STATE OF NEW JERSEY

DEPARTMENT OF ENVIRONMENTAL PROTECTION

IN RE: :

NJ CLEAN AIR COUNCIL :

:

---

401 East State Street PO Box 027

Trenton, NJ 08608-1501

Wednesday, April 14, 2004

9:30 a.m.

GUY J. RENZI & ASSOCIATES

824 West State Street

Trenton, New Jersey 08618

(609) 989-9199 or (800) 368-7652

www.renziassociates.com

B E F O R E:

JORGE BERKOWITZ, PhD, Council Chairman
MICHAEL EGENTON, Council member
FERDOWS ALI, PhD, Council member
JAMES BLANDO, PhD, Council member
JOSEPH CONSTANCE, Council member
GEORGE CURRIER, PE, Council member
ELEASE EVANS, Council member
GLEN FEYL, Council member
RICHARD LYNCH, PhD, Council member
JOHN MAXWELL, Council member
STEPHEN PAPENBERG, Council member
GILBERTO SOTO, Council member
IRWIN ZONIS, Council member
LEONARD BIELORY, Council member

S P E A K E R S

SPEAKERS CONTINUED

CHAIRMAN BERKOWITZ: Good morning. My name is George Berkowitz. I'm pleased to be chair of the Clean Air Council and welcome you to our annual hearing.

Each year the council holds a hearing on a timely topic of concern to New Jersey and the citizens regarding clean air.

The proceedings will be recorded. A report will be generated and presented to the commissioner regarding our findings concerning today's hearing.

Before we get started I'd like to have an opportunity to present the Council to you and ask Mr. Egenton to start.

MR. EGENTON: Thank you, Chairman.

Michael Egenton, Vice Chairman of the Clean Air Council and I'm also Assistant Vice President with the New Jersey State Chamber of Commerce.

MR ALI: My name is Ferdows Ali. I represent the New Jersey Department of Agricultural, member of this council.

MR. BLANDO: My name is Jim Blando. I represent the New Jersey Department of Health and Senior Services.

MR. CONSTANCE: Good morning, my name is Joe Constance. I'm small business on Nezbis (phon) New Jersey Congress Commission. I represent the New Jersey Congress Commission.

MR. CURRIER: My name is George Currier. I represent the New Jersey Society of Professional Engineers.

MS. EVANS: Good morning, I am Elease Evans, Freeholder Director of the Passaic County and I represent the freeholders State of New Jersey.

MR. FEYL: I'm Gene Feyl, Mayor of Denville Township and representing the New Jersey State League of Municipalities.

MR. LYNCH: Richard Lynch, Environmental Safety Management Corporation representing the Public and American Industrial Hygiene Association.

MR. MAXWELL: Good morning. My name is John Maxwell. I'm a public member of the Clean Air Council and when I'm not doing this, I am the Associate Director of the New Jersey Petroleum Council.

MR. PAPENBERG: Good morning. My name is Steve Papenberg. I'm the health

officer of South Brunswick Township and I'm representing the New Jersey Health Officers Association.

MR. SOTO: Good morning, my name is Gilberto Soto. I represent the Port Division of the International Brotherhood of Teamsters and I'm for the public.

MR. ZONIS: Good morning, Irwin Zonis and I'm a public member of the Clean Air Council and I retired some years ago from a small chemical company in Newark.

MR. BIELORY: I'm Leonard Bielory. I'm a public member. I come from UMDNJ Medical School Department of Medicine.

CHAIRMAN BERKOWITZ: And I am George Berkowitz. I represent the New Jersey Business and Industry Association.

Welcome to the Clean Air Council's version of Woodstock. For one day we are going to have music and fun and nothing but music and and fun and some interesting discussion on a fine particulate matter and its impact on human health.

We have a very tight agenda, and as such I am going to be a stern taskmaster, as a

warning to our speakers, to try to keep us on schedule. As it stands right now, if we adhere to our schedule, we'll be out of here by about 5 o'clock.

The format will be that the presenters will present their presentations, how's that? And after they present the presentation, we will have about five minutes of questions and there will be no opportunity for the public to question. And I apologize for that, but that's how we have to do this hearing at this point.

With that, I'm going to introduce our first speaker. I'm going to do away with formal introductions and ask the speakers to introduce themselves.

Our first speaker is Kenneth Fradkin, from USEPA. Kenneth, thank you for being with us.

MR. FRADKIN: My name is Kenneth Fradkin. I'm with the Air Programs Branch for EPA Region 2.

Today I'm going to talk a little about EPA initiatives on fine particles.

We've received New Jersey's

recommendations concerning the non-attainment area for PM 2.5, New Jersey is recommending a ten-county area; we're currently evaluating the recommendations and in July we will announce the boundaries of the non-attainment area after considering New Jersey's recommendations.

In December we will formally designate the PM find non-attain area, then the state will have three years to develop an implementation plan.

EPA has a number of national and regional initiatives on controlling PM fine. We have several in-place programs, as well as proposed programs.

The proposed programs include PM 2.5 implementational which is scheduled to be released in June or July of this year. The Non-road Diesel Emissions Rule, which was proposed last May and scheduled to be released this month and will lead to a 90 percent reduction in emissions from non-road diesel, diesel engines. And the Interstate Air Quality Rule which was released in December of last year and is scheduled to be released by the end of this year which deals with the regional

transport issue of precursers, nitron oxide and sulfur oxide.

Through the use of innovative programs a variety of measures are available to public and private sector. Innovative measures provide continuous inducement or otherwise reduce emissions.

EPA diesels retrofit program is an example of a highly successful EPA program. For the past two years public and private partners have retrofitted over 87,000 diesel engines which have led to a reduction of approximately 26.000 tons of nitron oxide and 12,000 tons of particulate matter.

Also in the area of innovative programs, the EPA is going to release a web base innovation catalog, which contains information on over 500 innovative products. We're in the process of making that available to the state and the state will also be able to enrich its database by entering in the innovative projects. That's scheduled to be made accessible to state government within the next few months.

EPA is also working on a guidance

document, actually in draft, on using non-traditional or innovative measures to reduce fine particles and that should be used within next couple of months.

Finally, there's an EPA Air Innovations conference scheduled this August on innovative measures for fine particles, as well as other pollutants and if you want more information on that, you can see me and I'll give you an agenda scheduled; August 10 through 12.

EPA is in the process of reviewing the National Ambient Air Quality Act for Particulate Matter. The PM criteria document and draft PM staff paper are still undergoing peer review, but they are in the process of being released; the criteria document be released in the summer of 2004, just like July. And we're in the process, looks like the revised standard will be released in 2005.

Some of the preliminary draft staff paper recommendations. We're looking at lowering the annual standard from 15 micrograms per cubic meter and to as low as 12 micrograms per cubic meter. And lowering the 24-hour

standard down to a range from 65 micrograms per cubic meter to 30 micrograms per cubic meter, and that's within the range of the present AQI, which is 40 micrograms. That's it.

Any questions?

CHAIRMAN BERKOWITZ: Any questions?

MR. BLANDO: For the air innovation process is there a web site?

MR. FRADKIN: You can actually contact me. It's a new conference. They have just announced it internally within the last week at EPA. I'll give you an agenda.

MR. BLANDO: And also with the innovation catalog, would the public have access to that as well?

MR. FRADKIN: Currently it will be made available to state government. Right now there's not a plan for a public access. I know I've seen -- they've actually commented on it and I see no reason why not to have the public have access. Certainly right now, as far as entering in the information, we are going to leave that to the State.

MR. BLANDO: The public won't be

able to view the actual catalog? Who commented on making the comment that the public shouldn't be able to --

MR. FRADKIN: Actually, there's a document in the recent proposals. We did get that comment in, EPA is still taking comments on making the database available.

MR. BLANDO: But EPA is still taking comments?

MR. FRADKIN: Yes.

MR. BLANDO: If we wanted to comment on it, we could?

MR. FRADKIN: Yes, you can.

Thank you.

CHAIRMAN BERKOWITZ: Another question?

MR. BIELORY: When you say it's under peer review, who are the reviewers per se for such document? When you say your document is under peer review on your next to last line under, presently under peer review.

MR. FRADKIN: Yes.

MR. BIELORY: What's the group that's sent out for overview of the document?

MR. FRADKIN: Clean Air Advisory

Committee.

MR. BIELORY: It's actually the Committee of Advisory.

MR. FRADKIN: Yes.

CHAIRMAN BERKOWITZ: Thank you.

We are in an embarrassing position with no -- Dr. Turpin?

With that, I'd like to go off the record and entertain any questions from the public that individuals might have of the EPA.

(Pause in proceeding.)

MR. MAXWELL: In terms of the retrofits, something New Jersey is looking at, can you give us an idea of what the average size of the grant is and to whom has it been given; is it given to school bus league and garbage.

MR. FRADKIN: Yes; school buses. Unfortunately, I can't give you the number of the monitory grants. It's been given to school buses, many school buses. EPA is asking for additional money for grants for the Clean Schools Bus campaign; they're asking for like 65 million dollar in grants. I know they've given nationally approximately six million

dollars for grants for school buses.

MR. MAXWELL: Have any of them been in New Jersey?

MR. FRADKIN: Unfortunately, I don't have that information. Maybe somebody from New Jersey DEP knows.

UNIDENTIFIED SPEAKER: No one from New Jersey.

MR. FRADKIN: Thank you.

CHAIRMAN BERKOWITZ: Thank you very much.

I neglected to introduce the hearing chairman Mr. Stephen Papenberg.

Steve, I would like you to just quickly tell the public and the members of the audience why we selected this topic and acknowledge the other members of your committee.

MR. PAPENBERG: Thank you, Jorge.

This is a topic that actually had been discussed much earlier amongst the Council members, and, finally, I think it reached a point where the council felt that this was the most appropriate time to bring this issue forward in the form of a public hearing.

Of course New Jersey is very concentrated and has a tremendous concentration of population within a relatively small area, so air quality is a major issue and at past hearings we have really come to understand that a large portion of the air pollution problem can be attributed to transportation issues, as well as some of the issues regarding interstate transport. And the fine particle issue I think crosses both boundaries.

I'd like to introduce or indicate who the other members of the committee were. Irwin Zonis. Of course, Jim Blando, who you have heard questions from also. John Maxwell who you've heard questions from. And Jorge, I'd like to take this opportunity to also thank the staff; Phil O'Sullivan and Sonia Evans for all the work in putting this thing together because this is quite a feat, and, quite frankly, while we lay out the parameters of what the hearing is going to be, it's really the staff that follows up on all of our requests on contacting people and putting this thing together logistically. So I thank all the staff together.

Jorge, I'd also like to take this opportunity to just advise the people in the audience now that if they have an idea of what the Council should be looking at for future hearings, I mean please, contact us and let us know because, you know, we are a public agency; we don't want to operate in a vacuum. We need input from the public to really make our hearings most worthwhile. Thank you.

CHAIRMAN BERKOWITZ: Thank you, Steve.

I would say at one point in my career I was Director of Environmental Quality within New Jersey DEP and the air program was in that division and most of you -- many of you members in the audience, as well as at the table, knows John Elston who used to be the assistant planning director on all the air quality issues and I come down Route 29, I asked; John, what's all of this stuff coming out of these diesels? He said, well, as any technical problem at that point in time, reveals itself like peeling an onion layer by layer. John said no, it's just ugly, it's not terribly important from a health perspective.

