the plant which we thought would more than handle the initial requirements for two or three years. If you go back to what the automotive industry said and what our expectations were, they really wouldn't begai until the 1994 model year.

ASSEMBLYMAN VASCONCELLOS: You could make it available sooner, but you've chosen not to because you don't think they'll be ready for it?

MR. BRAY: We do have it available sooner in quantities that more than supply what we think their expected needs are.

ASSEMBLYMAN VASCONCELLOS: Could you have it available sooner for total conversion sooner?

MR. BRAY: No.

ASSEMBLYMAN VASCONCELLOS: Why not?

MR. BRAY: The next plant that we will be able to build will start up around 1994, mid 1994.

ASSEMBLYMAN VASCONCELLOS: What are you going to do for the next five years you couldn't start a plant next month?

MR. BRAY: It takes about four to five years in the investment process, in the plant building process, normally building a plant takes seven years. The first step is you've got to get in on a cooperate capital budget.

ASSEMBLYMAN CALDERON: Do you have any government funds to help you build those plants.

MR. BRAY: No. If you get in on a cooperate capital budget which in the first step is to fund the design of the plant and that's with part one approval. Then you have to fund the initial early purchases of long lead items like reactors which may take a year or two to have fabricated and then you actually have to build the plant. The whole process as quickly as you can do it is about a four year process and for us to start up a plant in '94 we'd basically have to have started that process today. And all I'm telling you is that that was in anticipation of what the market needs would be and frankly given the state of the technology, it's probably as fast as the automotive industry can do it with reasonable risks and it's not just risks for them, it's risks for to the consumer. The consumer gets forced to have air conditioners in their system with questionable reliability because the auto makers didn't have a chance to test them fully. That's doing a disservice to the consumer. I think we've taken some real risks in building a plant before there's really a commitment or we have real knowledge of when that use will start.

CHAIRWOMAN TANNER: Mr. Calderon.

ASSEMBLYMAN CALDERON: In terms of your four year time

line is probably the quickest time to build a plant. Does any of that time period have to do with any environmental concerns that you have to observe in terms of building your plants or is that not a factor?

MR. BRAY: I think the four year time line I talk about assumes a favorable resolution of things like permitting and accessing that there is no road block that falls that the equipment doesn't get delayed in being delivered and so forth. That is about as good as you are going to do for a big plant.

ASSEMBLYMAN CALDERON: In other words, if you had for instance, if you had a freeway in Japan and you had goverment financing with minimal strings fast tracking in terms of development of your plants in relation to these permits, do you still think it would be a four year time period?

MR. BRAY: I'm really on the marketing side of the business and I'm probably not an expert in either construction of plants, design of plants, or what the impact would be on Japan. I don't think I can answer that.

ASSEMBLYMAN CALDERON: No, I'm not asking you what is happening in Japan. I'm eluding to the relationship between business and government in Japan contrasted with the relationship of business and government in this country. What I'm asking you and maybe I'm not being clear is to what extent would financing and fast tracking in terms of permit process facilitate a quicker development of the plants? That is really what I am asking.

MR. BRAY: It certainly might take the risk out of the

process and it might let you if you knew that you had government support and you knew that you had total industry commitment in a plan for an industry and you understood totally the use plans of the industry, you might be able to parallel some of the approval processes that a company like DuPont has to go through internally. We really have to compete for the dollars for this kind of an investment with other parts of the businesses within DuPont. There are some financial limitations, and if financial limitations were not a concern, maybe we ought to have built a bigger plant the first time. We built a plant that we thought would take care of the needs for the first few years.

EPA has also done some other things, they have sponsored test work at Nest and at Oakridge. They have sponsored work at a number of universities and they have co-sponsored technical meetings. So I think EPA has played a positive role in trying to get people to move on 134A.

The toxicity test on 134A to date are very favorable. There was a press release that came out last week on 9/26, which basically said 123, 134A which was 141B which were the three early compounds that the past groups looked at do not show significant signs of toxicity. However that work will not publish in final form until some time in '92, '93 or maybe even '94. So we are looking at continuing toxicity tests which will not publish. We are all going to have to make a lot of very tough investment decisions. The producers, the users about what they're going to do with these compounds before they have the ulitimate assurance

of toxicity. However, 134A as everyone looks at it looks extremely clean. It has a TLV of a thousand, it is toxolistic, which means it could be sold commercially if commerical quanities were available, but there is still some uncertainty there. If you look at our small commercial plant in Corpus it will support early testing in use on a trial basis by manufacturers, and as I say it will not produce enough product and I do not believe there will be enough product available until the '94 time frame to satisfy the real needs of substantial conversion of the automotive either (inaudible...) or after market. As you know we are a world wide producer and we have about 50 percent share in the U.S. We've got about 25 percent share worldwide. It will cost DuPont about one billion dollars to convert its CFC facilities to alternatives. There are many factors which influence that decision and it leads to your question of status of the technology, not only how we make it but how people can use it, toxicity status. We want to make sure that we are not building a plant for something that can't be used or sold, potential market size, what does the market plan to do in terms of timing, how quickly will that phase in, will they do it in over a year or two or over six, what is our expected share, what is our profit expectation? We have to make more than you can in U.S. Savings Bonds or nobody is going to put money in a risky plant. We have to be concerned about the expected life of these alternatives. I'm sure you've read a concern on the part of some people over 8 CFCs the hydrogen containing, chlorine containing compounds. Some people are saying we may have to limit

the use of those compounds in the future. "124", one of the compounds that is in our alternative plan is an 8 CFC. If we thought that it had no future life that we were going to be regulated and prevented from selling that in a very short time frame, there would be very little incentive to build a new plant. As I mentioned what is our ability to fund both in terms of finite, financial resources within DuPont and our ability to compete for those dollars within DuPont. The Freon business in DuPont is a very unique situation. We have never been there before, we have a large established market it is going to have to change. You think that you could jump right in and say it's terrific, but there are some just in-kind alternatives for many of our applications.

There are choices to be made, for instance, between 134A and the blendswork that I'm going to talk about, where do you put your money. There are some uncertainties and you can't just say I'm going to build this plant because I know the demands there, it may switch to some other product and if you do not watch what you are doing you might end up with a plant you don't run very well.

There are no simple solutions either for the OEM or for service and in the absence of a drop in and there are no drop ins, they basically will either have to be retrofit products or CFC-12 will have to continue to recycle and be used as long as it is available to run the equipment which people have already bought, and that is really to eliminate premature obsolescence of an

investment that somebody has made. You kind of saw the figures of where CFCs and MAC (inaudible...) air conditioning are used and I generally agree with those I think the focus on reducing use between now and the time they are phased out has properly been by industry. I am trying to see what you can do to reduce leakage and/or reduce service losses, and that in my mind will only help us meet the need for CFCs to service that equipment. It will not satisify the total need and what we are really going to do is face an increasing demand to retrofit equiptment to use different refrigerants, that's not going to be cheap. The automotive industry has looked at possibly retrofitting 12 systems with 134A. I have heard estimates of somewhere ranging between one thousand dollars and fifteen hundred dollars. If you tell every consumer that he has to spend, most people don't want to spend twenty-nine dollars to have it serviced, they really don't like it if they have to have a compressor replaced and have to spend four hundred dollars and if you tell them that they have to spend one thousand dollars to fifteen hundred dollars in order to run their air conditioner in the future is probably a very expensive solution. One of the advantages that we feel the blends may have is that that retrofit process can be done more inexpensively, cost less. So people, we feel, will pursue the blend technology because it is an easier retrofit and it will be a way of keeping existing 12 systems operating when 12 is no longer available.

CHAIRWOMAN TANNER: On retrofitting or on using the blends and retrofitting or on an entirely new unit where 134A is

concerned, how much more energy are we going to have to use if we retrofit? How much more gasoline are we going to consume?

MR. BRAY: I think 134A just as a system operating alone, I think I've seen different numbers, but it is probably around the ballpark is 5 percent more energy. I think for the air conditioner alone if you look at that it inoculates the use of one thousand dollars a year or less. The impact is maybe two miles per gallon when it is operating. I think the real impact on energy in operating a car gets lost because the air conditioner is a relatively small piece of the total energy requirements of the car. I think it is a truism that 134A won't be as efficient but I don't think it is a major energy impact. On the other hand, the blends can be designed so that they have comparable energy efficiency and maybe that is one of the advantages.

Based on the DLE kind of numbers that you looked at, service practices and leaks are the most opportunistic things we can focus on or reducing CFC use. I think leaks, people can use electronic leak detectors, they can use dyed refrigerant, they can use dyed oils, some of them are red some of them are blue, some of them are fluorescence. I think people will learn to use more dyed products from better leak detection methods. I think there are some leaks which are inherent in the system, leaks through seals or leakage through hoses. Service practices I think the primary, bottom line driving force we are going to have to improve service practices is that we won't have the product. The serviceman in order to let that customer go out with a system that operates is

going to have to save the refrigerant that he came in with. He can't afford to vent it because he won't have the product to put back in there.

A question was raised about destruction. CFCs can be destroyed in high temperature kilns or incinerators. I think that if there is a surplus I'm sure we'll get to that. If they are contaminated beyond use I think we will see the use of chemicals to destroy them. It is very expensive there is a limited capacity in the country to be able to do that and by the very destruction process of an incinerator you burn it and you form HF or HCLs and some things which are pretty nasty critters which are going to have to be disposed of on their own.

CHAIRWOMAN TANNER: Citing incinerators is almost an impossible situation.

MR. BRAY: Let me talk a couple of minutes about the tri-blends. DuPont announced in early '89 a patented three way, free component blend as a candidate to replace Freon-12 or CFC-12 in primarily the auto after market or any other after market applications. It is not a drop in and I think there is some press confusion over whether it was a drop in or not a drop in. It uses 22 and 152A which are currently commercial products and it would use 124 which is not a commercial product it is not toxocolistic, it has to be handled under the research provisions of toxoco today so that people are very careful in the way they handle it and it can't be for example put out and fleet tested. We think that it has great promise. We can design those blends to have

equal energy efficiency or equal capacity or equal pressure in the operating portions of the system. However, they won't be used without change. They will require nylon lined hoses and all automobiles don't have nylon lined hoses. They will need a different desiccant dryer than the one that is currently used and an alkiobenzino oil, which is a synthetic oil originally made by Chevron but available commercially. It is not having to invent a new oil it is just switching oils. Auto manufacturers will have to go back and look at the products he's made in the past, the automobiles that he's made, and see whether changes have to be made to accommodate the use of these new three way plans, that's a major task. Right now they're looking at how do I change my next one design to use 134a. To use the plans they're going to have to go back and look at years worth of production, and say, it's for each one of those models, what should I do or do I have to make a specific recommendation or change on that model.

Their focus has been, rightfully so, primarily on expediting the ability to use 134a. The sooner they can use 134a the sooner we'll stop producing 12 systems that leak and will be around at the turn of the century. I think they're getting to the point, at this stage, where they have some resources and are beginning to devote them to the blends, they've only known about the blends since early this year, but there is sincere interest on the part of the auto manufacturers in evaluating the blends for the after market.

Question was, do any of the components of the blends,

are they currently proposed to be regulated? No, not as a CFC. In the future I guess there is no way to know who is going to regulate what and whether HCFCs will come under scrutiny or not. I think we have an expectation that the blends and the components thereof, will be available for their typical 30 to 40 year commercial lifetime.

Question was, whether or not the blends would impose new threats to either ozone depletion or greenhouse? The ozone depletion of 134a is zero and that's most desirable for ODP. The blend would be .03 which is less than Freon 22 which is one of those compounds that everybody considers an alternative and part of the solution. On greenhouse we would say that, both of them have a .06 greenhouse potential versus one for 12. So, either of the blends of 134a are much better, they have six percent of the affect that 12 would have, so a major step in the right direction.