We know differently. The reason that we have this hearing today because we were presented with significant information from New Jersey DEP that indicated the types of impacts that very fine particulate matter could be having on select populations within this state.

As you will here today, the good news about that situation, there's something you can do about it. In terms of the transport issue, we don't know. But in terms of controlling our sources within the state and if the will is there controlling sources outside of this state, there are solutions to this problem. So that's what we're here to do today.

I'm done stretching. I would suggest we take a break until the commissioner appears.

MR. ZONIS: Can I have 60 seconds?

CHAIRMAN BERKOWITZ: Absolutely, Irwin.

MR. ZONIS: You answered my question earlier by saying EPA is asking for 65 million dollars in grant. In November the Clean Air Council had a presentation member of

the DEP who talked about retrofits for mobile diesel engines and if my notes are accurate and I can't swear to nothing these days, we were told that, first of all, there is some federal money available, but bus companies don't want to touch it. I can't explain why that is, but be it on the record.

Finally, we were told, New Jersey needs 50 to a hundred million dollars to get into this problem of school buses. And that is in comparison to the 65 million dollars the EPA is asking for and it's just a fraction implied, there's not any guarantee that EPA asking is going to get that. But if you do get 65 million, why don't you send it to Trenton because, we can use it here and the problem, as the 10-county proposed designation indicates the problem is serious enough.

Thank you.

MR. BERKOWITZ: Thank you.

Let's take a break and we'll reconvene when the commissioner appears.

(Pause in proceeding.)

CHAIRMAN BERKOWITZ: Back on the record.

I'd like to take the pleasure to introduce you all to the extremely capable, very notable Commissioner of Environmental Protection, Mr. Bradley Campbell. Commissioner Campbell we thank you very much for taking time out of your schedule to address us.

Commissioner Campbell.

COMMISSIONER CAMPBELL: Thank you and good morning.

Thank you for convening this hearing today. It's an honor to have all of our members of the Council committed to these issues, committed to advising DEP on what I think are some significant challenges and probably this meeting couldn't be more timely in the sense that we expect this week Administrator Levitts of the EPA to be announcing or releasing many of the attainment designations for the states generally, including the State of New Jersey. We have had an ongoing debate, lively, robust debate with EPA about some of the decisions we've made in that process.

Because we recognize and certainly Governor McGreevey recognizes that there is

much at stake in terms of public health in New Jersey, much at stake in terms of our economy and significant challenges ahead in terms of how we meet tougher health based standards for smog, how we address long-standing challenges in terms of Mercury deposition here in New Jersey.

I want to take a moment to thank and acknowledge a couple of leaders in our fight here in New Jersey.

Among them, Sam Wolf, our Commissioner for Environmental Regulation. Bill O'Sullivan and I think Chris Salmi is here also in the back. A new face into issues is Peg Hanna, who is going to be leading our fine particulate initiative, our Stop The Soot campaign.

I want to put a few matters into perspective.

First, by any measure that the reductions that New Jersey will need both in-state and out-of-state to meet tougher standards adopted by EPA and endorsed by the Bush Administration. Those challenges -- the reductions that will be needed are significant

and they need a fundamental reassessment of our program to make sure we are identifying the right opportunities for reductions that we are doing, that we are identifying. What are the most cost effective sources of reductions? And that we are implementing those -- whatever measures are needed in a way that gives fair notice to the regulated community in which the burdens of those reductions are shared.

So I think that's the magnitude of the challenge both in terms of the level of reductions and the means of reaching the reductions, I think is significant.

Second, I think it's important to recognize that those reductions have significant public health impacts and just to give you a sense of perspective, if we were to achieve in a timely manner the new federal standards on soot and smog, we would avoid more premature deaths than if we averted every homicide in the State of New Jersey and/or if we averted every traffic fatality in the State of New Jersey. That's at the low end of the estimates.

At the higher end of the estimate,

we would avert more premature deaths than if we both averted every homicide and averted every traffic fatality in the State of New Jersey.

Now, we tend not to think of those public health impacts as seriously as we do homicide or traffic accidents because for the simple human reason that in the case of those other impacts, those other premature deaths, we know the victims have names, faces, their families are identified. In the ergo of environmental protection, these premature deaths are suffered by unascertained victims, but I think that the premise of the tougher standards that EPA has adopted and that the Bush Administration as endorsed, the premise is that those victims are no less worthy of protection because they're unascertained. They are worthy of our best efforts to reduce exposure to avoid premature deaths that can be avoided through better emissions controls both in New Jersey and out of New Jersey.

A third, and I would also highlight the fact that I -- that said of the benefit in terms of premature deaths avoided, looks at a narrow set of public health benefits in terms

of premature deaths avoided. If we met those same standards in a timely way here in New Jersey, there would be significant additional benefits, many more emergency room admissions for asthma avoided, many more asthma cases avoided and I think the statistics that EPA developed in adopting the rule speak for themselves in terms of those broad public health benefits.

A third thing that I think needs to be acknowledged is the economic impacts are significant as well. Each of those public health impacts has an economic component in terms of health care costs, in terms of workdays avoided, in terms of school days avoided, learning losses, etcetera. And we have to recognize that there are economic impacts depending on how we get our emissions reductions, how those reductions are distributed, how deft we are in identifying the most cost effective reductions that will meet the standards and minimize disruption to the regulated community.

A fourth point that I think we need to bear in mind is at the same time that New

Jersey is confronting these tough challenges in terms of meeting stricter standards to meet public health, we are having taken away from us or weakened the very tools we need to get there. Particularly with respect to upwind out-of-state sources and the rollback of New Source Review and other tools under the Clean Air Act. We, in New Jersey, get more than a third of our -- roughly a third of our dirty air from upwind sources in Pennsylvania, in Ohio, the midwest. We rely heavily on federal enforcement to ensure that those sources are not essentially saving costs and shifting costs to the expense of New Jersey residents as they operate their facilities and the rollback of the New Source Review probably creates an unfortunate contrast which the federal EPA is probably enforcing much stricter standards, as they should, to protect public health environment on smog. Currently they are taking away one of the vital tools in terms of New Source Review that we need to get there and they are placing many of our New Jersey businesses at an unfair competitive disadvantage by changing the rules and

rewarding the law breakers.

PSEG, among other firms, has stepped up to its responsibilities under New Source Review through a consent decree with the Department, they are in competition with entities in an open or competitive electricity market with entities that have not stepped up to their responsibilities that have evaded the law. So I think it's a particular challenge for us in New Jersey to identify first what we can do to combat those unfortunate changes in the law with their direct impacts on public health and the environment.

Second, to identify what other leverage we have in those circumstances to force control of upwind plants. I'm in discussions with our counterparts in Pennsylvania. Earlier this year, with the assistance of Attorney General Harvey we negotiated the shutdown of the Martin's Creek Bullfire facility for 2007, which are of significant health benefits in New Jersey, but more needs to be done and we will continue after the attorney general has in case after case both against the federal government and

against upwind sources, we will continue that fight to ensure that New Jersey isn't asked to produce more than it's fair share of reductions to get to the health based standards for soot and smog that we all strongly support both in New Jersey and the federal level.

A final point I would make is that it's time to heed a long-standing call of our regulated community here in New Jersey. That call has been for regulators to acknowledge and act on the fact that time and time again when we look to what reductions are needed to meet clean air standards, we have gone back to the well repeatedly to stationary sources without considering mobile sources. And I think we will continue to recognize that there are areas where stricter standards are needed for stationary sources. I think our proposed mercury rule, which will have benefits not only in terms of mercury reduction in the state but also will have significant co-benefits in terms of fine particulate reductions, those are entirely appropriate. But what we also recognized and what Governor McGreevey recognized in his State of the State Address,

is the fact that we can no longer disregard, at least some part of the mobile source inventory where we can find the most cost effective reductions. And with that charge from the governor, we are developing with Peg Hanna's able leadership and Sam Cole of his the diesel initiative, to try to target the dirtiest and longest running of our roughly 250,000 plus diesel engines in this state. To look at roughly 11 percent of those for appropriate retrofits, to couple that with stricter enforcement of idling restrictions and other enforcement measures that will reduce the contribution from our diesel inventory to our emissions challenges, that will ensure an equitable distribution among sources in terms of who we're asking to make those reductions. And I'll recognize that in so many cases those reductions we can get through those targeted retrofits. We are going to be much more cost effective, provide much more bang for the buck than asking -- going back to many of our stationary sources and seeking further reductions there.

Again, there's not only a

significant public health issue at stake, there's also an economic impact. And I think one part of the governor's vision and one reason for our fine particulate initiative is to get ahead of the curve in terms of compliance. Not to simply wait and see what EPA pronounces and see what draconian measures are needed on the compliance line, but to get ahead of the curve, to achieve those standards in a timely way to as much as possible reduce or eliminate the number of areas where economic activity may be constrained by the need for offsets and to avoid any impingements on our economy that could be avoided if we have the foresight, the will and the equity to begin to address these sources now and to show, I think, once again, that New Jersey is in the lead, not just in strict health-based environmental control, but also in innovation and in fairness in terms of where we look for the reductions we need to address, a vital public health issue.

So with that, I'd like to end my remarks and really turn it over to the chairman and Council for any questions or concerns you want to raise with me directly.

CHAIRMAN BERKOWITZ: Thank you, Commissioner.

Questions for the Commissioner?

Mr. Egenton.

MR. EGENTON: Thank you, Commissioner, for your review; very commendable sum of the issues that you highlight for us.

I'm curious how is it your working relationship that you have with other groups as we look to outside the State of New Jersey such as the Ozone Transport Commission, and others, are they stepping up to the plate in helping out in some of these efforts?

COMMISSIONER CAMPBELL: Since I'm the chair of the Ozone Transport Commission, it's a great relationship. I think we have had a very good relationship.

Many commitments, in fact, in some ways many of the other OTC states have been ahead of us. We're now finishing up some of the rules that we're committed to collectively by the OTC. Two things are occurring. One is an significant turnover due to elections, turnover in membership of the OTC so there's an education curve.

Secondly, the OTC, like New Jersey is sort of in this dual battle of trying to keep the federal standard as protected as possible to avoid any rollbacks and to the extent that it's either multi-political legislation or as is currently pending, the air quality role, make sure we're getting as many reductions from that process as we can. At the same time, look to what next we need to be doing in terms of local controls. And I think that you'll continue to see close support and leadership on those issues and this comes from very active STAPPA/ALATCO under Bill Burger and I think we'll continue to see that leadership and we're also seeing significant partnership among states and some other litigation burdens and enforcement cases as well. The states, sadly in the combination of restrictive state budgets and the number of bad rule proposals there are and the number of non-compliant facilities there are upwind, we are learning to share the load in terms of litigation and I think we'll continue to see that cooperative spirit prevail among states because this is not a partisan issue, it is a largely, in my view,

it's a public health issue in which Governor McGreevey is right where Governor Patacki is and we think Governor Rendell should be right where Governor McGreevey and Governor Patacki are, but time will tell.

MR. EGENTON: Thank you.