What's Dupont doing to try to solve this MAC problem? We believe we're supporting a fast transition to 134a as can technically and economically be justified. We're certainly supporting the use of triglens in the future as an after market solution, we're encouraging, within Dupont, both conservation in-house, we're providing use to end users, we are in the process of establishing a recycle reclaim activity which will help people to conserve and use the CFCs which are going to be required to service existing equipment.

I appreciate the opportunity to speak to you, I think it's still this morning.

CHAIRWOMAN TANNER: Yes. There is a question. Mr. Calderon has a question, then Mr. Vasconcellos.

ASSEMBLYMAN CALDERON: Did you give us a timetable of 1993-94? Perhaps it was our witness Dr. Wolf, but let me ask a question, a new. Assuming successful development and marketing of 134a, assuming that it is determined as the alternative and a solution to the greenhouse and ozone depletion issues. How long would you expect it to take for a complete conversion to the new system?

MR. BRAY: I think from a product supply standpoint, I don't think that the supply will be there until, at least, the 94 model year, and it might be the 95 model year before you could have total conversion. I think from a manufacturer standpoint, I expect to see them -- they've all talked about switching in the 94 model year or starting to switch in the 94 model year, and I would expect they'll try to go a little earlier, you'll see some conversion in 93, but they can't do it all and I expect it will take them three or four years to make that transition. You know, the last year may not be very much in 12, but they may have some models, you know, they won't bother it they're going to stop making that car anyway and they won't convert. So, my gut feel on transition says, maybe starting in '93, certainly starting in '94 model year and maybe finishing in '96 earliest.

ASSEMBLYMAN CALDERON: And then blends being used for existing models?

MR. BRAY: The after market.

ASSEMBLYMAN CALDERON: And so, before...

MR. BRAY: In the blends we still have to do the "tox" work on 124, that will come through about a year later than the "tox" work on 134a, and so, the broad commercial use of that won't start till probably '94-'95. The blends will really fit that market need in the last half of the '90s. As we drastically cut the 12 supply, we'll have product that people can use in their cars.

ASSEMBLYMAN CALDERON: So, theoretically, anyway, we should start seeing some measurable reductions starting in '94 and '95 and from then on, at least in theory, measurable reductions of CFCs and the stratosphere, at least, over this country, theoretically.

MR. BRAY: I think you'll see it before then, and the reason, and there's a lot of product to be released. In terms of us, I think we're going to see continuing reduction and use. We're seeing the prospect of government taxes, which was going to have a pretty big step increase on a federal level, now, I'm talking, in terms of cost and that will encourage conservation.

CHAIRWOMAN TANNER: And recycling.

MR. BRAY: And recycling.

CHAIRWOMAN TANNER: Yes.

MR. BRAY: I think in the Montreal Protocol is going to come down quicker. We knew and we've got another 20 percent cut in '93, and my belief is, we'll see cuts in '93, '94, and '95 to zip, but I think the next real big drop will be '93, and I think

before then you'll see some companies moving to not in-kind technology because of cost.

ASSEMBLYMAN CALDERON: So, I guess this is not your question, but a question I would have for a scientist. What is this process, is it a ten year or a 15 year process? Let's say it's a 15 year process before we see substantial reduction in CFCs and in the stratosphere. Then, if that's an accurate figure, if it's 10 years, 15 years or lets even say it's a 20 year process, then the question would be, what would be the effect on the ozone and what's the impact in terms of greenhouse in 20 years, even if we didn't change anything, versus some reduction occurring every year during that process. Is it scientifically significant or not? Do you have an opinion? Perhaps that's probably for our...

MR. BRAY: I'm really, probably am not equipped to handle that question very well.

CHAIRWOMAN TANNER: Mr. Vasconcellos.

ASSEMBLYMAN VASCONCELLOS: Sir, do you have any dispute with Dr. Wolfs' or Dr. Blakes' analysis of the threat that CFCs posed for the ozone layer or the greenhouse effect?

MR. BRAY: We fully support a transition away from CFCs as soon as it's technically and economically feasible.

ASSEMBLYMAN VASCONCELLOS: You've not answered my question and I find that really antagonizing.

MR. BRAY: I'm sorry.

ASSEMBLYMAN VASCONCELLOS: Do you have any dispute with the Blake or Wolf analysis of the threat that CFCs posed to the

ozone layer and the greenhouse warming effect?

MR. BRAY: No.

ASSEMBLYMAN VASCONCELLOS: Okay. So they are dangerous?

MR. BRAY: Absolutely.

ASSEMBLYMAN VASCONCELLOS: Lethal, perhaps?

MR. BRAY: I can't comment on that.

ASSEMBLYMAN VASCONCELLOS: Dangerous and you still keep making them and selling them?

MR. BRAY: We're working hard to find alternatives.

ASSEMBLYMAN VASCONCELLOS: You still keep making and selling dangerous stuff? You know what it reminds me of, current (inaudible...) the earthquake this past week, a week ago to day, it's like this is a universal fault, it isn't just San Andreas it's the whole globe has this fault and you're pouring fuel in it and the people are pouring fuel in it. I think it's dumb.

CHAIRWOMAN TANNER: Thank you Mr. Bray. Thank you very much.

Our next witness is Gerald Stofflet. Mr. Stofflet is the Assistant Director of Automotive Emission and Control at the General Motors Technical Center in Warren, Michigan. He is GM's CFC emissions expert and will be involved in whatever action GM takes to reduce or eliminate CFC emissions from air conditioners installed in the motor vehicles, a manufacturer. Mr. Stofflet will be talking about these actions. The timetable for redesigning their air conditioners, the capitol investment involved and the impact these actions are likely to have on the

environment and the consumer. Mr. Stofflet.

MR. GEORGE F. STOFFLET: Thank you Chairman, members of your committee.

I'll briefly summarize my statement and then you can ask any questions you wish.

Three points I'd like to make. First, General Motors Corporation is committed to phasing out CFCs as soon as safe substitutes are available. Second, it has been pointed out, no drop in substitutes exist for refrigerant of CFC 12 used in mobile air conditioners. And, third, GM supports the Montreal Protocol to resolve global ozone depletion. Unilateral action by the U.S. Federal or State Governments would place GM and the U.S. domestic auto industry at a competitive disadvantage.

Relative to the bill, I have a couple of comments on chapter 1 and 2, a slight one on chapter 1 dealing with recycling, and you'll see the words here. What we're basically concerned with, if you take CFC 12 auto and automobile air conditioner, put it through a recycling machine, put it back in, we have no problem with that, that machine will meet our specifications, we'll stand behind the warranty. If, at some point in time, people start going around collecting CFC substitutes, from wherever, like scrap yards, out of refrigerators, no matter where they get it from, there may be purities that that specific machine will not clean up. That machine was designed to be cost competitive. We put the purity spect so that it didn't have to bring it back to pure (inaudible...) like they may need in a refrigerator, and all that

we're saying, is that depending upon -- we know what is in an automotive air conditioner, we don't know what's in a used or scrapped refrigerator. We're just making sure that, if it comes out of a car it can go back into the car once it's been refilled.

CHAIRWOMAN TANNER: So there is a warranty question there?

MR. STOFFLET: Yes, Ma'am.

Relative to recycling in general, we support recycling and on July 2nd, General Motors announced, "that beginning with the 1991 model year recycling will be mandatory in all of our dealerships." They will have the equipment and they will do the recycling during servicing with approved u-haul equipment. Prior to the fall of 1990, as the production of this equipment becomes upstream, we will provide it to the dealers that want it on a first come, first serve basis. We feel that this is a necessary interim step, that you need to recycle to stop the CFCs from going up. You also need it to try and prolong the CFCs availability for the NU's fleet.

I guess the only thing I'd like to point out, and you may want to question some of the equipment producers. A lot of states around the nation are really looking at about the same time frame that you people are looking at for recycling, the capacity isn't there, these machines were just approved in August of this year, they now know what they can do and they're starting to bring their production up, not only are they trying to supply the U.S., there are a lot of orders, I understand, coming in from overseas.

So, I guess all I'm saying, you might want to look at your date relative to the production capacity relative to other states that are proposing similar type rules.

The real question is with Section 444748 which says, "100 percent ban by January 1, 1991, for mobile air conditioners that use 12". That date technically is not feasible as you have hear not only from the chemical companies, the supply won't be there, we do not have all the engineering know how to do that in that time frame. Another factor is that for two (inaudible...) lead time, our 1993 models will be released by the end of this calendar year, 1989. We don't know the yet, we've got lubricants that are working. We don't have the final one, we don't think it's an impossibility. We have to redesign our compressor, we have to get larger condensors. We have to look at the tubing material. We also have to look at the durability of the system. It's a long drawn out affair and once you start going into production, you not only have to look at the supplying the dealerships, you have to look at all the after market, all the service outlets that would get this material. And as was stated, there is about 200 thousand shops that you would have to have 134a available for.

CHAIRWOMAN TANNER: So, if that ban, if we were to pass the bill with that ban at that date, it is impossible to meet that date, for manufacturers.

MR. STOFFLET: From General Motors standpoint, I can only speak for that, it is not possible to have the 134a system

out.

CHAIRWOMAN TANNER: Then, what would happen is that the automobiles would have to be sold without air conditioners, is that correct?

MR. STOFFLET: Yes, ma'am.

Again, there is no substitute, drop in substitute. We are looking at 134a a fluorine base. We are working simultaneously with the chemical companies. They're taking a risk on building a plant and they have to fine tune that plant to put that material out. We are taking a risk by going ahead without all the toxicity test done to redesign the total system. When the toxicity test are done then we will be ready to go and move ahead into 134a.

One of the problems that complicates this for a domestic manufacturer like GM, is that we have 28 models that we have to specifically engineer for an air conditioning system, we have three basic compressors, but to have all the lines and all the placement under the engine compartment, we have to engineer specifically 28 models, that's an impossibility to do in one year and especially in the time frame that your people are talking about.

In my statement I have a note that, the motor vehicle manufacturers, we testified in last week, October 17, before the Consumer Subcommittee of the U.S. Senate Committee on Commerce Science and Transportation, and I have enclosed a copy of our statement for the record here.

CHAIRWOMAN: All right, thank you, we'll put that in the Committee records.

MR. STOFFLET: The only other thing I would like to mention is on the area of blends. The automobile companies in general, are looking at blends, we need to find something because we don't think that 134a will be, I should say, that there will be enough 12 even with recycling, you have to have some blends out there. Again, as was pointed out, that is not a drop (inaudible...) and our big concern is, what have we put out in the past years? All of the automobile companies, and specifically General Motors, has made significant improvements in hose design and connections and we have upgraded our system over the years to prevent -- really for customer satisfaction so that it wouldn't leak and they would have to have them bring their cars back in. And so, you will need something out there for those cars that are in there, but before we can drop a blend in you have to go back, as was pointed out, and look at each one of those designs to find out, and each manufacturer has to do that because if you drop a blend in, and what you would like is one blend for the whole industry, you drop a blend in it could work in one manufacturers equipment and could ruin it in the other case. So that is a main point to consider.

That concludes my statement.

CHAIRWOMAN TANNER: All right. We have Ms. Allen, then Mrs. Wright, then Mr. Calderon.

ASSEMBLYWOMAN DORIS ALLEN: My question would be, even

with GM being converting with all of your outlets, etc. to recycling by 1991, can you project what your foreign competitors, will they be able to come along or will they be doing the recycling, and how will that impact you or them or the consumer, ultimately, as well as what we're dealing with here, which is try to get the ozone layer...

CHAIRWOMAN TANNER: Ms. Allen, Nissan is here to testify, and so they can respond to the foreign automobile.

ASSEMBLYWOMAN ALLEN: Well, I guess that would help me a little bit, but have you had any projections...

MR. STOFFLET: I guess I would say the automotive industry, in general, in the U.S. and I think around the world, are very interested in recycling, again the problem is getting enough equipment out there in the field to do this, we say, rejection wise, it looks like it's going to take two and a half to three years from what we hear from some of the producers to get each shop with one of these pieces of equipment. It just can't be done over night.

ASSEMBLYWOMAN ALLEN: So that would be, not only Jim, but others as well, and based on what you're hearing, other American manufacturers, U.S. manufacturers, are going to be on line about the same time you are with not only the equipment to get out to their outlets, and we'll hear from Nissan as was mentioned, but that will be one foreign car dealer maybe they can have heard from others as well too. But I think from my standpoint it's going to be interesting to see, even economically

as well as reduction in our ozone layer of the chlorine and the other types of things that were described as very ample today. I'm just curious, you know, you project in your marketing or in whatever it is that you're doing because you are looking at a risk. What if something does break down with 134a and etc., and I imagine you have really studied that at great length in your business departments.

MR. STOFFLET: We have looked at that and as all the data, and we're working closely with all the chemical companies, the data that is being developed, at this point in time, would not lead you to believe that, but by the same token you don't want to create another risk by rushing out there until those test are done, because once you press the button you have a lot of cars rolling out that this stuff gets people exposed to. It doesn't look like that's going to happen, but there is risk involved with that. And we're just saying, we need realistic phase-in-dates so that we can do this in an early transition and I'm not an (inaudible...) chemist, but if you look at whether we phase it out in one year or three years, and you look at some of the charts that EPA developed, you probably can't see the difference if the automobile industry were to empty that out and phase it out.

ASSEMBLYWOMAN ALLEN: My other concern, and perhaps this is a political concern more than it is a industry concern though I think you would have one. To go to the max and say we will not have anymore air conditioners as of a certain date in cars due to the fact that there is not enough technology out there to provide

that or enough ample turn around time as you had mentioned, can you project what would happen, the people obviously would still buy cars, but I would imagine they would hold off for a while, use the old car until the new technology or whatever was available which could have an economic impact, one. Two, I'm afraid it would have a political back lash as well to the efforts we're all trying to do to get this reduction, and ultimately, zero danger to our ozone layer.

MR. STOFFLET: It also would have a problem, I think, in California, with the old cars staying around because they pollute more than the new cars.

ASSEMBLYWOMAN ALLEN: Thank you.

CHAIRWOMAN TANNER: Mrs. Wright.

ASSEMBLYWOMAN WRIGHT: Let's go back to this situation of the blends. The statement was that, you wouldn't have to do that much change in your system if you use the blends, is that correct?

MR. STOFFLET: I did not make that statement.

ASSEMBLYWOMAN WRIGHT: No, but I want you to respond to that statement. Is that true?

MR. STOFFLET: No, that is not correct, ma'am.

ASSEMBLYWOMAN WRIGHT: There would be some changes you'd would have to make in the system?

MR. STOFFLET: Yes, ma'am. We're almost back to where we are on 134a, and what we've really been saying, that since about the first of the year there have been a lot of companies

announcing a lot of blends. Unfortunately, we call it the blend of the month club and what we're trying to do, at this point in time, is to take our resources and do the job as quickly as possible to get 134a out there, get it in cars and stop using 12. If we take...

ASSEMBLYWOMAN WRIGHT: So, you would rather go from what you're doing now to 134a rather than go through the blend process?

MR. STOFFLET: That takes the biggest bite out of using 12. Yes, ma'am. Because it's going to take a longer time for us to determine what each manufacturer has in those cars, that if you pour that in you're not going to seize that compressor up. We need a new lubricant with a blend. We need a new desiccant with a blend. We may need new hoses because it contains 22 molecular, it goes through the molecular structure of hoses and permeates out. And so, therefore, the performance goes on in the air conditioner and the customer has to take his car back in and he'll get very upset with that.

ASSEMBLYWOMAN WRIGHT: Well, wouldn't it be better to go with a blend process if you could say that over a period of time that it would be good for ten or 15 years beyond this blend, rather than put all of your eggs in one basket of working with 134a and then have it fall apart?

MR. STOFFLET: Again, it's a matter of resources, at this point in time, and the payoff looks greater with 134a, that's about the only way I can explain it right at this time.

ASSEMBLYWOMAN WRIGHT: If you came down with a ban and

said no more air conditioning period, isn't there still some kind of air conditioning that has to be used in order to keep the motor cool?

MR. STOFFLET: No, you would just use the fans in the radiator coil to cool the water temperature. No, you do not need the air conditioning to do anything with the engine. We'd create a little economic hardships in this country, I mean, with no air conditioning. Most of the cars coming off the line around the nation, about 95 percent of the passenger cars air conditioned, about 80 percent of the trucks are air conditioned, and in your state alone in 1989, 90 percent of GM cars sold are air conditioned.

ASSEMBLYWOMAN WRIGHT: Okay.

CHAIRWOMAN TANNER: Mr. Calderon.

ASSEMBLYMAN CALDERON: In terms of the impact and the consumer for a conversion, (inaudible...) using 132-A and recycling. Let's deal with the recycling issue first in terms of the impact to the consumer, and forgive me if I seem a little cynical here, but let me be the devils advocate given my experience with auto repair bills by dealerships. What will be the cost added to the servicing, air conditioning servicing, just because of the recycling? What will be the cost component of that recycling?

MR. STOFFLET: I can't answer that question directly, but I can tell you that the piece of equipment cost around $2,300, how the dealership advertises that then over his cost to recycle I

don't know, but you have the other problem that he probably will use it, and because you will have to refill when the person comes in and his air conditioning probably isn't functioning, the price of Freon has gone up and is going up and with the tax that was just passed in Washington, the tax hasn't been settled on, but it was at the point that I knew about it, a dollar a pound per year, and it's been rising even without a tax.

ASSEMBLYMAN CALDERON: What about the expertise, the cost? Is there any particular expertise needed for recycling?

MR. STOFFLET: Just the equipment and minimal training once you show the person how to operate this they use it. In our research shops that we have this equipment in, we showed the people how to use it and they use it, you don't have to tell them to use it, they think it's a good (inaudible...) program.

ASSEMBLYMAN CALDERON: It's something...

MR. STOFFLET: Makes their job easier and they can continue doing something else.

ASSEMBLYMAN CALDERON: But you have no idea what we can expect as reasonable or unreasonable?

MR. STOFFLET: I do not, not at all.

ASSEMBLYMAN CALDERON: You're a good politician, too. Now let's go to 132-A. My information is that dealerships are getting rid of lines that are not moving, they're actually cutting back on their orders to manufacturers, that even though car sales are up, the cost of or the overhead associated with selling a car is extremely costly, with what, the average car going between

$12,000 and $15,000. How much will this add to -- the conversion of 132-A -- how much is that going to add to the price of the average car?

MR. STOFFLET: I may have to be a politician again. Again I don't know, but we have to redesign the compressor, not totally, not throw all our tooling away we can use some of that, we do have to go to a larger compressor. We have new lubricant which is going to cost more, not a lot of that is used. The SU 134a is going to be more expensive and we only use about two and a half pounds in a car. I really don't know, but, you know, I guess if you're looking at a range it maybe up to 100 something, just over 100 dollars, that might be one range. But I really don't have a good...

ASSEMBLYMAN CALDERON: And, of course, air condition is an option or feature.

MR. STOFFLET: It's an option and it runs around, on the average for the industry, it's in the neighborhood of 800 plus.

Thank you Madam, Chair.

CHAIRWOMAN TANNER: Thank you very much, Mr. Stofflet.

Our final witness, before we break for lunch, will be Mr. John Schutz, and Mr. Schutz is Director of Testing and Evaluation and General Manager of Nissan, Nissan U.S.A.'s Research and Development Center in Los Angeles. Mr. Schutz will be testifying about the same thing as Mr. Stofflet from GM only from Nissans perspective. Thank you for being here, Sir.

MR. JOHN SCHUTZ: Yes. It was good morning, I guess

it's now good afternoon. Mr. Stofflet has really stolen my speech.

We are very close to GM in our opinions regarding the blends and R-134a.

CHAIRWOMAN TANNER: You heard Ms. Allen's question, then, how would this relate to foreign automobiles?

MR. SCHUTZ: Yes.

ASSEMBLYWOMAN ALLEN: In terms of recycling.

MR. SCHUTZ: Yes. In terms of recycling, why, although we are a foreign manufacturer, why, we have a U.S. dealer organization and we buy our recycling equipment or are contracting for recycling equipment from a U.S. supplier. So, we're in much the same situation as the U.S. manufacturers. We have reached agreement with one of the suppliers, we expect to start supplying recycling equipment to all of our dealers beginning in March of next year. It is now a required piece of equipment for all of our dealers and it will be in place well before the '91 model year, so, that part of it is settled.

ASSEMBLYWOMAN ALLEN: Do you interact with other foreign car dealers, as well? Are they all pretty well revving up for the same time frame?

MR. SCHUTZ: I don't have direct contact on it, but my understanding is that, yes, that the major Japanese manufacturers, at least, are very much on the same schedule as we are. That's right.

ASSEMLBYWOMAN ALLEN: What are the advantages? In other

words, what is the incentive for you to do that? If some didn't, I would think they could sell their cars for a little less, but what is the incentive for all of the, not just you, but GM and etc, if some of you do it, such as you and GM, what is the incentive for the others to stay on the same time frame as you or would it be more of an economic advantage to them not to?

MR. SCHUTZ: Well, I think it's just generally good policy to move quickly in an area where there is a consensus on an issue of major concern. I think that we all have signed the EPA Agreement to move quickly into recycling. At this point, the economics of recycling look pretty good from the dealers standpoint. We think there's a price, that was mentioned earlier in testimony, as the price goes up of CFC 12, why, the dealers will be happy to do their recycling. It will be proper.

ASSEMBLYWOMAN ALLEN: That's more of the incentive then anything else, probably.

MR. SCHUTZ: Oh, absolutely, that's the best way.

ASSEMBLYWOMAN ALLEN: Thank you, I appreciate that.

CHAIRWOMAN TANNER: Service stations, not dealers, but service stations that do venting and repairing of air conditioners won't have these machines that the dealers will have or will they?

MR. SCHUTZ: Well, that's a subject that I can't address directly, certainly the equipment will be available. The equipment that we are recommending cost a little over $2,000. Now that may be out of the reach for some of the service shops, but certainly shops that specialize in air conditioning service, I

would think, would be able to do that.

CHAIRWOMAN TANNER: Yes, we do have a witness today who will testify on that.

MR. SCHUTZ: Yes. Fine.

ASSEMBLYWOMAN ALLEN: We'll have the same incentive as well knowing that the cost is going up.

CHAIRWOMAN TANNER: Yes.

MR. SCHUTZ: Yes.

CHAIRWOMAN TANNER: Yes.

CHAIRWOMAN TANNER: I didn't mean to interrupt your testimony.

MR. SCHUTZ: No, that's quite all right, that's quite all right.