CHAIRMAN BERKOWITZ: Mr. Feyl.

MR. FEYL: How do you view the opportunities of an action plan intrastate and state responsible commission such as Transit DOT and what is being done there to improve that situation under the control we do have in the state.

COMMISSIONER CAMPBELL: The DOT is part of -- certain DOT facilities will be part of the fine particulate initiative. The head of New Jersey Transit, George Warrington, who has been willing to look at additional areas where they can accelerate reductions through additional equipment, faster transition to ultra-low sulfur diesel and has even been willing to consider whether some of the rail sources that we otherwise wouldn't have authority to regulate might be appropriate for retrofits.

We have also had in the marine sector some very interesting developments in close cooperation with New York and the Corps of Engineers in the context of developing the harbor deepening projects in recognizing the additional air commission is so successful in getting dredging moving in the Port of New York and New Jersey, the sheer volume of dredging equipment and tugs, they are doing that job and generating a new set of problems in terms of NOx and soot generation. So working with the Corps, working with the Port Authority, working with the State of New York, we've developed an offset program in which those new admissions will be more than offset by retrofitting some of the ferry lines to newer, cleaner engines, and those will obviously be benefits that we get, even though the project is a relatively short duration, the benefits we get from that kind of smart offset trading approach will be far more enduring.

CHAIRMAN BERKOWITZ: Richard.

MR. LYNCH: I think you did a fantastic job of describing some of the public health benefits that will come from these

efforts and we on the clean Council think those efforts are important.

For example, you described the reductions of premature death that will be accomplished in an effective way here.

I also want to encourage your resolve in another area and that is that in helping people in 2000 and subsequent planning documents one of the major issues was to eliminate health disparities in subpopulations and the evidence is pretty significant related to the increased rates of pulmonary diseases among minorities. As you superimpose these maps with the urban centers and the highly concentrated areas where minorities live in New Jersey from Mercer through Middlesex and Union and Essex Counties, it's important that we recognize that in addressing these issues, we also have a good opportunity here to reduce some of the exposures that may be associated with some of the elevated rates of morbidity and mortality among the subpopulation of minorities both at the child and adolescent level, as well as the adult population.

As we talk about the importance of

mobile source control, both from within the state and as things are happening in these cities, I think it's important that we, in combination with the DEP and working with the EPA, emphasis that this opportunity for reducing this health disparity exists and I think we really need to move forward.

COMMISSIONER CAMPBELL: You have our commitment on that and certainly Governor McGreevey's Executive Order Environmental Justice memorializes and reinforces that and I can't emphasis enough that while we know the -- we know a lot about the public health burdens of failing to meet adequate public health standards; we also know quite starkly that those burdens do not fall equally. That asthma rates link to poor air quality are far higher in black and Hispanic populations, for example, than they are in the general population. I think the least alarming studies, I think show that the rates are roughly twice as high among Hispanics and three times as high among African American communities. There are studies, a recent one in Harlem, which by proximity suffers many of the same exposures as Northern

New Jersey communities where the rates were 14 times what they were in mainstream populations.

I think there's a recognition that both as a matter of public health and as a matter of social justice that getting these reductions in time is critical.

It also requires us to look at our diesel -- the fine particulate team is looking at. What does that mean in areas where we should focus on local controls? Trucks that operate a significant portion of their day in local traffic. Also means that for a large part of the fleet that people ordinarily think of as the big diesels like long-haul tractor trailers because they operate such a small fraction of their time in New Jersey, unlikely that we are going to get any benefits from retrofitting those. We get some benefits as we switch to cleaner diesel fuels, but those aren't the right ones in terms of addressing those localized impacts. So it presents a challenge in terms of just doing this in a way that's smart and targets the right objectives.

CHAIRMAN BERKOWITZ: Any more

questions?

George.

MR. CURRIER: What would you think would be three of the most important things that the EPA could help our efforts here in New Jersey?

COMMISSIONER CAMPBELL: First and foremost stop the rollbacks.

Second, enforce the law, particularly New Source Review.

And third, in the standards that are forthcoming like the Interstate Air Quality Rule, I would say two things. One is, set the standards; set standards that reflect what you say you support, which is the new standard. If you are going to do an Interstate Air Quality Rule, attainment of those standards should be the objective, as it is under the proposals both in clear skies and the Interstate Transport Rule, it will -- 20 years or more will pass and it won't make a wit of difference by our analysis in terms of the attainment status of most of New Jersey going forward. A generation -- obviously, some attainment challenges may take a generation, but we need

to be showing more progress than the rules that are on the table.

EPA can't have it both ways and say, you know, these new ozone and fine particulate standards and soot and smog standards are the right objectives for public health and then propose -- make regulatory changes or proposals, whether it's rolling back Resource Review or Interstate air Quality Review, that will stymie our ability to get there.

CHAIRMAN BERKOWITZ: Steve.

MR. PAPENBERG: Yes. Commissioner, you had mentioned earlier about strategies for stricter enforcement of idling of diesel vehicles. Do you have any specific strategies in mind on that?

COMMISSIONER CAMPBELL: I think there are a number of areas where we simply have to enforce the law as it is; provide stricter penalties when people violate those laws and some of it's going to be, frankly, we're at a starting point where some of it is going to have to be education about what the law is, the fact that trucks are queuing up and

idling are presenting a public health threat, as well as a violation of the law.

In some cases we're trying to use innovative technologies to reduce idling, as is the case with our Idle Air Initiative at two locations where trucks that otherwise would idle to keep there air conditioners and VCRs going at truck stops, can plug in rather than run their engines. It's going to take a series of measures, education, stricter enforcement, tougher penalties, in some case, providing reasonable alternatives that enable those engines to be shut off or eliminate the queuing that leads to that idling.

CHAIRMAN BERKOWITZ: Commissioner, I want to thank you very much for spending time with us.

I will say that when the Council received the presentation by Dr. Stern regarding the health impacts on fine particulates, the Council was floored. Clearly this is one of the things we think we can do something about; Council, thinks we can do something about. We very much appreciate the department's efforts.

We also believe there is a disproportionate class associated with the environmental issues.

The Council looks forward in trying to craft some recommendations to you and we'll do so at a later date as a result of this hearing. We thank you for your support throughout the year, thank you for being with us; we thank you for the support of Sam Wolf, Phil O'Sullivan, Sonia Evans, Chris Salmi and everybody else, the Council is very appreciative of all the department's efforts.

CHAIRMAN BERKOWITZ: I'm sorry.

MR. SOTO: Commissioner Campbell, I just want the public and the members of this Council to know that I am very honored to be here today. It's the very first time in this Council. What I'm hearing is very encouraging and exciting.

I represent the Port Division of the Union. Specifically I want the public to be aware of the different kind of concerns that we should all have in the port, the port areas. When I hear idling, when I hear air pollution, when I hear public safety, I'm not

going to get into details. There's a lot of issues and I'm proud and happy to be here, because hopefully this is the beginning to fix some things that I'm sure would be for the good of New Jersey and everybody, because no matter where you come from in the globe, sometimes you come through New York and New Jersey to Pennsylvania and you're right in the arrow. Therefore, I want to express how proud I am to be here, a honor actually.

COMMISSIONER CAMPBELL: Thank you.

And welcome to the Council. And I think you have seen firsthand some of the challenges we are trying to grapple with. I look forward to your recommendations. As always I urge you to be prompt in your recommendations, as well as thorough. And I'll look forward to seeing them as you bring them along.

Thanks very much.

Thank you very much.

Is Tom Corcoran in the audience yet? Tom? No. I don't see Tom.

Dr. Turpin, would you please present to us.

Thank you very much.

DR. TURPIN: It's an honor to follow the Commissioner.

I was asked to talk this morning about the composition of particulate matter. And let me first say that there's a lot of work going on right now to understand how the chemical and physical properties of particles affect their toxicity. I'm not going to talk about that, but the talk I give you today should provide you with a good background for understanding that work as it comes out. And also generally speaking, to understand what different kinds of control strategies can do for us.

Now, there are billions and billions of particles between me and you and I know you haven't seen them yet so I thought I'd start by showing you a couple particles. I see it's a little bit light, but what you see here, I'll outline the one particle I want to show you. This is one particle. It's probably from a diesel engine. I found this particle in downtown Minneapolis and it's comprised of very small solid carbon particles all stuck together

in agglomerate and this is pretty close to a fractal, if you've heard of fractals. This is one of the particles that you'll find every day walking around in New Jersey.

On the next overhead, can you click on the slide show?

This is another particle. It's actually found in the same volume of air as the last one and it's bubbling away as I'm looking at it under the electronic microscope. So this is a spherical liquid particle, it's almost entirely made up of ammonium sulfate and water. So this is another very common particle that you've find every day in New Jersey.

Go on. Certainly not all particles are created equal. In the same air, we will find many different kinds of particles. There are solid particles, like the one you just saw that range in shape between spherical and fractals, and these contain things like elemental or black carbon and sometimes metals.

We also have organic sticky viscous, oily, greasy organic liquid particles, which can be their own spherical particles or

can be coatings on those solid particles. Mostly these come from combustion processes or some other processes like petroleum which is a sticky liquid, ends up getting very hot and becomes a vapor and as it cools back down or as it's partially combusted and cools down it condenses.

Also, we have a lot of particles that are highly concentrated aqueous solutions, solutions of water or either water soluble acids or water soluble salts. Acids like sulfuric acid and organic acids, ammonium sulfate, ammonium nitrate and organic salts. These form in the atmosphere. They can either form their own particles or they can condense and absorb into preexisting particles. So they can be a coating on those other two particles that I explained earlier.

In addition, we have particles that are mechanically generated; they are broken down from larger materials. These are irregularly shaped particles, and they're mostly too big for us to call them PM 2.5, but some of them, some of them are just barely small enough to fit into the fine particle

mode. These are things like wind-blown soil dust, plant debris, sometimes cement dust you'll find in the air. Just the tail of the fine particle.

So you can see that particles are created through different mechanisms, they have different composition, different physical and chemical properties and they are likely to have different effects.

Now, this very complicated diagram, anyone who knows me knows I can spend a whole term talking about this diagram. But what I'm trying to show you is that, yes, we have some particles that are emitted from sources, mostly from combustion sources but also other sources and those are primary particles that are emitted as particles. But most of the particulate matter in this state and I'll show you this, is formed in the atmosphere. So atmospheric processes dramatically changes the concentration of fine particles, their size distribution and their composition. For example, SO2, which is mostly from coal-fired power plants, is oxidized in the atmosphere with the help of sunlight.

We have to get back to where we were.

It's oxidized in the clear atmosphere to sulfuric acid, which has a presence of ammonia, which eventually becomes ammonium sulfate, it's also oxidizing cloud droplets, sulfuric acid and eventually into ammonium sulfate.

The nitrate is a big deal in California. There's not very much here in New Jersey for kind of a complicated reason, which I won't explain right now.

But organic particulate matter is also formed in the atmosphere. It's formed because of NOx emissions and VOC, volatile organic compound emissions. So NOx is emitted from high temperature combustion from things like coal-fired power plants and diesel trucks are good emitters of NOx. That NOx and the sunlight and reactive organic compounds that are emitted from motor vehicles, from cars and from vegetation react in the atmosphere to form organic particulate matter. Turns out we're learning that it's looking like this organic particulate matter forms more readily when

there's already acidic sulfate in the air.