I would like to talk a little bit about what we're doing in the service area. In addition to the recycling, we are recommending to our dealers some changes in service procedures. In fact, we have just redone our air conditioning training kit and training manual and we are recommending a new procedure to replace the old multiple evacuation which resulted in a large release of CFC 12 into the atmosphere. That information is now in the hands of the dealers. We're recommending a much more CFC 12 economical procedure. That will significantly reduce release during the servicing before they have the recovery equipment available. In addition, we have stopped the purchase of the small cans, there will be some sale of the supply on hand but the small cans, which are available to the consumer and to the dealer will no longer be

available during 1990.

I would also second the comment by Mr. Stofflet, that we will warrant fully any air conditioning repair using recycled CFC 12, that's in our policy now.

I'd like to talk for just a moments about the blends and our impression, so far. Our study, so far, and our suppliers -- and by the way we work with three air conditioning suppliers, and the information so far is that the blends are not satisfactory as a drop in, we agree with that statement. They do require a different lubricant, a different desiccant and some other minor changes. We feel that because of the different rates of permeation, because it's a three material compound, that the properties of the coolant will change over time and thus that's very difficult to control. At this point, we are not interested in pursuing blends or original equipment application. Now, as time permits, we will study the use of blends as retrofit for existing vehicles. We do think that there is some possibility there. We think that there maybe some reduced performance, but with hose changes, with the change of the receiver dryer, it may be relatively economical to provide a customer with a choice of a retrofit, not to use the blends, but that type of study is very time consuming. You need to look at each system and we don't have as many systems as General Motors, but we do have about ten systems that we have to study. So, that activity will follow the adoption of 134a.

Now regarding 134a, we are quite optimistic, we think

that that is clearly the best alternative. We have studies well along, we're looking at the durability of components, we're developing the systems, we've done tentative release of the changes we feel are necessary to accommodate 134a. We expect to be ready with vehicles when the supply is available and our suppliers tell us by late '93. So we expect some time during '94, excuse me, I'm a year off, late '92, so we expect that sometime during the 93 calendar year we will begin production with 134a. Certainly by '94 model we will have several models in production. We expect that we will phase in over a couple of year period. Right now we can't be specific about when we will complete it certainly by the mid 90's we will be completely phased over to 134a barring any unforeseen circumstances.

Yes, I think that's really the essence of...

CHAIRWOMAN TANNER: After a certain period of time the automobiles that are using the R-12, todays automobiles and yesterdays automobiles, we'll find that there will be no R-12 available and those air conditioners then will be obsolete, is that pretty much correct?

MR. SCHUTZ: Yes that's correct. That's correct. I think we see a typical life of an air conditioning system without need for any service, perhaps four or five years, and with minimal service ten years.

CHAIRWOMAN TANNER: Yes.

MR. SCHUTZ: And certainly the recycling equipment will serve to keep those systems in service for quite some time. But,

if the production of new material drops, why eventually, you're right, it will reach a point where customers will be in need of some sort of substitute and we think that by that time the industry will have addressed the possibilities of retrofit kits.

CHAIRWOMAN TANNER: Or there may be a drop-in available?

MR. SCHUTZ: That's possible.

CHAIRWOMAN TANNER: Mr. Calderon and that's the final question this morning.

ASSEMBLYMAN CALDERON: Thank you, Madam Chair.

Preliminary question. What is Nissan's market share here in the U.S.?

MR. SCHUTZ: Our market share right now of cars and trucks is about four percent.

ASSEMBLYMAN CALDERON: How has Japan responded to this issue or are they responding to this issue in terms of their governmental policy, you know, manufacturing strategies, environmental concerns, what can you tell us about their approach?

MR. SCHUTZ: I can tell you just a limited amount. I know that the schedule for production change over for Japan domestic products is the same as for the U.S. there's no difference. I think the environmental concern there is also high. I'm not familiar with the government policies, but the issues there are really that of supply the material. So, I think the change over in production will begin as soon as there is material available.

ASSEMBLYMAN CALDERON: Thank you.

CHAIRWOMAN TANNER: Thank you very much. I appreciate your testimony.

MR. SCHUTZ: Thanks for the opportunity.

CHAIRWOMAN TANNER: We will return from lunch and begin at 2:00. Thank you ladies and gentlemen.

I know we didn't have much time for lunch and to get there eat and get back, but they will arrive. I think what we will do is begin our afternoon session and we will hear from Craig Kistler who is the Owner and Operator of Craigs' Automotive in Whittier. His business does a large volume of motor vehicle air conditioning service, he's also active in the Automotive Service Councils. His wife, Moonyean, is that right, Kistler is a legislative representative for the councils. Mr. Kistler will discuss the established procedures for servicing motor vehicle air conditioners, how CFC-12 is vented, and the efficacy of using new CFC recovery and recycling equipment. Mr. Kistler comes from Whittier and Whittier is very close, in fact, represent a corner of Whittier, so you probably were very aware of the earthquake and probably felt it in Whittier.

MR. CRAIG KISTLER: Yes we were, the last big one.

CHAIRWOMAN TANNER: Yes, the last big one. Welcome, Mr. Kistler.

MR. KISTLER: I was standing there kind of amazed. The shop was bouncing up and down, I couldn't believe that could happen to a building.

CHAIRWOMAN TANNER: You know how quickly FEMA works and

the state works.

MR. KISTLER: Yes.

CHAIRWOMAN TANNER: I'm teasing. (Laughter) It's terrible, it really is terrible. A friend of mine, one of my friends had a real terrible loss and no insurance and she told us that she got a check for $120.00 from FEMA because the front door, among other things, wouldn't open and close. Very exciting. I think the people in San Francisco and the Bay Area have a lot to look forward to.

MR. KISTLER: Yes.

CHAIRWOMAN TANNER: So, back to CFCs.

MR. KISTLER: Well, thank you for inviting me here, I hope I can be of some assistance to what really goes on, you know, what we called, where the rubber meets the road.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: I want to thank you, Sally, Chairwoman and the Committee for inviting me.

My name is Craig Kistler and I have been a member of Automotive Service Council since 1972, which is when I went into business. I have been in the automobile repair business since high school. I went right from high school, I went to college for six months and decided I liked what I was doing as a part time job better than college, so I stayed in it.

But before I start, I did get an impression, sitting here all morning, about what is out there in the industry as far as the technicians working on the cars. I got the impression that

you feel that the technicians have some form -- there is some form of licensing or something required before they can work on automobiles. The best way I can express that is, in our industry you can row a boat from Cuba to the United States and go to Sears and buy some tools and walk into some place and say, I am a mechanic, and go to work. It's that simple. And I think that that's something that probably needs to be addressed with this particular problem, as well as it is being addressed with the smog problem because now you can't do that. But that's the only area in our industry that you cannot walk in and do smog work without some form of experience.

CHAIRWOMAN TANNER: So, you're suggesting that we ought to look at the possibility of licensing a...

MR. KISTLER: I don't like the word licensing, what I would like to see is some kind of a certificate, maybe from a school or even from a manufacturer that manufactures equipment where the man has at least...

CHAIRWOMAN TANNER: Certification.

MR. KISTLER: ...some kind of certification. Not necessarily done through the state, I would really prefer it to be done in some form where he's been through, oh, EVERCO is a manufacturer, we have several manufacturer that do put on training programs. Something. Just something of some sort, rather than just having nothing.

I did have some questions to answer. To start off with, it was kind of the question, what happens when a car does come

into the shop or a vehicle with air conditioning that requires some service?

Currently, what is being done, and what is recommended by the manufacturer, is that all the Freon be removed from the system and the system evacuated and charged with new Freon.

CHAIRWOMAN TANNER: So you just vented it into the...

MR. KISTLER: Basically, until the last two months, it just goes into the atmosphere. It's just vented into the atmosphere. And that's been the recommended procedure. Because as we all know until the last two or three months there has been no recover equipment and the equipment is just now being certified by UL. So it is coming.

I had that in my thing here. Until recently no system has been available to capture the R-12, so that has been the standard practice. You just dump it and evacuate it and recharge it.

I also feel that there will be no mass purchase of the equipment until the shops are forced to. Either through competition or such as General Motors mentioned this morning, Nissan also, they are going to require the dealers to purchase the equipment. Until there is some way of forcing them to buy the equipment, I don't think you're going to see it happen. I don't think that the cost of the equipment is all that bad, we're looking at between $2,600 and $3,000 is what I have found so far on the equipment. And compared to the smog equipment, that's a small cost. And compared to most of the equipment purchased

that's small. Smog equipment, the last round was $7,500 and the next round, starting 1990, is going to be at least $15,000.

CHAIRWOMAN TANNER: So it should be at least a certified shop, right?

MR. KISTLER: Yes.

CHAIRWOMAN TANNER: And then, that certified shop would have to have the equipment?

MR. KISTLER: If the equipment is required, I think you're going to see a lot of changes, because a lot of the shops that are -- the small shops that are maybe doing a minute amount of it would probably drop out, and hopefully they're the ones that don't have the qualified people to do it in the first place. So, even the equipment itself can have an effect who stays in the business.

Another question was, how much loss of Freon is going on?

We're finding, from myself and I've talked to quite a few shop owners, that the cars are coming in on the average of about two years for a recharge, now some will go three, four, and five years, but the average seems to be somewhere around two to three years that we're having to service air conditioners and we're having to add generally 14 to 28 ounces, which is roughly, one to two pounds.

CHAIRWOMAN TANNER: But you say you vent? You have been?

MR. KISTLER: No. That's if we just add to it. I was

going to mention, that's yet to come.

There's two ways it's being done. Now, some shops are just venting it and recharging it. The other shops are adding to the unit what's required, they're just adding enough to make the system get cold again. The only accurate way is to discharge all of it and evacuate it and put in the correct amount. That's the only accurate way to do it. But the quick way, and that seems to be what the customer wants the customer tends to want you to add Freon to it and get them on down the road as cheap as possible. And the customer tends to push you to just add some to it and let them get on the road.

CHAIRWOMAN TANNER: Do you usually look for the reason for the leakage?

MR. KISTLER: We do it in a couple of different ways. We ask how long it's been since they've had the system charged and if it's been in the area of, let's say, two, three, four years and the system is not very low, and we can kind of know if there is not a serious leak. If it's been six months then we know there is a serious leak and so we approach each one according to what the history is.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: And some of the small leaks are almost impossible to find. A leak that leaks, oh, less than, well, I ought to word that so you can understand it. If the system goes three years with a very small amount of loss, that leak would be almost impossible to find.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: It would be really tough.

CHAIRWOMAN TANNER: But a fast leak of a lot of...

MR. KISTLER: That would be quite easy. Yes. Three to six months...

CHAIRWOMAN TANNER: Then you refill?

MR. KISTLER: ...a leak that would leak three to six months would be easy to find. And there are things we do look for, you mentioned what do we look for? We do look for oil residue. We go over all the hoses in the condensor and we look for oil residue, because anytime there is a leak there's oil mixed in the Freon and it will leave a residue which will collect dirt. So we look for little signs. But that all comes in training, too.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: And what to look for, just experience, and being around it a long time.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: Another thing is, of course, where the losses come from. Most of the losses come from just natural seepage through hoses. The rubber hoses they use just do seep and the GM man mentioned that GM is working on that trying to improve the hoses, and I think I would have to tend to agree that, in the last four to five years that they probably have made some headway. Because the cars I work on are generally three years old and older, and I'm noticing that the newer cars tend not to be losing their Freon as fast, at least on the ones we've worked on. That

might be a problem in the older cars. But most of the loss is through seepage through hoses.

Another loss that probably should be addressed is, when any kind of a major engine work is done, the way the systems are designed today, you have to disconnect the system, which means you're going to have a total loss until we get access to doing engine work.

CHAIRWOMAN TANNER: Would there be a way to -- with this -- what do you call it?

MR. KISTLER: It's a recovery system.

CHAIRWOMAN TANNER: A recovery system?

MR. KISTLER: With the recovery system you could overcome that problem. But the other thing is that, how many people doing engine work do air conditioning work or they're probably not going to have the system to recover it. An awful lot of shops that do engine work are really specialty shops that do just that type of work and they generally don't do air conditioning work. So they're not going to have the recovery equipment unless they take the vehicle to an air conditioning shop and have them pull the Freon out and then take it back. That probably needs to be addressed.

CHAIRWOMAN TANNER: Why, yes, I would think there would be a number of automobiles with that problem.

MR. KISTLER: Most any major engine work the system has to be disconnected. Say you're going to lose the whole thing. Of course, another problem is rear end accidents, too. That was

mentioned this morning, too. When you run into someone elses back end, there goes your air conditioning system and all the Freon. Not much you can do about that.

I would hope that the manufacturer could come up with maybe some kind of a quick disconnect where you could actually disconnect major components and not lose the whole system.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: In a lot of cases just longer hoses so we'd have a little more room to move a compressor out of the way to work on it which would help greatly. A little redesign.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: The hoses, they tend to use, short hoses, everything they do it tends to be as minimum as they can, wiring, hoses, everything, just as short as they can get it and that leaves very little room to work around or move things out of the way. Any time you have a question just...

CHAIRWOMAN TANNER: Yes, we will.

MR. KISTLER: Yes. Another problem, and it goes back to the training of personnel. Just in the last three months I've had two systems come into my shop that weren't working and both of these people said that they've had people working on that system for six months and nobody can make it work, and they've related that they've put in five and six and seven and up to maybe ten pounds of R-12 and the system won't work. And both of these jobs I evacuated it and I recharged it with the correct amount and the systems work perfect. Which means that who ever was working on

them just didn't know what they were doing. They're dumping Freon in, where the Freon is going we don't know, but it's not going in the systems. And just a basic evacuating charge and these things work. Well, that comes back down to a little bit of training.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: And there are companies out there, I don't want to mention any names, there's large companies out there that force their employees to work on any car that comes in the door whether they're trained or not. The car comes in the door, they have to work on it.

ASSEMBLYWOMAN WRIGHT: (Inaudible...)

CHAIRWOMAN TANNER: Use your mike.

MR. KISTLER: Yes. It would be. Yes, it would be...

ASSEMBLYWOMAN WRIGHT: Should I repeat the question?

CHAIRWOMAN TANNER: Yes. Please.

ASSEMBLYWOMAN WRIGHT: What I'm saying is, they request their employees to be generalist instead of specialist.

MR. KISTLER: Yes. Yes. They're generally large companies that tend to do that. What they're after is to get a name in the industry of being a person that can take care of your car totally, and whatever make you drive. This is a little place where I have a little bit of a problem. I really believe, today, that we have to be more specialist. Not only on the type of work we're doing, also, we cannot have the capacity to work on every make and model that's out there today. We have more cars in just Chevrolet, more makes and models, you know, types of cars in

just Chevrolet alone than the whole industry had 20 years ago and you just can't do it.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: My terminology is, you're a fool to try to. You usually make more messes than you do repairs.

Another question was, what percentage of Freon is usually added to a system? I kind of answered that, I guess, with the 14 to 28 ounces, but that works out to be roughly 20 to 40 percent of the system.

Another thing that happens too, and it's been going on in the past, is that when a unit comes in, it's not working right and we fill it up to check for leaks, then the Freon that we put in to check for the leak, we end up dumping that to do the repairs. But you might catch on, as I'm all for recovery systems.

CHAIRWOMAN TANNER: So, one of our witnesses mentioned a color, adding a color to the hard...

MR. KISTLER: Yes, a dye...

CHAIRWOMAN TANNER: Yes, a dye.

MR. KISTLER: ...basically a dye.

CHAIRWOMAN TANNER: That would probably help you identify the area.

MR. KISTLER: Help to find the leaks.

CHAIRWOMAN TANNER: The leaks.

MR. KISTLER: Yes. Usually we do that on a leak that is hard to find, put a dye in it.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: The dye comes, actually in a can, comes in a full size 14 ounce can is what it comes in. And like I said, when you find the leak then you have to dump the system to repair it. So, we need to recover it. I, in fact, said some of the stuff that probably elaborate too much. A lot of the late model General Motors systems, you need to actually let the Freon out even check the oil level in them about every three to four years. We keep coming back to catching that Freon that we let out.

CHAIRWOMAN TANNER: You really believe the recovery system is very important?

MR. KISTLER: I think it's very important, yes. I think that's very important.

Another thing too, is I see no problem with the 12 ounce or 14 ounce, they're talking about going to 12 ounce cans so I have 12 ounce in my head now. But, I see no problem with getting rid of the 14 ounce cans and going to 15 pound bottles. I sometimes feel that we have to be careful sidestep and the do-it-yourselfers, but we do get quite a few jobs in that do-it-yourselfers have tried to work on and have put in the same thing. A couple cans of Freon and he can't make it work and usually it's because they're trying to put it in the wrong place and it goes into the atmosphere. So, I am behind getting rid of the 14 ounce can just to stop that.

Another problem we have in waste oils, is that they know that 60 percent of the waste oil that is being drained from automobiles is done by do-it-yourselfers and goes in the

dumpsters. There is an analogy there, the do-it-yourselfers, you know, it's an area we have to be concerned with.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: Another question that I thought I'd answer is, how many a shop of my size does in a year? I have myself and three employees that are actually technicians, and we do about 150 to 200 services a year. And, another thing that was interesting in my number on the amount of shops out there doing servicing, my estimate was right at 30,000 which is identical to an estimate made this morning of how many services were out there. I estimate about 30,000. I did mention the price on the equipment earlier, didn't I?

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: What I found out to be.

CHAIRWOMAN TANNER: Two to three thousand dollars.

MR. KISTLER: Twenty-six hundred to 3,000 at this particular time, hopefully it might come down a little bit with more of them being produced.

The other answer is that, I found in my checking with the other shops in our area that the fellows that have already bought recovery equipment have been the younger, mostly guys in their 20's. The fellows are in their 20's, generally, or very early 30's that have bought the equipment, they seem to be more concerned with the environment than the older people in their 40's and 50's. And they are all specialty shops, too, all but one, only one general shop that I talked to has bought the recovery

equipment. But quite a few of the specialty shops did.

CHAIRWOMAN TANNER : And the recovery systems are readily available now?

MR. KISTLER: They are readily available, yes. I don't know if everybody started -- if we had a mass purchase of them if they would be readily available, but right now they are.

CHAIRWOMAN TANNER: Yes.

MR. KISTLER: I think that's about all that I had.

CHAIRWOMAN TANNER: Thank you.

MR. KISTLER: Oh, I did have one other little thing to finish up with when you're kind of done with the questions.

CHAIRWOMAN TANNER: Why don't you just continue and then we'll ask the questions.

MR. KISTLER: One question this morning that was mentioned by Cathie Wright -- mentioned something about cars being specifically made for California. I don't really think that that would be too big a problem if they did have to specifically do something for California. Right now all the cars, because of emission components, are being made specifically for California, because of emissions, we have California cars and Federal cars. If California was to try to be the leader in getting this going, I feel that that would not really be a problem. I agree with Mr. Vasconcellos that somebody has to start the ball rolling some place and it seems like things tend to go from California east anyway. It really did in the smog program and a lot of other things that are going on it tends to get started in California and

flow east. Some good some bad.

Another thing that is directly related from the emission program, is that I did just read recently, too, that the Federal Government is considering adopting the California Emissions federally. So I think that we're going to see that coming pretty quick. So, all the cars will be the same, but they will be to California spects. California does tend to lead these things.

ASSEMBLYWOMAN WRIGHT: I have something to say on that point. As Mr. Vasconcellos is sitting here, don't agree with him too much because then I don't have anything to argue with him about later.

MR. KISTLER: (Laughter) Just a little bit.

Another little ironic thing that I find working with the public. I don't know how many of you folks have worked with the public, actually worked with the public and for the public, but you have to work with the public to understand the public.

CHAIRWOMAN TANNER: If we don't we wouldn't be back.

MR. KISTLER: Yes, right. You're right, too. Yes.

What I found in the smog program, and I'm sure we'll find the same thing in air conditioning, and I just happen to have one yesterday that goes along with this. The public -- I made a little statement here -- the public wants to capture your CFCs, but they don't want you messing around with mine. They tend to want everybody else to have to do it, but you know, not my car. And it's an attitude when they come into the shop that they have. You know, they want everybody else to clean up their emissions,

but let me get away with my illegal car. And I had one yesterday on a 74 Chevrolet truck that I just had to battle with this guy because he said it's an old truck and it's not work fixing. And I said, it's illegal and that's what they're after, to get these things fixed. And that car was polluting ten times what it should have been polluting. And this guy -- I got to the point where I had to tell the guy, I said, give me my $24 for the smog test and get out of here, or tell me to fix your car. And the estimate was only $100. It wasn't that much. But it came down to that point where I just told the guy, you know, get out of here or tell me to fix the car. And he was already four days past his deadline, too.

ASSEMBLYWOMAN ALLEN: Well, did you fix it?

MR. KISTLER: I fixed the car. Partially because I also told him that it's today or, God, I'm not going to be here tomorrow, which is today. As of 3 o'clock today I'm gone, I have to go to Sacramento. But, I did fix the car and it actually came out less than $100 when I got into it. But, it's an attitude, you know, just give me my smog certificate and let me get out of here.

CHAIRWOMAN TANNER: It's not in my back yard or not in my garage.

MR. KISTLER: Yes. Another little mention was one of the things I wanted to answer. On the recovery equipment, it looks to me like the life span is going to be five to ten years that we will be using this equipment. Real heavy for probably the first five years, but with a life span of five to tens years I think it would be cost effective to use recovery equipment.

CHAIRWOMAN TANNER: Any questions, Members? Mr. Vasconcellos. Thank you very much.

MR. KISTLER: Okay. Thank you for...

CHAIRWOMAN TANNER: It was important to hear from you because you know we hear from the manufacturers and from the...

MR. KISTLER: (Inaudible...)

CHAIRWOMAN TANNER: ...yes, and those people who have made the CFCs, so, you know, we really did want to know what the process was and how you are accepting the recovery system. Very good. Thank you very much.

MR. KISTLER: Thank you.

CHAIRWOMAN TANNER: Our next witnesses are Richard Miller and Carl Stratemier, and they will be testifying on behalf of the Automotive Refrigeration Products Institute.

Mr. Miller is a Technical Director for Tech Chemical. He is responsible for new product development, safety, environmental issues, quality control and engineering. Mr. Miller is a chemist with an MBA. Mr. Miller.

MR. RICHARD MILLER: Did you want to go first?

CHAIRWOMAN TANNER: I can't give you any background on Mr. Stratemier because I didn't know that you were going to be testifying.

MR. CARL STRATEMIER: Well that's not fair. (laughter)

CHAIRWOMAN TANNER: Well, it's my consultant, he'll hear from me later.

ASSEMBLYWOMAN ALLEN: Besides you can say anything nice

about yourself that you want to.

MR. STRATEMIER: I can just broadcast all sorts of good things that I can.

CHAIRWOMAN TANNER: Tell us about you.

MR. MILLER: What I wanted to make the panel aware of is what is happened at the federal level.

The week before last I was in Washington and attended two functions, one was the International Conference on CFC and Halon Alternatives, and I also attended the EPA Industry AD HOC Committee on Mobile Air Conditioning. I think it's important that this committee be aware of what was agreed to at that meeting.