So this sulfate, nitrate and organic matter that forms in the atmosphere is particulate and it dramatically changes the composition of the airborne particles.

This is a pie chart. It shows the species which make the fine particle at Brigantine National Wild Refuge, Annual Average Composition. Brigantine is frequently used to study the Regional Mid-Atlantic states aerosol. You can see then that -- I will show you with my finger the sulfate. The sulfate, nitrate and some of the organics are all water soluble materials that were formed in the atmosphere and they compromise more than half, substantially more than half of that Brigantine, of that regional aerosol, which you find in the Mid-Atlantic states and which is formed over the last few days at an upwind site.

We can go to the next slide. Where does this stuff come from? It should be no surprise that it comes from upwind. If you look at days in which particle concentrations are high in Brigantine versus days when they're

low and you look at where those air parcels were over the last 48 hours, all of the high days come from this direction and the low PM days come from that direction. Now, that's not surprising. But what it's illustrating is that sources in the midwest and in everywhere between the midwest and Brigantine are contributing to the Brigantine aerosol. Those particles, more importantly the particle precursers, the SO2s, the NOx, the VOCs that enter the atmosphere and are processed through clouds and the aid of sunlight, that's what's ending up at Brigantine and creating that aerosol.

This is a pie chart from Newark, I didn't get it exactly right. I think I borrowed some -- it's not exactly right for Newark. But what I wanted to show you is the Brigantine PM 2.5 mass is about 70 percent -- the Newark PM 2.5 -- okay, the Brigantine aerosol comprises about 70 percent of the Newark aerosol. So that additional 30 percent in Newark comes from local sources. The 70 percent is from the regional -- is the regional aerosol, like I just described to you, and the

30 percent is local.

For Camden and Elizabeth I think the local is about 25 percent. So this is the important because I tried to estimate how much of that 70 percent could be natural. And if you say that three to five micrograms per cubic meter could be natural, that leaves at least at least 50 percent formed through transportation.

So we know from this that what happens upwind of us with particle precurser emissions makes a big difference in terms of the aerosol concentration here in New Jersey.

Now, I would like to point out that you know what the composition of that regional aerosol looks like. It's largely comprised of these water soluble compounds, these secondary, these materials that are formed in the atmosphere. The local stuff is very different. It's much more dominated by primary emitted particles, by material that's emitted directly in particle form, usually from combustion processes.

Next. So the composition isn't the same. The composition of the regional stuff

and local stuff is different. And we don't really know how that matters in terms of health. I don't want to belabor this, but the types of compounds that will be emitted directly from sources in the particle phase, elemental carbon and some metals and these less water solubles, nonpolar or very low polarity of organic materials, including pHisms, which is keytones and quinones and stuff like that, kinds of materials that are found in fuels that have been partially burned and materials that are formed by the partial combustion of fuels are good examples.

Here's an example -- the point I want to make here is that while most, about 75 percent, 70, 75 percent of PM 2.5 mass is regional and secondary and comes from upwind sources. That's not true for primary PM species, for PM species that are emitted in particulate form. Here's an example, Benzo(a)pyrene shows concentrations in various places in New Jersey and these are annual average concentrations from the New Jersey Atmospheric Deposition Network. You can see that Jersey City concentrations are a lot

higher than the other concentrations. In fact, we believe that about 75 percent of Benzo(a)pyrene in Jersey City is emitted locally. So in contrast to fine particle mass -- there are components of fine particles that are mostly emitted locally.

And if you look even more locally, we did a study not too long ago called "RIOPA" which measured indoors and outdoors and on people or one hundred homes in Elizabeth, New Jersey, as well as a hundred somewhere in Texas and a hundred somewhere in California. What we found, but many other people with other kinds of studies have found similar things, within 1 or 200 meters of a major roadway, emissions like elemental carbon, which is a good tracer for combustion, particles are elevated. So elemental carbon was about .4 micrograms per cubic feet higher -- was .4 microgram higher for homes that are very, very close to a major roadway than it was for other homes in the study and that's about a third of the study in EC.

With elemental carbon comes combustion generated organics like

Benzo(a)pyrene, for example. If you live very close to a roadway, you do have -- you have elevated concentrations due to that, plus some elevated concentrations within the city as a whole. And then there's the regional material.

A little update. I think I've done pretty well. We can skip this.

I wanted to, I couldn't let you go there and not say something about the indoor environment, because I have been studying quite a bit lately. Most of you spend most of your time indoors and yet we're spending a lot of time talking about outdoor particles. An average U.S. resident spends about 87 percent of their time indoors; but it turns out that outdoor particles are the major source of indoor particles, of indoor PM 2.5 in non-smoking homes.

I can skip this also. This slide talks about most of the indoor generated particles are organic. What I wanted to say here is that the composition, as you bring those outdoor particles indoors, the composition can change. And it turns out that

this is a big deal in California where there's a lot of ammonium nitrate. When you try to bring ammonium nitric indoors, ammonium nitrate exists in an equilibrium nitric acid, which is a gas. Nitric acid gets sucked up by the wall, wall materials and then disturbs the equilibrium and the ammonium nitrate which is in the particle phase starts coming out into the gas phase and it all disappears basically.

So in California that can be half of the particle mass. So you can take an outdoor particle and bring it indoors and the mass goes down by 50 percent. So what that tells you is that in some places the composition of PM of outdoor origin found indoors is dramatically different from the composition of outdoor particles. So far we don't have any evidence to suggest that this is a dramatic effect in New Jersey. There are some differences because primary combustion particles have a different size distribution than the secondary particles, they're a little bit bigger. And mechanically generated particles like soil dust are much bigger. So their ability to infiltrate and remain

suspended indoors is different because of the different sizes. This will cause the percentage of each of these particle types to change as it comes indoors. So there is some change in the bulk composition of the aerosol as it comes indoors because of these different types of particles have different properties.

We think this isn't a very big deal for New Jersey particles, but it is for California particles. So it's worth keeping in mind.

Next please. In conclusion. I'll start from the end and go backwards.

Exposures to particles of outdoor origin occur mostly indoors and composition of outdoor PM can be altered with outdoor-to-indoor transport of primary, for example, combustion particles are enhanced very close to sources, for example, 100 to 200 meters away from a major thoroughfare. That's not very far. That's within a block of Route 1 and 9 in Elizabeth where many of our homes were. This exposure is in addition to the exposure you have because it's a little higher within a city and then the regional PM that is

formed largely through atmospheric photochemical reactions involving emissions of precurser gases upwind. Thank you.

CHAIRMAN BERKOWITZ: Thank you, Dr. Turpin.

Questions?

MR. PAPENBERG: I'd like to start the questioning.

Dr. Turpin, do you have a sense of the transport of the source of these particulates that have become regional in New Jersey air? How far out are we looking? Are we looking midfield, farfield; what are we looking at?

DR. TURPIN: We're looking at least a couple of days out, which puts us in Ohio, that scale. But sort of the eastern midwest, that scale.

CHAIRMAN BERKOWITZ: Thank you.

Questions? Irwin.

MR. ZONIS: Dr. Turpin, if you think about ammonium nitrate and ammonium sulfate and I recognize you're not focusing for the moment on toxicological effects, would you consider that these two chemical compounds

which must be lung air, is that the primary problem or is the primary problem that the ammonium sulfate that you mentioned, help convert VOCs or organic particulate matter?

DR. TURPIN: My primary problem -- do you mean healthwise?

MR. ZONIS: Healthwise.

DR. TURPIN: I'm not going to speculate on health effects. It's not my area of expertise, but there's so much going on right now and I started with this comment, there's so much research going on right now, I'm waiting to see what they learn.

MR. ZONIS: I think that the results of your work, your presentation is absolutely fascinating, but mind boggling. It's obviously very complex. I can just imagine looking at that one particle under the electronic microscope and watching it, essentially, disappear and trying to best describe what it consists of.

Thank you for the presentation.

DR. TURPIN: Thank you.

CHAIRMAN BERKOWITZ: Dr. Blando.

MR. BLANDO: Quick question for

you. In terms of the acidity of the aerosol in New Jersey, can you roughly estimate how ammonium sulfate completely neutralize? Can you give us an idea of how acidic our aerosol is in New Jersey.

DR. TURPIN: I'll try. It is a composition question. I'll answer it. It's not neutralized. It's more like ammonium bisulfate or a little more acidic than that. The sulfate in New Jersey is generally acidic and that's one of the -- there's not enough ammonia to neutralize all of it. If we added a whole bunch of ammonia to the atmosphere, which I don't plan on doing, then we start having nitric acid, converted to nitric acid, so we'd have more of a problem.

MR. BLANDO: I just had a few other questions. I just wanted you to comment on the diurnal seasonal nature of the composition. I'm assuming in New Jersey it varies, does it vary substantially? And just a few comments in terms of what you see.

DR. TURPIN: In the summer when it's hot, we have a lot more photochemistry, so concentrations of all those secondary

components formed in the atmosphere go up and that causes PM 2.5 concentrations to generally go up. But the winter time we have temperature inversions that put a cap on the atmosphere, the pollution that we emit is more concentrated and so primary emissions, things that are coming directly out of sources, tends to be -- have higher concentrations in the wintertime. So wood smoke combustion products are more concentrated in the wintertime.

MR. BLANDO: One last question. You mentioned the indoor environment, certainly Clean Air Council, we've had a lot of discussions about air quality. I was just wondering if you can make a brief comment about some of the indoor sources of fine particulate matter such as gas stoves and so forth.

DR. TURPIN: The biggest one you all know is smoking. It certainly is worse for you have if you are the one doing it, but if somebody else is doing it in the same room, it also is -- overloads. In this study we had to use only non-smoking homes, otherwise, we wouldn't learn anything except about smoking.

Certainly cooking; cooking is a big

one. Now, certainly housecleaning, you'll be glad to know that housecleaning produces particles, so maybe you'd like to stop doing that; they tend to be larger particles. But vacuum cleaner motors produce particles. And another very interesting fact is that volatile organic emissions from things that have a lemony fresh smell, that's limonene; limonene reacts to ozone to form aldehydes, which are nasty things. And fine particles. So we've done experiments where you spill some limonene on the floor, you bring in an ozone generator, which could have come in from outdoors and you could form a hundred micrograms of particles. I don't know if these are bad for you, but they look very much like secondary organic aerosol that you form outdoors.

One way, if you like doing experiments like this, I won't name any brands to get in trouble, but you could buy an ionizing air cleaner which will generate ozone for you in your house and some of those plug-in deodorizers that smell like lemon and put these in the same space and wait and you'll get lots of particles.

Any other questions?

MR. ZONIS: I can't resist the comment, your remark certainly was meant to be facetious about putting more ammonia in the atmosphere, reminds me of comments equally facetious made years ago that we never really noticed that acid rain was a problem until we began to eliminate the dust put out by cement plants, because that's a relatively high alkaline dust, we took the alkaline out of the atmosphere, that left the acidity unresolved with the results that we don't know about. And thinking about the subject of today's meeting, we certainly could help control a pH by letting those cement particles go into the atmosphere uncontrolled, but that would generate a completely different set of problems. But the same facetious things and it's a matter of serendipity or maybe negative serendipity in actions we take.