Industry and EPA agreed in principle on EPA regulations that would cover the mobile air conditioning industry for several years to come. The regulations are intended to be published in January of 1990 about another three months. And what those regulations will say, basically, is that recycling will be mandatory on a federal level, a national level and my industry fully supports that. We want to see the emissions controlled since the intentional venting and the service sector has been the major cause of CFC emissions in the United States.

The mandatory reclamation recycling will probably be done in a phased-in bases with larger air conditioning shops being mandated to have the equipment by January of 1991 and everyone else having to have the equipment by January of 1992. Along with that will be a restriction on who can buy Refrigerant 12.

In January of 1992, it will be necessary to have

recycling equipment in order to be able to buy new Refrigerant 12. This will essentially do away with the do-it-yourself market because I wouldn't imagine a do-it-yourself would want to spend $3,000 on a piece of equipment, so that's going to take the air conditioning repair work, what portion was in the do-it-yourself market and put it in the professional arena. Along with that will be a training certification program that was spoken about by our last speaker and at the federal level we're looking at an organization, such as, the Society of Automotive Engineers, certifying mechanics that they know how to operate the recycling equipment and know how to work on an air conditioning system, so when you take a car in and have it worked upon, they're doing the right job.

One of the issues that was spoken about is the issue of the container and that's been brought up here before. I think everyone at the federal level agrees that it's not the container that's the issue it's the practice that has been the problem. Practice by service industry intentionally venting. Whether you get virgin material in a 14 ounce can, a 30 pound cylinder, a 50 pound cylinder, it doesn't really make any difference. Once you get the recycling equipment and you take a car in to be serviced, they're going to pull the refrigerant out of the car, they're going to take the moisture and any non-condensable gases out, they'll put that recycled material back in your car, and if it needs additional material, you can add the virgin material from a 14 ounce can, a 30 pound cylinder, it really doesn't make any

difference, but then you can add that to your car in the proper amount and have your car air conditioner running at the level that it should be.

Then the last thing, is the EPA and industry are going to sponsor a public awareness program. Because of the transition out of the do-it-yourselfer for market, we think it's important that the public be aware of what's going on, that industry is aware of the seriousness of the problem, and that we're making an effort to deal with it. So, we're spending considerable money with the EPA in brochures and radio advertisements, making the public aware that this is going to take place. We want the public to have their car properly serviced, and that this transition, although it maybe more costly, is better in the long run. So, I think it's important that when you consider legislation in California that you be aware of what's happening at the federal level.

And when we talk about the reclamation, the federal level also talking about mandating reclamation machines for junk yards, or somebody else who may do engine work that would require disturbing an air conditioning system on a car. In my opinion, the item that's going to make the reclamation recycling successful is an economic reason. The Federal Government is considering taxes, imposing, I've heard a $1.10 recently, $1.10 a pound which essentially doubles the price of refrigerant on virgin refrigerant, when it would be purchased by a user. So, when you double the cost of refrigerant that gives a shop an economic

incentive to use recycled material. So I think all those taken into consideration, the mandated recycling, the mandated training, the restriction of Refrigerant 12 to the service sector and the public awareness program, I think a lot is going on right now, and I hope that this committee will take all of that into consideration.

CHAIRWOMAN TANNER: There was, in this mornings testimony we heard that recycled R-12 is not necessarily pure, it isn't as clean as the virgin R-12, and that it could cause problems. Is that...

MR. MILLER: There have been a lot of advancements in recycling equipment. Society of Automotive Engineers was just issued three, what they call J standards, which are specifications, one is for the purity of recycled material. One of the most critical elements is the moisture content. Virgin Refrigerant has a specification for moisture of ten parts per million. The recycled material, according to the SAE Standards, is 15 parts per million, and the automotive manufactures will not void a warranty with this current SAEJ Standard.

CHAIRWOMAN TANNER: And then the oil is separated from the R-12, is that right? And then the oil...

MR. MILLER: When you draw a vacuum on the system, you draw everything out of the system, you draw the Refrigerant 12, you draw any non-condensable gases, and you draw the refrigeration oil out. The refrigeration oil goes through a separator and is captured in a separate vessel inside the recycling machine. When

you put the refrigerant back in it will also be necessary at the same time to add a certain amount of refrigeration oil back into your system to make sure your compressor continues to be lubricated.

CHAIRWOMAN TANNER: And that oil that you have drawn out is the oil that you would put back in plus additional oil?

MR. MILLER: You would have to add virgin refrigeration oil back in your system. The oil that was captured and taken out of your system would be handled as any other waste would be according to local, state, federal regulations.

CHAIRWOMAN TANNER: Yes.

MR. STRATEMIER: The oil is contaminated that you take out of the system, you don't want to put that back in. But the refrigerant that you take out when it's recycled, all the machines that have passed the UL requirements comply with the J Standards of the Society of Automotive Engineers, so, it's permissible to put that material back in without any problem.

CHAIRWOMAN TANNER: Mr. Stratemier do you want to tell us who you are with...

MR. STRATEMIER: Sure. I'll go ahead and tell you who I am, I'm not a mystery guest here or anything like that.

My name is Carl Stratemier, I'm President of Aerosol Company, Inc. out of Neodesha, Kansas. A member of the Automotive Refrigeration Products Institute, that's who I'm here representing today. RP is a national organization of producers and container manufacturers and packagers of automotive refrigerant sold in both

the small containers of 14 ounce cans and the 30 pound cylinders.

We're very supportive of the phase out of the ozone depleting chemicals. We also believe, as Richard has told you, that federal legislation of regulation is preferred in lieu of state legislation because of the likelihood of inconsistent and conflicting requirements from each state. I have a few comments I'd like to give you regarding the 14 ounce can here today if I may.

There has been many attempts, including here in California, to prohibit the sale of Refrigerant 12 in containers smaller than 30 pounds, and this is obviously designed to eliminate the do-it-yourselfer. Unfortunately, though, it is also the preferred choice of use by the trade sector as well. There has been just a great deal of misinformation that has been circulated about the 14 ounce can. The container is not the issue here, it is the contents that we have to worry about. Banning the can to address the CFC 12 problem is analogous to banning baggies to alleviate the nations drug problems. EPA estimates that the use of 14 ounce cans by consumers contributes only 1.7 percent of the total CFC emissions. The major source of this, the major source of emissions is by intentional venting by refrigerants into the air, a practice that is common among the professional services sector, not among do-it-yourselfers. The cans are a preferred choice because of their ease of use. They are less wasteful and an ideal method for inventory control. The valve and hose that's attached to the container, which you attach to the car, provides a

sealed system preventing any loss of CFCs while you charge the system.

The real challenge that we have before us is not whether we us a 30 pound cylinder or a 12 ounce can or a 14 ounce can or any kind of can or size, it's the education of the users that we have here using the material. If we go out and continue to use the product in the manner that we have now we're going to continue having problems regardless of whether we have any legislation or not. The only way we're going to reduce the use of CFCs is by continually to inform the people how to use them correctly and safely.

We review the 14 ounce can as an environmentally friendly means of delivery. The can is compatible with recycling and provides precise filling of systems as opposed to using a 30 pound cylinder, and at this moment, using recycling equipment. The can is also probably the best method for introducing any blends that we want to use in the future, blends that are available now and ones that are being developed for the future.

RP agrees with EPA that an immediate ban on the can before that we have recycling a reclamation may cause an increase in the actual emissions that we receive. Current emissions that we receive from refrigerant in the service sector is about 35 percent and we can reduce this, of course, with the use of recycling and reclaiming. But if we disallow the use of the 14 ounce can by do-it-yourselfers it will have to go to service sectors that do not have this equipment available at this time and

the result will be the venting of material into the atmosphere. It will take about three to four years. Yes, ma'am.

CHAIRWOMAN TANNER: But, a do-it-yourselfer does not generally check for the leak or doesn't usually know how to correct the leak. Isn't that so?

MR. STRATEMIER: A do-it-yourselfer, generally what they do is fill the system to bring it back so where it can work again rather than venting the system out.

CHAIRWOMAN TANNER: But then, if there is a leak then the leak continues and that emission...

MR. STRATEMIER: If there is a leak then they have a tendency to want to try to fix it by filling it rather than fixing it.

CHAIRWOMAN TANNER. Yes, and that's that 14 ounce can.

MR. STRATEMIER: This is part of the education process that we're trying to establish. We understand and realize that the do-it-yourselfer is not an area that should be continued, it is something that needs to be eliminated, but just like we say, if we do it immediately the people that are doing it themselves if they take their cars in to have them serviced and they go to a place that does not have reclamation or recycling, the first thing that is going to happen is they're going to vent what is in the system up into the atmosphere, so you'll actually see an increase until there is enough equipment in the marketplace for recycling and reclaiming.

CHAIRWOMAN TANNER: Unless there is a law that prohibits

servicing without recycling the system.

MR. STRATEMIER: Right. That's exactly right. The thing we have to have is education on that.

ASSEMBLYWOMAN WRIGHT: Excuse me. Just because you would make it illegal, Sally, doesn't mean that somebody isn't going to try to do it anyway.

CHAIRWOMAN TANNER: That's right.

ASSEMBLYWOMAN WRIGHT: I mean, all you do is create undergrounders rather than...

ASSEMBLYMAN VASCONCELLOS: Are you saying we shouldn't make it illegal then?

ASSEMBLYWOMAN WRIGHT: Well I think the point, Mr. Vasconcellos, is the idea of the educational part of it and phasing it in so that when you do eliminate it everybody on board knows what they're doing. But I think if you just mandate you can't do it up front, you end up with having people doing it anyway because they don't know what the reasoning is behind it.

CHAIRWOMAN TANNER: Mr. Kistler said that he felt that the people who generally are servicing air conditioners and who are specialist haven't hesitated to invest in the system. And so,...

MR. STRATEMIER: It's not so much an hesitancy to invest in the equipment or anything of that size, it's the fact that you cannot get the equipment, there's only going to be about 5,000 pieces of equipment out there in the marketplace this next year. There's over 300,000 service centers in the United States

providing air conditioning repair work and they will not all be able to get equipment at this time. It has also been stated by Mobile Air Conditioning Society that some of the equipment that's being manufactured today is not even staying in the United States. So some of the 5,000 units that are going to be produced will not even be here for our own service. So, where are these cars to go when you've only got 5,000 places that you can go? Now all of a sudden you're going to have preferential treatment between one type of a business and another type of business as to who's going to get the equipment, who's the one that's going to be denied the equipment, who's going to be denied the opportunity to do the service and at least make you have a source of income.

Our message that we would like to present is bold, simple, and clear. If it leaks, fix the leak. Don't vent. Recycle and reclaim. Use all of the contents of the container regardless of the container.

That's basically all I have to that, if you have any questions I'd be happy to answer them.

CHAIRWOMAN TANNER: Members.

ASSEMBLYWOMAN ALLEN: It's clear.

CHAIRWOMAN TANNER: That's a very bold statement, but a very good statement.

MR. STRATEMIER: Well, we hope that we can get our message across. We know that the 14 ounce can or the 12 ounce can is not going to be the can of the future, it's not going to be something that's going to remain forever. As recycling and

reclaiming continues to become more commonplace, it will not remain there as a simple method of delivery. Obviously, 30 pound cylinders, or whatever size cylinders are to be used will become more commonplace and easier to handle, but at this time it is not, it is more difficult to use a 30 pound cylinder, a 30 pound cylinder has just as many difficulties in being used as a 14 ounce can has. You can have leakage from a 30 pound cylinder just as much as you can from a 14 ounce can. A 30 pound cylinder will be set aside, the valve doesn't get completely closed on it, instead of losing 14 ounces, you may lose 20 pounds. Which is worse.

ASSEMBLYMAN VASCONCELLOS: How about requiring that every air conditioner sold in a car has to provide the buyer a leaflet saying, this is lethal stuff, don't vent, your series of advice's, would that be valuable to your educational program?

MR. STRATEMIER: I don't know that I could answer that, really I don't have any expertise on that. What I would suggest is that we just stick with a program of getting rid of the CFCs and not wasting any time with that. The people, I think, are paying attention to the CFC issue, they know that they've got an air conditioner that's using CFCs and they would like to get them out just as much as the rest of us would. All we're doing is antagonizing, I feel, if we sit there and say you're buying something that's got a dangerous chemical in it.

MR. MILLER: And there will be an industry EPA public awareness program and we hope that everybody gets the message so we can make the transition to mandatory recycling more acceptable

to the public.

CHAIRWOMAN TANNER: So you feel it's best to leave it with the federal government and for the states not to pass legislation.

MR. MILLER: In my opinion, yes. I think the federal government is very far along in the process and I spoke with Dr. Steven Anderson who's the Chief in charge of the CFC problem in DPA and he is committed to having something in January.

MR. STRATEMIER: The EPA's been working on this project for over two years now.

CHAIRWOMAN TANNER: That will be a regulation an EPA...

MR. MILLER: EPA regulation, yes.

MR. STRATEMIER: We feel that the movement that's been made by EPA and industry to this date, far exceeds any legislative action that has occurred any place else at this time. Sure it's understandable that the industries had to have sort of a jump start in this thing. We've had to have some sort of legislative awareness on this, but once it got started, the momentum that was created by that has been so great that nobody is going to stop and turn around and go back the way we were, simply because there is no further legislative action.

CHAIRWOMAN TANNER: I've dealt with EPA waiting for standards on various chemicals and water and the standards were to be set, and it was eminent that the standards would be set within a month, that was nine years ago, and those standards haven't been set yet. And, so, you know, I feel that we in the state have a

responsibility to move and not wait for EPA. You know, I wouldn't want to hold my breath.

MR. STRATEMIER: The EPA, I feel in the previous administration was kind of left impotent at times because it was not an environmental administration, whereas, the administration we have today is definitely very much an environment administration whether they really want to be or not, they have to be. The most concern of everybody right now is our environment and this is giving EPA a lot more initiative and clout that they've never had in the past eight years.

CHAIRWOMAN TANNER: You mean we don't just have to say no.

MR. STRATEMIER: (Laughter) We have to say more than just say no.

CHAIRWOMAN TANNER: Okay, thank you. Any questions, members?

ASSEMBLYMAN VASCONCELLOS: No.

CHAIRWOMAN TANNER: Thank you very much.

MR. STRATEMIER: Thank you.

CHAIRWOMAN TANNER: Our last witness is Steve Albu. Steve Albu is the Chief of the Engineering Studies Branch Mobile Source Division of the State Air Resources Board. He works in the El Monte office of the ARB. He will tell us the role of the ARB in this problem of CFCs.

MR. STEVE ALBU: Thank you very much. I'm here with the invitation of the committee, but to primarily address the actions

taken by the board last month in rulemaking which covered on board diagnostics for new California Vehicles.

Basically on board diagnostics are a system on the vehicle which is used to monitor the emission control systems proper function. For a number of years now we've had regulations in effect which require on board diagnostics on new California vehicles beginning with 1988 models. What these do is, the computer on the vehicle is suppose to monitor the proper behavior of all the components that affect emissions. While we were developing a second round of diagnostic regulations, we considered the fact that we could probably monitor the loss of CFCs from air conditioners at the same time. So, last month we developed a second round of regulations, which require that all emission control systems on the vehicle be monitored by the on board computer for proper operation, and in addition, we also included the check for CFC leakage.

CHAIRWOMAN TANNER: What's the timeline on that?

MR. ALBU: The implementation schedule is 1994 through 96. A lot of the requirements we're asking for in this regulation are technology forcing. We're asking...

ASSEMBLYWOMAN WRIGHT: May I ask a question on that.

CHAIRWOMAN TANNER: Yes. A question by Mrs. Wright.

ASSEMBLYWOMAN WRIGHT: If you're talking about the computers that are already in the cars now, because the cars are set up with computers, all the new cars have all these fancy computers, the whole system is run, why would it take so long to

punch in this particular item? Why couldn't it be put into the computer now?

MR. ALBU: Okay, the computers vary in their capability, and the technology to perform the monitoring requirements that we're asking for has yet to be developed. For example, we're requiring that the computer detect when misfire occurs in any cylinder of the engine. We're also expecting it to monitor the catalyst efficiency, in other words, how well is the catalyst working. And to do this requires development of software and computers that can actually perform this kind of function. They have to develop new censors and they have to develop greater computer power for processing the information to make a reliable determination.

Now, in the case of CFCs, one thing that we did find out when we talked to manufacturers about this, is that monitoring the early leakage of Freon from air conditioners is not straight forward. Basically you have to add some vacuum transducers and temperature censors to the air conditioning system. On the discharged side of the compressor you have to add a vacuum transducer and a temperature switch, you also have to monitor what position your blowers switch is in, in other words what the fan speed is. You have to know that the temperature lever is in the cold position and you have to know that the ambient temperature outside is at least above 70 degrees. Now, when you take all this information and process it in the computer, then maybe you can make a fairly reliable determination when the system is losing

enough charge to affect its efficiency.

CHAIRWOMAN TANNER: It seems a little ludicrous to me that that's what the ARB is talking about, something that is so complex and something that won't take effect for a number of years, and it seems to me that we have an immediate problem. I'm rather amazed.

MR. ALBU: Okay. Well, we realize that as well and there are two affects from our action. We realize that this is a fairly complex thing to achieve, but what it does do, if we should find down the road that all the testing on 134a doesn't work or we find it's carcinogenic or something that we don't expect, this is simply a fall back position that we can take to make sure that if we still have to use CFCs that we do have a way of monitoring loss.

CHAIRWOMAN TANNER: And if it's phased out by the time, if the CFCs are phased out by the time you folks regulation has to be implemented, it just doesn't make any sense to me at all.

MR. ALBU: Right. We have said in the regulation that, if manufacturers phase out the use of CFCs by 1996, then they would not have to adopt this monitoring light requirement. So that we have it covered both ways, if 134a does not work there has to be a monitoring requirement in place, but if they phase out the use of CFCs by 1996, then there is no need for a monitoring requirement. And what this does, I think you've heard earlier that there is approximately a seven year design cycle for the complete change over of manufacturers product line. What this

does is serve notice to the manufacturers that you better prepare now or the eventuality of 134a by making room in your new bodies, for larger evaporators, larger condensors, and larger compressors. So, there will not really be an excuse come 1996 for this to be phased out, assuming, of course, that 134a is successful in it's test.

CHAIRWOMAN TANNER: And in the mean time the ARB has done something very special.

MR. ALBU: I'm sorry, I missed the point of that.

CHAIRWOMAN TANNER: Well, it just seems to me that kind of action -- I mean you really haven't taken any really serious action, it seems to me (inaudible...).

ASSEMBLYWOMAN WRIGHT: Excuse me, Madam, Chair. I think they really have. What they've said to the manufacturer is, you know, you put all this investment into changing these computers and doing all the software, and if by 1996 we're doing something else let's just drop whatever you've done and switch over. It doesn't make sense to me on that point. You're going to have them expending all this money to get a new software and then drop it if it doesn't work.

CHAIRWOMAN TANNER: Is there something else that you are working on?

MR. ALBU: Well, the regulation was developed over a two year period and this requirement with CFCs came in at the last minute, and it was also requested by EPA. We're expecting that this regulation will go nationwide, they're going to be,

basically, adopting the same system we have proposed, they will be proposing it about the beginning of 1990. So we did a part in response to their request, as a back up, again, but we've also been very mindful of the fact that, as you are finding out now that there is a great deal of developmental work going on right now, and it's been difficult for us to assess over the framework of this regulations to just where it's going to end up, and what successes are going to take place.

What our board directed us to do, in recognizing the same things you have, is to come back in two years and report on the need for a monitoring requirement, and if we should make a change to regulation at that time. However, it looks like that will be preempted, of course, by the passage of AB 1736 because we will have to make much the same kind of assessment you are and we'll be looking at the legislative activities at both the state and federal level on CFCs, and we'll have to report to the legislature by June of 1990 on our findings.

We're also going to be looking at the availability of recycling equipment, we'll be working with the Bureau of Automotive Repair to insure that there is effective enforcement in the field in use of this equipment. We have to continue the assessment of the status of the 134a replacement activity. And we're going to also look at any non-traditional approaches to the refrigeration cycle itself.

The last thing that I might mention, we've noted that the presents of CFCs in the atmosphere can be monitored and so we

have set aside in our budget plans to monitor the effectiveness of CFC measures by looking at ambient concentrations. And as I say, that report will be due in June of next year.

CHAIRWOMAN TANNER: Yes, Mr. Calderon.

ASSEMBLYMAN CALDERON: Has the board done any ambient air testing up to this point for CFCs in the air?

MR. ALBU: To my knowledge only preliminary studies have been conducted to see if we could first measure them, and to the extent of that I'm not sure.

ASSEMBLYMAN CALDERON: Well, how are you going to measure compliance if you don't have a base to go from?

MR. ALBU: Well, that's, of course, where we'll have to start. As I say, we're going to start a program to look at monitoring CFCs in the ambient, and we will monitor the progress as these rules take effect, and how effective this phase down will be.

ASSEMBLYMAN CALDERON: So, when would you plan to do it, right before the rules go into effect?

MR. ALBU: I don't have the timetable in front of me, it will be conducted by our research division in Sacramento and I might have to get back with you on that.

ASSEMBLYMAN CALDERON: Is the board interested in determining exactly the content of the CFCs now, in California, in the air?

MR. ALBU: Yes. We have to have a baseline, as you say, to be able to quantify the improvement to be gained from our

regulatory actions.

ASSEMBLYMAN CALDERON: Thank you.

CHAIRWOMAN TANNER: Mrs. Wright.

ASSEMBLYWOMAN WRIGHT: No, I'm not going to say anything else I'm just going to keep my mouth shut for a while.

CHAIRWOMAN TANNER: Mr....Yes.

ASSEMBLYMAN CALDERON: Let me just follow up. If you really haven't done any testing how do you know there's a problem in California? Maybe we have a unique situation here.

MR. ALBU: There is a person for our research division present, perhaps he could augment what I've said. I came in response to a request to address primarily on board diagnostic side of the issue, I'm not that familiar with the research side. Perhaps, if he could come forward he could maybe address that somewhat.

ASSEMBLYMAN CALDERON: Well, I'll leave it to the discretion of the Chair.

CHAIRWOMAN TANNER: Is he here?

MR. ALBU: Yes.

CHAIRWOMAN TANNER: Yes, Please do.

ASSEMBLYWOMAN WRIGHT: Oh, look who he is. (Laughter)

CHAIRWOMAN TANNER: Is she here?

ASSEMBLYWOMAN WRIGHT: You can't tell the difference?

MS. SYLVIA OEY: My name is Sylvia Oey, I'm the legislative representative for the Air Resources Board.

ASSEMBLYMAN CALDERON: What is the current state of the

air in California with respect to CFCs compared to other parts of the country or other parts of the world?

MS. OEY: I'm not sure what the comparison of ambient concentrations is. With respect to your previous question, however, last summer the Air Resources Board, or two summers ago, the Air Resources Board conducted a massive ambient monitoring effort in the South Coast Air Basin, primarily for ozone related compounds. One of the things we found, though, is that we could measure CFC concentrations in the ambient air and so we do have a limited baseline of sorts for that.