CHAIRMAN BERKOWITZ: Turpin, one quick question. To what degree of confidence can you differentiate regional particulates to local particulate, ballpark?

DR. TURPIN: To give information

like on an annual average 70 percent, 75 percent I think comes from regional or upwind sources; I think we can do that. We do that by a combination of looking at back protectories, so many that you have to cluster together, and compositions and enough measurements that we can look over several years. But the DEP has been very good about producing those measurements.

CHAIRMAN BERKOWITZ: Thank you very much. We always appreciate you addressing the Council.

I'd like to call to the podium Dr. Morton Lippmann. I met Dr. Lippmann through the literature, but not in person. Dr. Lippmann comes to us from NYU and we are very pleased that you are here.

Thank you, sir.

DR. LIPPMANN: Couldn't asked for a better introductory presentation to prepare you for some of the speculation that I will be presenting on health.

We all know that, especially with the DEP, that you have to deal with regulatory concerns, which are based largely on health

observations, and largely and especially for particles on epidemiology. As you, I'm sure know, epidemiology is a fairly blunt tool, but one that can't be ignored. We're looking at the right species, humans, and we're looking at observed health issues or indices and they have been associated with pollution on both a daily, annual, time-varying basis looking for mortality and hospital admissions and lost time and other things. And we're looking also at annual exposures to particulate and seeing associations between fine particles and the communities and longevity.

On average, the latest data suggests a couple of years the difference in longevity between U.S. cities with the highest level of pollution versus the lowest level of pollution. Of course, U.S. cities with the highest level of pollution are much cleaner than the cities we grew up in. We made a big difference. We're not talking about very heavy exposures, we're talking about cities with a little bit of a problem in the regulatory arena.

So I'm -- I'll try to give you a

perspective and some generalarities with specificity where I can say something explicit, but because we can't give you hard and fast answers -- there's a 50 million dollar a year health research program on particles for the last four years that Barbara alluded to it and they're beginning to turn out some of the answers we need, but the EPA has recently announced recompetition so that there will be five more years of research, maybe by the same institutions such as mine, maybe not, to hone in further where the bad actors are.

The problem is, our measures of pollution and the exposure inferences that we draw from them are based on a gravimetric assay or an instrument which, to the EPA satisfaction sufficiently simulates a gravimetric measurement to be used in regulatory purposes. And you certainly know now that the composition of the particles changes from season to season, from day-to-day, from place to place. Certainly all of New Jersey is not seeing particles of the same composition gravimetric measure which is imperfect, even as a gravimetric measure. Because the ammonium

nitrate, which say it's even only 10 percent here, bigger problem elsewhere, will it still be on the filter when the filter is weighed. We're taking 24-hour samples; a lot of air is going through the filter and semi-volitiles, organics and nitrate may not be there when you weigh it with all the precautions that you can take.

We have particle-associated water, because the nitrate and sulfate certainly are quite microscopic and so we equilibrate to a certain moisture level, but that doesn't get rid of all of the water. In the east we're paying sort of a penalty penalty in this gravimetric "gotcha" game because we're measuring water, which we really don't think we should be measuring.

In the west they have an advantage with more organics than nitrates, which are more likely to be lost rather than added to the mass of the particles we think we're interested in on the basis of certain chemical properties.

Just a little background. Each of the six criteria pollutants has different

standards of different time constance and/or chemical forms. The standards are really for NOx, but they're indexed by NO2. The standard is the sulfur oxide standard indexed by SO2. Lead is all kinds of compounds of varying toxicity and PM is the worst because we don't have a gas standard where we measure all gases; we have a particle standard and we know that compositions can make some difference, although there's evidence in the health literature that particles, per se, seem to have an effect irrespective of composition.

Then we have different size cuts on a health-based standard. We used to use a big vacuum cleaner, basically an Electrolux with a 8 by 10 filter attached to it and it collected everything that could be sucked in. That was a stupid selection for a health-based standard, because the health effects are due to the particles that get into the thorax. So in 1987 we made an advance and said let's inertially cut off those big rocks and only let the particles under 10 approximately reach the filter to be weighed. That was an advance and epidemiology remained more conclusive, because

we weren't measuring windblown dust on high wind days with a lot soil, which is less toxic we're pretty sure, we were measuring what could get into the thorax.

In a regulatory framework that had a limited value, because if a community was out of compliance, they could pave and wash roads and that would bring down the mass, because the mass is concentrated in the biggest particles that you collected, if there are large particles present. So then we also realized through the work of atmospheric chemistry research, the kind that Dr. Turpin does so eloquently, that the composition is very different, as she said. We have soil-like materials in the two and-a-half to 10 and secondary aerosol, plus some primary carbon in the smaller particles. And so you could get everybody within a PM 10 limit by somewhat artificial means, but it wasn't doing anything to really address the issue of less than 2.5, where most of the health effects are believed to be associated.

So we went to this dual standard of having 10 and 2.5.

Next line. What kind of health effects are we talking about? Obviously, premature mortality. This catches everybody's attention; also the economists like that because when you do a cost-benefit analysis of a control program, then mortality trumps everything else, the rest becomes almost insignificant. But in terms of understanding what's going on, we can look at other things. The advantage of mortality data and hospital admissions data is we don't have to collect the primary data. The public health agencies tell us how many people died on a given day. We can also get some information on the cause, as good as autopsy records are. In terms of hospital admissions, we can get hospital discharge data. If somebody was admitted to the hospital, if they didn't die, which most people don't, fortunately, they were discharged with a discharge diagnosis, which of course, is better than the entry diagnosis, which is tentative indication until doctors see them.

So the pollution control problem as you people well know is largely ozone and PM 2.5. And yesterday we found out how many more

communities were in violation in the ozone standards and the one-hour standard that preceded it.

Next please. This is a simpler version of some of the things Barbara was trying to tell you. We have an idealized or long-term average which even varies with location, but we have the accumulation log, which is these gas-based products that are accumulated in the atmosphere, they get washed out by the rain, washes out the visibility causing particles whether it is right at the peak of the accumulation loads and effective at scattering scores mode, as I said, narrow down. Why was PM 2.5 selected for the fine mode rather than one and-a-half? In a lot of the country we have nitrate and sulfate, which is microscopic. If you want to be conservative about catching all of that, allow for the fact it grows into particles exceeding one micron into the two, two and-a-half micron range. It gives some source attribution to people problems because you have little bits of course material in the fine material. If you look at the particles below one micron, which get into

what we call ultra fine particles in the health community, but the engineers and physicists call nanoparticles, even if they are in different modes within that very small fraction and typically collectively they add a microgram, in worst case, two micrograms in cubic meter to the mass. They dominate the number concentration, but they don't show much when you're looking at a gravimetric index. The Aitken mode is where the raindrops form around and then we get into the accumulation mode, which is smaller in number concentration, but dominates in mass concentration. And the nanoparticles are a new health concern. The nanotubes appear to have toxicity and it's very early looking at that, that's something to look at down the road.

This is just a global summary of what we're seeing in the accumulation mode aerosol and that, as I mentioned, shows the negative and positive artifacts therein.

Next please. Let's skip that. In the different parts of the country we can see different mixtures. If you analyze everything in it, we get different amounts and just saying

so, I think was adequate as far as Barbara's presentation was concerned. Now in the -- on the basis of the first few years, every county-wide annual PM 2.5, in terms of meeting the current annual criteria of 15 micrograms per cubic meter as an annual average and modeling from the measurement data in the counties where measurement exists for a county and sometimes they don't represent a county very well, that very big geographic county, still you get some idea where the problem areas are and Southern California and a little bit less than New Jersey with areas that were expected in this analysis to be in exeedance as exeedances are determined, but not by very, very much. So some communities will have to knock down fine particles by 20 percent or so in the presence of continuing economic growth and miles traveled and so forth. It's not easy, but it's not quite, in my view, as horrendous as of meeting the ozone standards, however, in my view, the PM standard is more intimately related to the human health, so it's something we do have to worry about.

There is something that effects New

Jersey, certainly. These are the old power plants. The grandfathered power plants exempted from New Source Review. Some have grown substantially in output on the basis they weren't doing major overhaul, but just maintenance and new power plants have emitted much less sulfate than nitrate and I think the annual standards could be met by the enforcement of the New Source Review. All of these plants have been 25 years of operation without a major overhaul by their definition, which is quite an artificial situation. And if you do the emissions analysis, the bulk of the SO2s coming from these plants in particular, so that's an issue which you can't do anything about, but you can push on the state attorneys general to enforce the emissions.

Now we have a gravimetric standard and Barbara introduced some particles that are created indoors. And some researchers without an ounce of sense have gone around measuring the mass of the particles indoors and saying that because it doesn't correlate well with outdoor community measurements, that the outdoor community measurements don't indicate

what people breath in.

I'll jump ahead and say that based on all of our evidence, that daily mortality and hospital issues is very, very significantly with the outdoor measurements and they don't vary with what the total is on the indoors, even without cigarette smoke is complicated. There's something about the overall composition or surface activity of particles that are outdoors that do come in that's more toxic than the equivalent mass of indoor generated particles from resuspension when you vacuum or you're sitting down on an upholstered couch or cook. Certainly smoking is a different issue because that's toxic material. I think it's important to recognize that while the central site monitors are not really very good measures of what each individual in the community is breathing, they're a good measure of what the average person in the community is breathing and since we're looking at integral data at hospital records and deaths, it turns out it's a very good index of exposure of concern.

And so in this current round of review of the PM standards, which is going into

the fifth stretch review, it's never been more than three before and it really shouldn't be more than one or two, because of all the contention and the unproven assumptions that are sometimes necessary, it's not going to change. We are going to still have fine particle standard, still going to be gravimetrically based. Hopefully now with the research going on, we'll have a basis for more chemical specific standards at the next round or maybe not even then. But in the evidence, which is consistently coherent in terms of the effects measured, if people are dying, which is the hardest data, and people are going for medical attention in the hospital or clinic, which is reasonably hard data and they miss school or work, which is pretty hard data, then you would expect a cascade of effects that not everybody is going to die, they may get sick and not die. So we have the unresolved problems which we're dealing with as best we can. The toxicologists often say, without understanding the mechanism for the toxic effects, they're not going to believe it.

The lawyers will say whatever their

employer tells them to say. The epidemiologists have to defend the associations and increasingly look at confounding factors which might explain it like weather variations, differences in the mixtures of people from one town to the other in terms of the annual levels, but it is -- all of these things that need further information and we have to look so far as the weight of the evidence.

Next please. In the criteria document draft, even in the last one, you find this diagram which summarizes this difference in temporal scales, composition and so forth, fine and course particles, the travel distance and the age and so forth and I won't belabor that.

Next slide, please. What are some of the usual suspects that we look for when we look for something to measure other than mass? Well, the candidates that are still in the running, although none of them I think will prove to be the silver bullet, as we might say. Strong acid in and of itself, is the one material that produces a measurable biological response at peak current and recent levels in

terms of lung clearance. It also, as Barbara indicated, is strongly associated with the formation of organic aerosol and sulfate has proven to be a very durable surrogate index for whatever it is in the particles that's toxic. Sulfate is associated with acid. It's associated with peroxide in the atmosphere, with quinones in the atmosphere. These are things that are more toxic than in other known complements. The transition can be important in terms of stimulating oxygen irradicals in the body and the acidity may play a role there too because it's the soluble metals and transition metals which are most active in that mode and the acidity makes the particles more soluble than they would be if they're acid coated. But I indicated the doubts about whether they really constitute a -- especially important component.

Next slide, please. Now, there are all kinds of things going on. I wanted to put in some relatively recent data. This is asthma hospital admission rates, 95 percent competent intervals for course particles for 6 to 12 year old children in Toronto. Toronto's mixture is

not that different from what we have, although it's a different country. But the population is similar and we'll take data wherever we get it. It indicates that the relative risk is dependent among the exposure averaging time and especially for girls.

These are by different methods but are getting similar results with the magnitude effect depending upon the model you want to use. Epidemiologists have to have models to correct the things that are correctable and that adds on certainty as well. I think it's observable that cases pile up, deaths pile up, not just from one day's exposure, but exposure peak, three or four days duration, that's not surprising. We talk about lags.

The luminescence which may be a good bio marker with concentrated air particulars. A lot of our better appreciation of the plausibility of effects is coming from studies going on in my lab and others around the country, looking at concentrated and fine particles. How do we do this? We inertially separate them. You use a virtual impactor, get rid of the 90 percent of the air and throw the

particles into the smaller fraction extreme, it's the same particles still in air. If you do controlled exposures, the only way you are going to have any chance of seeing effects in a small group of animals, small animal or people, is to somewhat enhance it, but we're still talking about concentrations lower than what were when we were kids, it's not outrageous, it's lower than a lot of European countries. This shows that the exposure to CAPs Concentrated Air Particles, not only cause reactions that can be measured with a bio marker in the lung, but in the heart as well. That's where the epidemiology has been moving. It's been moving towards cardiac effects. Looking at the 52 London episode, but the highest level of risk was respiratory disease, but the largest number of deaths with half the relative risks was due to cardiac, because cardiac disease is more prevalent.

And I'll just give you a hint of some work we're submitting momentarily for review. We have done the first study not only of CAPs for a day or two or three, but for daily, five days a week, six hours a day for

six months. And we did it in mice. And the mice were wearing implanted cardiac monitors, it's a bump on a mouse, but it's solvable. We used a normal mouse and a genetically altered mouse from that strain, which is prone to develop cardiac aortic plaque spontaneously. And this in the way we do things represents a model for the human cardiac patient. And believe it or not, for the summer of 2003, in studies done in Tuxedo, New York, about five miles due north of Ringwood, New Jersey, in a state park, which is the drainage basin for the Wanaque Reservoir upwind of much of the corridor from the megalopolis and in other local sources. We got significant changes in heart rate in the mouse model that varies on a daily basis with the concentration; we concentrated it 10 times, not at uniform concentration, but 10 times what the ambient was. Over the five months for the animals with the cardiac monitors, we saw base line shift in heart rate; 10 percent shift in the heart rate that accumulated with continuing exposure. This kind of thing is not definitive. We didn't look for clinical evidence of disease

which is hard in the animals. We did autopsy, we see some changes in the plaque distribution at sacrifice. We've seen some genetic market changes, which it might stimulate other health responses. And we've seen some other things, which I haven't even mentioned because they're further from publication submission. This heart data was presented in Baltimore a couple weeks ago, Society of Toxicology.

So we're seeing that both acute and chronic effects can come from the particles in the ambient air in a susceptible model that we think represents human cardiac disease and we didn't even go beyond five months of exposure for the cardiac monitoring.

What if we went to a bigger fraction of a life-span? We were losing some animals anyway due to premature death because they are sick animals. And we might have knocked off more of them. We need to do more of these studies. We have just been completing a winter study because of the different composition and we think we're seeing effects of the winter aerosol as well.

So as of now, my advice to people

with interest in control is that the evidence is becoming firmer than it ever has been. The particles in the ambient air, for whatever reason, bulk composition, my bet is on surface composition. What's happening? We have all this chemistry going on and a lot of it is based on surface particles, which is the first things lungs see when they deposit.

Barbara knows a lot of people doing single particle analysis. Although we're doing it too. I think until we learn to peal the surface off, which we're trying to do, it's going to be limited value. The bulk composition of it is not the key. Anyway, that's pure speculation.

I thought I'd bring you up-to-date on where things are going in this business. The most recent analysis of the ACS cohort showed one cancer in excess of cardiovascular mortality on an annual basis. And a second paper on that same 16-year follow-up of the ACS population in circulation January of this year documented more specifically the cardiac causes and the air association; not overall cardiac, but specific cardiac association.

Now, I wanted, I think the last one was on course component, the PM 2.5 to 10. I won't go back to it. I won't say more than, mortality is most closely associated with fine particles. Upper respiratory irritation, asthma may well be more an influence by the two and-a-half to 10, which don't go all the way to the deep lung very much and they impact on the twitchy airwaves. So don't just concentrate on 2.5.

EPA has still not resolved how to deal with the Supreme Court decision that they can't measure both PM 10 and PM 2.5. They're almost forced to meet the challenge to measure course particles separately from the fine so we can start to get epidemiology that's more convincing on that. Thanks.

CHAIRMAN BERKOWITZ: Thank you, Doctor.

MR. LYNCH: Thank you for a very, very interesting presentation and I think cardiac issues are fascinating.

You said something at the very end that I wonder if you can sort of connect with Dr. Turpin's presentation. You said that you

really think that focus should be on the surface contamination issue. And Dr. Turpin described that as much as 30 percent of some of the urban center exposures may be low ball with a compilation what she described relative soluble materials versus relatively insoluble materials, etcetera. I wonder if someone sort of pressed you to hazard a guess at what you thought the relative risks might be when you're comparing some of the worst soluble issues to the non-solubles, as it relates perhaps to primarily obstructive pulmonary disease. How heavy is the weight?

DR. LIPPMANN: I can speak another half hour on your question. The last thing you said is a mixture of emphysema and chronic bronchitis. In the context of particles, that's two different pieces. Bronchitis is related to, I think, pretty surely, the particles depositing in the bronchial airways, which cause a shift toward more mucous excretion and excess excretion. Emphysema is a disease of the lower airwaves. So clearly for emphysema, it's fine particles. For bronchitis it may be two and-a-half to 10. In terms of

composition, everything Dr. Turpin described either gross bulk composition of all of the material in the filter and what you can extract and measure and even with the single particle maspecometers (phon), the bulk composition of individual particles and so that kind of information is valuable; it helps understand what's going on in the atmosphere.

In terms of the acute mortality epidemiology, it looks like with recent work done by Harvard investigators, that it's about twice what people used to say because they were looking up to five days of lags, with distributor lags going out to 40 days, which is the ultimate limit of the method; you get integral which doubles the excess.

So it's quite complicated. Is it the regional aerosol or is it the locally generated aerosol, I think what you started with. Certainly we have data that is very similar to Dr. Turpin's in New York. For a year we had daily samples in Tuxedo, upwind and First Avenue in Manhattan. And for the six warmer months, the 75 percent of what's measured in Manhattan on First Avenue was

measured in Tuxedo. It reinforces exactly what she said, even with a very dense population.

Now what's the difference? The difference was largely organic elemental carbon measured closely by monitors which tell us what element of organic carbon was. There's carcinogens in that stuff, so does that make it nasty? I'll say in contradistinction, we did our chronic/subchronic mouse exposure study in Tuxedo for two reasons. One, we could mount it there, that's where the lab is that had the capability. But second, if, in fact, the regional aerosol is causing the cardiac changes, we have a much cleaner exposure to regional aerosol. So the kind of things we're now seeing in cardiac changes, we're seeing reasonably little carbon in it. It doesn't exonerate carbon and different things may have different effects. Maybe the excess cancer risk is more closely related to the organics, maybe not. But we don't know. But until we do know which components are fragments of the silver bullet, I think we have no choice as public health professionals to advocate control of, essentially, all PM sources.

CHAIRMAN BERKOWITZ: Any other questions? George.

MR. CURRIER: Would the Council be able to gets a Xerox copy of your presentation?

DR. LIPPMANN: I can certainly give you an electronic copy of the slides.

CHAIRMAN BERKOWITZ: That would be helpful to enter into the record.

DR. LIPPMANN: My secretary was out this week and I didn't get to prepare a handout, which I intended to.

But I was speaking on, essentially, the same topic, you wondered what Montana had to do with this. I was at the Jordon conference, at least I have these slides to use and they were for the same kind of purpose of education, so I feel that they -- I can give you the slides that I used.

CHAIRMAN BERKOWITZ: Dr. Blando.

MR. BLANDO: You mentioned gravimetric measures that were taken. I was just wondering what your thoughts are. I had heard some discussion about should some of these stationary monitoring stations, should

they actually have devices available that will be tracking the number of concentrations or size fragment sum concentrations and how useful do you think number concentrations measures would be in terms of the epidemiology in understanding the health effects?

DR. LIPPMANN: I hate to say that really good scientific information will not be useful, but in the regulatory framework I think we're dealing, I don't really think so. There is some epidemiology which shows as good or better association with some health pinpoints with a numbered concentration. It's not ready for prime time, because the different instruments people buy from different vendors measure different ranges of ultrafines. It can't possibly explain everything, so I think keep it in mind.

What I would have a chance to do as a sales pitch on people in New Jersey is convince them to measure fine particles on a daily basis, because the epidemiology gets better as we have more information. And measuring every third day is better than every sixth day, but it does limit how much we can

make use of the health data. I'd rather see it done with a continuous monitor which could satisfy EPA's equivalence. I'm not worried about the precision for epidemiology; we don't need the last word in precision. If we can get more speciation data, we're looking at that as a research tool to try and understand the complements the three years of speciation data may help us pin down the geographic origin via tracers and that would help. And so we need both more focused toxicology on doable things and we need more epidemiologies and the greatest boom there would be more composition data and especially more day-to-day data.

The reason I advocate continuous monitors is because we use 24 hours as an index because it's just smart. You get enough material on a filter for many things for 24 hours. But if you could look at true temporal variations, we would have even more opportunity to associate effects with concentration and maybe we need something shorter than 24 hours. And especially as we go into components.

CHAIRMAN BERKOWITZ: We are going to have to break here. I would invite all the

speakers this morning, as well as future speakers to join us for lunch up on the seventh floor. We'll reconvene at 12:45. And thank you very much.

(Lunch pause.)

CHAIRMAN BERKOWITZ: We're back on the record and we'll continue with the proceedings.

It's a pleasure to introduce Charlie Pietarinen. We always are fascinated by Charlie's presentation. So Charles.

MR. PIETARINEN: I was very glad to hear from Dr. Lippmann this morning and his comments about the Federal Reference Method. I'm getting tired of complaining about it myself.

This is an even older piece of instrumentation. This is called a smoke shade analyzer and it's something we have been using in New Jersey for over 30 years to get a sort of surrogate measure of particulars. I'd like to say these things are old and reliable, but like me, they're just old.