ASSEMBLYMAN CALDERON: Now what was the purpose of the testing for the Southern California Basin, just to determine whether or not it could be done?

MS. OEY: It was a large scale monitoring effort aimed at a number of different pollutants primarily ozone related pollutants. We also measured trace compounds that would relate to other air pollution problems, such as, acid deposition and almost one of the artifacts of that, was that we found that we were able to measure CFCs in the ambient air in urban plumes.

ASSEMBLYMAN CALDERON: Well, was this...

MS. OEY: It was not directed primarily at ...

ASSEMBLYMAN CALDERON: Well, I mean, was there really a question as to whether or not CFCs could be measured? I mean...

ASSEMBLYWOMAN WRIGHT: Just what do you mean?

ASSEMBLYMAN CALDERON: I guess...Here's what I'm getting at, I guess. What has the State Air Resources Board done to at

least monitor this particular type of air pollution? Are they interested in measuring CFCs now just so they can have a base to monitor compliance with regulations that are going to be in place at a time when the industry is planning on making the change over any way? Has there been any leadership, in terms of the state of California vis-a-vis Air Resources Board, in terms of addressing this whole issue of ozone depletion and greenhouse warming? And what I'm hearing is that there really hasn't. So I asked the question of you, has there been any effort to make that determination? What I'm saying yes there was, and it was limited and what we found, is we found we could measure CFCs. Well, I didn't thing that was really an issue because there's obviously scientist that have done that since the 1970's. So, what have you done in this area?

MR. ALBU: Well, I wish I had someone here from the research division who could speak more to the issue. As I say, what I could contribute was simply the fact that this is a fairly new issue, we're still trying to assess what we can do, it's been more of a global issue rather than just a statewide issue. As you know, we have been somewhat in depth trying to deal with the ozone issue in the troposphere, and as I say, the first action we new we could take that was timely, was to implement on board diagnostics regulations or at least provide us some protection against, perhaps, failure of 134a or something of that nature. I wish I could answer better, but I guess I'm not able to at this point.

CHAIRWOMAN TANNER: One of the questions, and there were

a number of questions that we sent to Jan Sharpless, who is Chair of the Air Resources Board, and one of the questions a very simple question, not a simple answer, I suppose, it was, in general how does the ARB view it's role in reducing, eliminating emissions of CFC 12 and other ozone depleting substances in California? Does the ARB have a role?

ASSEMBLYMAN CALDERON: That was my question.

CHAIRWOMAN TANNER: That's exactly...

ASSEMBLYWOMAN WRIGHT: Well, why didn't you read it that way, Chuck.

ASSEMBLYMAN CALDERON: Well, I'm not as smart as the Chairwoman, that's why she is the Chairwoman.

ASSEMBLYWOMAN WRIGHT: True.

CHAIRWOMAN TANNER: No, I had it written down for me, though. But that was one of the questions and certainly, you know, this computer, and I want to get back to that computer after this question is answered...

MS. OEY: Okay.

CHAIRWOMAN TANNER: ...if it can be answered.

MS. OEY: Well , Madam, Chairwoman, as you and the rest of the committee are aware, this is a very new issue areA. Up until about a year ago there was not a scientific consensus that ozone depletion was occurring as rapidly as we now believe that it is occurring. The Air Resources Board has requested testimony on the issue of ozone depletion, Dr. Wolf, and others have made presentations to the board, and one of the directions to staff, as

a result of that presentation, was that we are to consider and report to the board on the ozone depleting impacts of any action proposed by staff to the board. That's a very significant move because CFCs and other ozone depleting compounds were popular largely because they do not react in the atmosphere and essentially they are substitutes for some of the products that people had been using previously which were smog producing. So, taking a look at that tradeoff in our regulatory action, is indeed a significant move.

The board also requested staff to look at other actions that the board might take with regards to CFCs and report back at a future date.

CHAIRWOMAN TANNER: Well, now, we heard in testimony today, and certainly the ARB knows this, that it's very likely that we will consume more gasoline, which means that there will be more smog, and there will be more air pollution, isn't that significant enough for the ARB to have acted, or at least, done some research.

MR. ALBU: It is a somehow common misconception that increased fuel usage means that there will be an increase in emissions and is not necessarily true. Our standards are based on vehicles meeting a grand per mile standard and small cars, large cars have to meet that same standard. In addition, there are developments taking place, and I think in a recent article by General Motors, they believe that the use of 134a will not exalt an immeasurable increase in fuel consumption. The reason being is

that they have new designed compressors and heat exchangers which are more efficient than the old ones so that there will not be a net increase in the fuel consumption. But, even if there were, that would not translate necessarily to an increase in emissions.

CHAIRWOMAN TANNER: Then if that's so, I'm rather startled by that statement because why then is the ARB asking, demanding rather in the South Coast management district, that fewer automobiles are to be on the road within a short number of years. Why are we attempting to reduce the number of automobiles, in that, we are also attempting to reduce the amount of fuel being used?

MR. ALBU: Right.

CHAIRWOMAN TANNER: If your statement is correct, that the amount of fuel that's being used doesn't affect the...

MR. ALBU: Reduce the number of vehicles, of course, will reduce the amount of emissions, but for a given vehicle, putting another passenger in the vehicle, for example, will not necessarily increase it's emissions because the fuel consumption went up. All I'm saying is that, for each vehicle...

CHAIRWOMAN TANNER: The more fuel you use the more you emit, right?

MR. ALBU: The emission control system can convert the emissions into more CO2 and water, that's basically what happens, it is capable of converting anything that's increased coming out the tail pipe into harmless substances.

CHAIRWOMAN TANNER: That's interesting.

ASSEMBLYWOMAN WRIGHT: It's not only interesting it's fascinating.

CHAIRWOMAN TANNER: Yes. It's a concept I hadn't, you know, wasn't aware of.

MR. ALBU: The reason, of course, you can look at a small car and a large car and both have to meet the same emission standards even though a large car uses more fuel than the small car. So, it doesn't mean just because it uses more fuel that it has to emit more.

CHAIRWOMAN TANNER: All right.

ASSEMBLYWOMAN WRIGHT: Or your recovery tank on the back of the car.

CHAIRWOMAN TANNER: Your computer that will detect leaks, how do the automobile manufacturers, they agree that that computer should be installed? Have you worked with the automobile manufacturers on this?

MR. ALBU: Yes we have. They generally are opposed to it because it would be fairly costly.

CHAIRWOMAN TANNER: And they, by then, feel that they will have phased out CFCs?

MR. ALBU: That's correct.

CHAIRWOMAN TANNER: It doesn't make a lot of sense to me, but it may be...

ASSEMBLYWOMAN WRIGHT: Somethings wrong here we both agree.

CHAIRWOMAN TANNER: ...It may be a good idea. You know,

I really think that the ARB should take a lead in this subject and this problem. I really believe that we should ask Jan Sharpless or members of the board to appear when we have a hearing on the bill or any CFC bill, because I'd like to see that there is some real action and some real concern, and you know, it bothers me that what we appear to be doing is reacting, and you know, suggesting that we put a device in an automobile after the fact, it's going to be very costly, very likely, and the consumer is the one that will pick up the tab for that. And if there is no need, it seems to me, the state should be doing something in the mean time.

MS. OEY: If I may, Madam, Chairwoman.

CHAIRWOMAN TANNER: Please.

MS. OEY: What we're finding as we talk to various industries and look into the need for various types of regulation, is that, industry is indeed responding as rapidly as they can to the need to phase out CFCs.

CHAIRWOMAN TANNER: I think so.

MS. OEY: Industries, for the most part, are aware that, well first of all the price of CFCs is increasing rapidly, and also, that they won't be around forever. And as a result, they are taking the initiative to change out of CFC something that we haven't seen in other environmental areas. And one of our concerns is not to push industry in a direction which is unnecessary, to push them into a direction that's not economically indicated.

CHAIRWOMAN TANNER: We had a witness here, Mr. Kistler, who described the process of repairing air conditioning unit, and mentioned that he felt that people who are working on the units should be certified. Has the Air Resources Board thought about certifying service for people who service air conditioners because of the danger of emissions or venting?

MS. OEY: One of the things that we're looking at right now and that we will be reporting to the legislature on in the near future, is the big picture, the same type of thing that you're doing here. What are all the factors that affect CFC emissions from auto air conditioners? What's happening in the industry over the next few years, what can be expected to happen? And what action should the state take as a result of those factors?

CHAIRWOMAN TANNER: All right, thank you. I really don't meant to be harsh, but I don't feel rather strongly about the government should act and those agencies which are responsible for our air quality should certainly have taken the lead, and I don't see that, especially. And I'm not really totally sold on this computer program, maybe it's a good idea, maybe we'll have to do that once the new 134a is developed or the blend is developed, maybe we'll have to have something, but the date on that doesn't seem to make a lot of sense either.

MS. OEY: Yes.

CHAIRWOMAN TANNER: The date that you require that those go into new automobiles.

MR. ALBU: Okay. I hope...

CHAIRWOMAN TANNER: And if the new automobile doesn't leak as much as, you know, are you going to require that the older automobiles, and those are the ones that are generally having the problems, that they have a computer.

MR. ALBU: This wasn't designed as a retrofit, it would have been very expensive to do so. Again, the requirement for this computer monitoring of air conditionings would not be needed if 134a is successful, that is a part of the regulation so we would not want to waste the money either, we agree with you.

CHAIRWOMAN TANNER: Yes.

MS OEY: Yes.

CHAIRWOMAN TANNER: And the units that are leaking are the old ones, generally, and we're not going to require that we retrofit so, it just seems like, it seems absurd, actually, to me. Ms. Wright.

ASSEMBLYWOMAN WRIGHT: I just have something here I'd like to pass out for the members of the committee who are here. It's from the Wall Street Journal, it was in todays paper. I think it might be interesting to read, I'll just give you the title as a tickler so that you will read it. And it says, "Is Science a Private Game Driving Ozone Policy" and I'll let you pass that over to the end of the table.

CHAIRWOMAN TANNER: You haven't read it.

ASSEMBLYWOMAN WRIGHT: I sure have.

CHAIRWOMAN TANNER: Thank you very much.

MS. OEY: Thanks.

CHAIRWOMAN TANNER: Any other questions, Mr. Calderon, Ms. Wright.

ASSEMBLYWOMAN WRIGHT: No.

CHAIRWOMAN TANNER: Thank you very much. We'll be in touch.

ASSEMBLYMAN CALDERON: You stay in touch.

CHAIRWOMAN TANNER: (Laughter) Well ladies and gentlemen that does conclude the testimony. I found it to be very interesting. There's no question that the California Legislature intends to move on this. We do understand that there are time lines that we have to consider. It will take a certain amount of time before the correct alternative is developed and before the automobile manufacturers can be prepared to accept the alternative. We have to find ways. I think, that recycling is something that we should absolutely mandate, and I would certainly think that certification of those who handle the units and service the units should be considered. I feel that I've learned a great deal, and I appreciate the witnesses being here. Mrs. Wright.

ASSEMBLYWOMAN WRIGHT: Yes, I just...

CHAIRWOMAN TANNER: Thank you. Mr. Albu.

ASSEMBLYMAN CALDERON: Let me just add some comments. I just think that this was an excellent hearing and I think you and your staff are to be commended. I really think it was fair. I think it was informative. We've generated a lot of good information and a good information base. I was real proud to be a

member of this committee.

CHAIRWOMAN TANNER: Thank you. That concludes the hearing. Thank you for being here.

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