We do have this 30 year history using this instrumentation so we can do a

pretty good trend of consistent measurement going all the way back to the early 1970s. What I try to do on this slide, the smoke shade measurement is not a direct measurement of the particles it doesn't measure particle mass; we have to sort of correlate the mass. And we developed over the years correlations, smoke shade to Total Suspended Particulates, which was what the original standard was for, correlations for PM 10 when that standard was correlated in 1987, and again for PM 2.5, that standard was promulgated in 1997. I won't say that any of those correlations were correlations great but it certainly gives you a frame of reference. And if you look over the history of particles here you'll see that in the early '70s, concentrations were well above the Total Suspended Particulates standard and concentrations came down as a result of many activities, both in New Jersey and in other states. By the time the PM 10 standard was put into effect in 1987, we were right around the level of the Total Suspended Particulate standard and since the PM 10 standard was slightly less stringent in some ways than the

original standard, we never exceeded that standard in New Jersey on any kind of regular basis. Since the PM 10 standard went into effect, we have pretty much been in compliance with that standard across the state.

When the PM 2.5 standard came in in 1997 and as you heard earlier PM 2.5 did not replace PM 10; both standards are still in effect, until those correlations we found that, at least according to the standards smoke shade instruments, we were running right around the standard in New Jersey. That's sort of the long-term history here.

In case you haven't figured out, the ambient standard is 15 micrograms per cubic meter. The 24-hour standard is 65 micrograms per cubic meter. You see in New Jersey the ambient standard tends to be controlling.

This is what the dreaded Federal Reference Method looks like from the outside. It is something you put out in the field, doesn't house inside a trailer or something like that and it is a filter-based measurement this document doesn't allude to. And really from an operational standpoint, one of my

complaints, running out and picking these filters up all the time, it's kind of a strain in the back. The other thing is, you do lose that great time resolution that you get from real-time measurements. It's not my favorite method, but it is for purposes of determining compliance with the standards, it is the gold standard. This is it. It's God as far as we're concerned.

This is the inside of one of them. It shows the mechanism. There's two cylinders there; the one on the left you put the clean filters in, it will shift automatically in position sample and then kick them over to the other cylinder and when it's done you collect several samples without having to visit the site between each sampling event or to change filters.

We began monitoring really in 1998, our first full year of data was 1999. If you look at how we compared the annual standard, you see that in the northeastern part of the state basically Union, Essex, Hudson County area above the 15 microgram cubic milligram standard. South Jersey and Philly run into

high 13, 14 high microgram per cubic feet. 2000 we continued to have significant levels; up in the northeast we got a bit higher levels that year in Camden area.

2001 wasn't quite as bad. We still got -- shouldn't say non-attainment. We were still exceeding the 15 micrograms per cubic meter annual a couple sites up in the northeast and running a little bit lower in southwestern New Jersey.

2002, the only site in which we were over in 2002 was Union City. Still continue to have a lot of sites that are borderline.

In 2003 you'll see that the Elizabeth Lab Site over Union City, you notice that suddenly Union City disappeared from the map. We didn't like those numbers, so we threw it out. Actually, we got thrown out. We got thrown out physically from the site so we're not there anymore and trying to find another suitable site. Notice that Camden went up. Also had logistic problems in Camden in 2003 and we really didn't get any data in the fourth quarter and we had a lot of fairly high events

in the third quarter of 2003, so the average over the year is high at that location than the surrounding two sites. When we go to calculate design values, the values on which we base our control strategies and the like, we will take into account missing data and the like.

In addition to showing the annual average concentration, this is just the year's worth of data using a continuous piece of instrumentation while reporting here on this graph; 24-hour average concentrations. So these are daily concentrations over the course of the year. It's the highest concentration we recorded at any of the four sites when we were making continuous measurements at the time this was done. This uses the air quality index scale so you don't see something like micrograms per cubic meter; you see zero to 200. Basically the way the air quality index has worked over the years is that you set an index value of 100 to the National Air Quality Standard. That's the way it has been traditional since the beginning of the index until PM 2.5. PM 2.5 is different. AQI in value of 150 is actually set to short term

standards of 55 micrograms per cubic meter; 100 level is 40 milligrams through cubic meter. That was selected because it's halfway between the annual standard of 15 and the 24-hour average standard of 65. That sounds confusing; it probably is. I'm not sure that I have a good explanation for it. I'll leave that up to the health people who develop this to try to answer this.

I want to point out here, when you look at this, you'll see it break point 50 on an AQI scale to 15 micrograms or the annual standard. You can kind of see that over the course of the year, it looks like levels on average are running a little bit above that annual. If you look at a value of 100 that's equal to 40 micrograms per cubic meter which exceed maybe a dozen times over the course of a year. It you look at the 150 value, you'll see went over that maybe twice during the course of the year. This is only a few sites, it's not all the sites in the program. That's using a non-reference method which I can't stress enough.

The other thing I'll point out

about this is that there are -- you may notice that the levels seem to be a little bit higher in the summertime. This is one way of looking at it, I know you can't see all those blue dots in the background, that's basically the 24-hour data. What we did is we took a 90-day running average to try to smooth that out. Each one of those peaks that you see, kind of corresponds with the summer months. So there is a distinct increase in particle levels in the summer.

Might have been easier just to put this up here in the beginning to show you that monthly averages in the months of June, July and August run about 20 micrograms per cubic meter and the rest of the year you're running in the 13 microgram per cubic meter area.

This is another way of showing the same thing but this also shows the hourly variation of fine particle levels. The red line at the top is summertime numbers; the blue line on the bottom, winter. See again, there's the significant spread between those two lines.

The other thing you may note here is that, as typical with pollutants that are

influenced by motor vehicles, this early morning peak at about the time of rush hour. We you look at the blue line, the winter line you'll sort of see an afternoon peak; that may or may not coincide with the afternoon rush hour and what you're seeing here, there's a definitive influence from motor vehicles, but it's not the only thing driving these concentrations. When you look at the summertime concentrations you'll see that morning bump up then it pretty much stays up after that. Can't draw too many conclusions from this, but you get a general sense that I see it's fairly consistent, at least in the wintertime with pollutants that have motor vehicle component to them and in the summertime I think you tend to see more of the regional signal showing up.

I think you've seen a lot of data about the composition particles. These are the four sites in New Jersey where we take compositional data. You'll see that it's dominated by organic carbon, sulfate nitrate, ammonium. The things that I would just point out here on this particular slide, the

Elizabeth site is Exit 13 of the New Jersey Turnpike, it's fairly heavily influenced by motor vehicles.

The site in Camden is located in a residential area in Camden with a lot of traffic; there's some industry nearby, but not directly adjacent to the site.

New Brunswick is in a more suburban setting and Chester is a different world setting.

What you'll see here I think is that the thing that is probably significantly different about Elizabeth, for example, is the organic carbon and elemental carbon are significantly higher than the other locations. Sulfate tends to be a little bit more uniform, although there is some variations with that as well. There's a lot of different cuts you can do with this data and probably in some of the earlier presentations you've seen some of it; I won't go too much further into it. There is some site-to-site variability and there is some season-to-season variability shown here.

One of the things that I did want to mention, I think one of the earlier speakers

talked about the impact of fine particles on visibility and focus on how the facts -- the reason I wanted to show this, this is from our visibility camera from Newark; it looks at New York. Unfortunately, the original target was the World Trade Center Towers, but they're no longer in the view, but it still gives a good look at the New York skyline. This is on a relatively clear day; you can see the skyline pretty well. Then you see on a hazy day, it's pretty well obscured. Now, this particular day is the worse fine particle event that I have had so far in New Jersey. And it was really caused by a naturally occurring event. We had forest fires up in Canada, you can see very definitively the plume coming down from Canada and blanketing New England and New Jersey.

This slide is a little hard to follow, but what you're seeing here is the part of concentrations you're running about 20 micrograms per cubic meter up until 3 o'clock in the afternoon; that number hit and it just took off. And they stayed high even at the end of this chart, they're still at 40, 50 microgram per cubic meter range. So this

episode extended over several days.

This moves it out a little bit so you can see also these levels were in range we consider to be unhealthy. Just another picture of the satellite.

During this particular event you'll see that concentrations got as high as a 125 microgram per cubic meter in a 24-hour average in Atlantic City. Again, those are the highest levels that we recorded and that was before the Atlantic City sampler shut down because it got clogged up with particles. It was a very, very significant event from our perspective.

It's interesting, though, because what do you do about numbers like this when you're trying to plan, as part of a planning process. And that you probably don't want to probably plan around events like this because it was probably not reasonable from a health perspective, very significant.

We also think that towards the end of this event those fine particles influenced ozone concentrations as well. These are the concentrations for July 8, recorded maximum concentrations on July 8. If you look at --

this is the Camden site; the black line is particles, the red line is ozone. You can see these events are kind of concurrent. You don't get much ozone early on here, but towards the end, last two days, very high concentrations of ozone and why would that be? Intuitively I would kind of think with all that haze and blocking of sun that you would have lower concentrations. Well, we think one of the things that's going on is the same day that I was in those bar charts that I showed you earlier and you see that the organic carbon component is about a third of the overall mass. And during the event, you can see that the organic carbon was almost 90 percent. And all that organic material flows in the particles and we know that organics participates in the process of the formation of the ozone and so we feel it was probably a pretty significant influence of these particles on those concentrations during the end of that event. So we had four days really of pretty poor air quality conditions in New Jersey during that episode.

I wanted to talk a little bit about

how we report this information to the public because the way we do it is not perfect by any means. I talked a little bit about the air quality index, which is what we use, our basic method for informing the public. The air quality index is a multi callute (phon) index so everything is standardized. Values of a hundred equals short-term national air quality standard. On our website on the first page you see a map, it's colored coded, it's color coded according to the index scale which is green for good, yellow for moderate, orange for unhealthy percent of the groups and then for unhealthy for the general population. So now being colored coded if you click on the region of the state that you're interested in, you'll get a bar chart as is shown here and it will show you which pollutant is causing that areas worst pollutants for that region. If you then click on specific site where that is occurring, you'll get little dials that will show you everything on a site and what the concentrations are and air quality and mixed values. Seems like a pretty good system. Couple of problems. One is, you heard Dr.

Lippmann talk about the Federal Reference Method. In order to report this stuff with real-time, you can't use the Federal Reference Method; it takes several days at a minimum to get data back when you have the condition filters and weigh them. So we use something called the Tapered Element Oscillating Microbalance, TEOM for short. It's a continuous method and here we're comparing it to the FRM. You can see these correlations are not bad, but far from perfect. To get some artifacts both from the Federal Reference Method and from these continuous methods we used for reporting purposes.

The other thing that gives us trouble and this is an old slide, I've used the a zillion times, just to show you the affect of having a 24-hour average standard, we report the current 24-hour average value so we can relate it to the health standard. What tends to happen with this event, when the actual particle concentrations were really high, about 1:00 p.m. on November 18, the 24-hour average was still in moderate range. If you went to our site, we'd be telling you air quality is

moderate. At about 2:00 a.m. the particle concentrations fell off, of course the 24-hour average concentrations doesn't follow, it stays up for a while. If you went to our website at 2:00 a.m., up kind of late, hopefully you wouldn't be outside, you'd be seeing unhealthy air quality reported really after the event had ended.

There's a number of things going on both at EPA and state level now to try and address this kind of issue, but we're reporting something that's more of a surrogate for what we think the 24-hour would be based on current levels that make sense.

And the other thing I think is about this is that during this event, for example, I think we really used to focus on ozone in the summertime, is when people would look or ask about quality, the ozone concentrations goes up and down, up and down, as you go across the course of several days, peaks occurring in the afternoon. And it was fairly typical, a lot of people can say, okay, this is going to be a high ozone day, so don't go out in the afternoon and jog, go out in the

morning and jog when those concentrations are real low. As you can see, the fine particle concentrations on the other line are still quite high in an unhealthy range, so you probably don't want to be doing that. That's one of the advantages in adding fine particles, makes it a more complete index even though there are shortfalls associated with it.

I did want to mention very briefly about -- I talked about urban visibility camera. New Jersey has one of the few Class One areas in the Eastern United States. I'll explain Class One in a second. That's the Brigantine National Wildlife Refuge. Class one areas are areas that are protected as special protection under the Clean Air Act. They are usually national parks or National Wildlife Refuges and the Clean Air Act protects visibility within those areas. So we have an area in New Jersey where visibility is federally protected. That's pretty significant.

We basically are charged with a very difficult thing in Brigantine. We have to eliminate basically all manmade or man-caused

visibility degradation within the refuge. We have a ridiculously long time to do this, I'm not sure how many, but it's a very, very ambitious calling.

We did the same kind of particle breakdown here. I took this directly from the IMPROVE program book; IMPROVE stands for an Inter-agency Monitoring Protected Visual Environments, it's another one of our great acronyms we love to use in government and I took it directly from IMPROVE for a reason. A lot of people put in IMPROVE data and like I showed earlier, take it on face value, compare it to New Brunswick, how come New Brunswick's average sulfate concentration is 33 percent of the total concentration whereas in Brigantine it's 52 percent? The reason is because they report sulfate differently in the IMPROVE program than they do the other one. They include the ammonia in the other so you are naturally going to see the higher percentages. So my only point here is, yes, sulfate drives the visibility issue in New Jersey to a very large extent, but I don't mean to minimize that. I do caution you, when you start to see

people throwing up a lot of this different compositional data to make sure you're comparing apples to apples.

The data that I just showed you is a three-year average and it put together by the IMPROVE program in 1996, they updated it in 2000, I guess we'll get another one this year. Total mass concentration averaged 11 at the end of 1996 and 9.9 at the end of 2000. And there are some changes in the compositional makeup here, but I'd be stretching it if I tried to explain these unfixed values, so leave them the way they are.

Commercial; this is a little commercial for our hazecam site. We do this in conjunction with the organization that I believe the next speaker is. A lot of states in the northeast have these cameras set up to look at visibility conditions. Some of them are urban, many of them are rural and you can go to that site at hazecam.net and look at visibility updated every hour. My little pitch for hazecam.

I guess these are my conclusions; I don't know if they're factual conclusions

necessarily. We are not exceeding the 24-hour average standard at every site, which does't mean that we've never had concentrations above the 24-hour average standard. One of the things that's odd about the standard is its form. We looked at annual average concentrations, any single year does not determine compliance; look at three-year averages. The 24 hour-standard, you don't look at individual averages when you're trying to look at overall compliance, you look at the 98 percentile of the data, that usually works out to be 96 percentile in a normal year. So we don't have any locations where we recorded those numbers of exceedances. But we have had exceedances of the 24-hour standard in a couple locations over time, as I showed you during the forest fires.

Most sites are meeting the annual health standard most of the years, but not all of them. Certainly up there in the northeast we do have a condition where the standard is being exceeded in a number of locations on a fairly regular basis and that's of great concern to us.

Concentrations usually peak in the summer, no surprise there. A lot of what you're seeing is secondary aerosol and that's compounded by locally generated particles. You can see some of the effect of those local particles in diurnal variations like I showed earlier.

On average the carbon, sulfate and nitrate tend to predominate, as I said a lot of that is secondary; start out as gases and form out over time. Evidence of episodes of forest fires can have a different makeup and episodes are localized, you kind of expect it to have a different makeup.

FRM/continuous correlations could be better. I said method improvements are coming and I'm just being optimistic maybe. I'm hoping that they're coming. We keep adding improvements and spending more money and pretty much of the correlations look about the same. Fine particulates are the primary cause of visibility degradation. I don't think that's a surprise as to the visibility issue.

I think that's the end of what I was going to talk about.

CHAIRMAN BERKOWITZ: Thank you, Charles.

Questions from the Council?

MR. MAXWELL: Charlie, you said the better methods are coming. Any idea what kind of a window? Is there any, as you stated, now in experimental stage that show a problem?

MR. PIETARINEN: Actually, it's kind of interesting. The states sort of started doing the experimenting in many ways. Methods are being developed. They'll come out with quote improvements unquote. We'll put them out in the field and see if they're actually improvements. One of the primary things that they're trying to get out of here is something that's alluded to earlier. You lose sample overtime when you sample particles. You lose it for a couple of different reasons and with some of the continuous methods, in order to deal with the moisture problem because you want to get rid of the water and measure it, heat the sample up when it comes in, when you do that, you start to lose some of the organic nitrates and other components of the particles. And so they're

trying to find different ways to compensate that within a different methods. That's one of the biggest problems that we're having.

One of the other things is some of the methods, from doing continuous measurements, don't actually measure mass directly but inferring it from either the light scattering characteristics of the particles or how they absorb different types of radiation.

CHAIRMAN BERKOWITZ: Any other questions?

MR. SOTO: For purpose of fitness, did I hear you correctly you said we should jog in the morning versus the afternoon?

MR. PIETARINEN: I'm saying you want to look at what the overall index is before you make that decision. Because what we have found is we've traditionally kind of said, yeah, run in the morning because ozone concentrations are lower, but what we're seeing now is that you don't get that real strong diurnal pattern with fine particles and they can be quite high in the morning, so you may not want to go jogging. You want to know what the overall pollution levels are, not just the

overall ozone concentrations, before you make a lifestyle decision.

MR. ZONIS: Charlie, it's been many, many years since I studied statistical analysis. Let me ask, when, for example, in 2002 we report Union City as having annual average concentration of 16.8, what's the precision of a number like that? Certainly it's based on very many analyses, individually analyses that add up to the annual number, but each of the individual analyses have some kind of precision of, let's say, 15 plus or minus 1 or 15 plus or minus a half and some how that has to end up in a plus or minus figure with respect to the Union City figure 16.8, is that plus or mine or.1 or plus or minus 10?

MR. PIETARINEN: That's a good question. We do measure precision, we have couple sites in the state that we co-locate instruments, taking two samples at the same time to evaluate that. I'm saying the overall precision runs about plus or minus 10 percent is our reference method on average. To some extent I think that's supposed to be accounted for within the way the standard itself is

structured -- because it's an annual average, I think it's -- that's sample by sample basis. I think the annual average is a bit more robust than that.

CHAIRMAN BERKOWITZ: Thank you.

Charlie, maybe you said it and I didn't catch it. What's your intuition between the summer and winter differences.

DR. PIETARINEN: How large is it?

CHAIRMAN BERKOWITZ: The cause.

MR. PIETARINEN: You're getting a lot more secondary aerosol formation in the summertime, a lot more photochemistry going on; more sulfate, nitrate and some of the carbon stuff.

CHAIRMAN BERKOWITZ: Any more questions?

I'd just like to say, I appreciate members of the family as well as you should. Charlie is a national expert when it comes to air pollution monitoring and we're very pleased that he's with the State of New Jersey. Thank you for all of your services, Charlie.

MR. PIETARINEN: More than happy.

CHAIRMAN BERKOWITZ: Our next

speaker is his Dr. David Brown from NESCAUM.

DR. BROWN: I am hoping something is going to come up in a moment.

I'm a toxicologist and I work with NESCAUM and I have been interested in the last -- for the last 8 or 10 years in how do we take all the data that we've gathered around us in all the different locations and make some sort of sense out of it? And one of the things that we try to do, that is try to merge health data with the environmental data.

When we start thinking about environmental data today, what we begin to realize, what I began to realize is that when we move from chronic long-term risk to short-term risks, we're really doing something quite different. The question that comes to mind; what sort of impacts would there be in short-term? What should we do about them? And how should we try to understand them?

The three short-term effects that we have are asthma, heart attacks, which are pretty short-term and then myocardial infarctions, which are a kind of heart attack but not exactly the same thing. Then we all

know we're words about COPD effects and we can't figure very much out about those.

As a public health person, what I'm interested in is, how does one take and make a decision when you've got a variety of kinds of data that, in fact, changes the qualities of the quality of public health that we're dealing with? That turns out to be a problem that is not amenable very well to the way we currently do science in this country, in the world actually.

You'll see a slide in a moment I hope that will tell you something about the primary goal that I have in this law which is to describe how a public health person thinks about all the data you have seen so far. I'm going to describe this to you from the perspective of exposure, not exposures for 24 hours or three years or even 5 or 10 minutes, but I'm going to look at three-hour exposures, because in terms of three-hour exposures, that's really a significant part of the amount of air that a child breathes in a day. I'm going to describe a set of experiments we did with a group in Connecticut called Environment

Human Health. Environment Human Health is a not-for-profit organization that we founded that -- I jokingly say, all of the public health and environmental people who are totally over the hill together in one group that said, now that you have no future left do what you would do anyway. So what we decided to do is to look for data and ask questions that could not be asked within the political context but which had to be asked differently. The first thing we did is we went and looked and asked for, what are the asthma rates in Connecticut? It turned out nobody knew what the asthma rates in Connecticut were and, in fact, it was impossible to get the asthma rates in Connecticut, so the Environment Human Health got themselves a look at asthma rates in the State of Connecticut. What we did was found a school nurse who has run the school nurse program in the state and was recently retired and gave her a little bit of money and said would you go ask all those people who used to work for you what the rates are in the schools. Then would you write the numbers down and put it through a shredder because we didn't

want anybody to know what the numbers were. And she came back with some exciting information.

First thing she said was, look, the rate of asthma with children who are carrying inhalers in Connecticut is 8 percent. That means in grammar schools in all of Connecticut in our rich towns like Greenwich and in our poor towns like Bridgeport and Hartford, the rates were over 8 percent -- in Hartford and Bridgeport they were 24 percent. In our rural schools they were higher than they were than our upscale urban schools.

So we wrote a report about it. In the first report we wrote criticized because we said, that's not the scientific method, which we all knew very well was, and CBC complained to us and so Rosa Delorus (phon) had given them some money, so instead of doing this study on $10,000, we did this study on $350,000 and this study is out saying exactly the same thing, except I'm saying five years later you've underestimated the rates; they have increased during that period of time. So we knew we had a severe asthma problem in the State of

Connecticut.

We tried to figure out what that problem could be related to and we were particularly trying to figure out why they were higher rates in the rural communities, I brought about eight or nine of these books along, whoever wants them can have them; if not, I'll take them back. What we did is we found 14 Connecticut school girls who wanted to be shadowed by a good-looking young man from Stuarts, students. And he followed these girls around for an entire day. He gave them a monitor when they got up in the morning and they carried it on their lapel and it measured PM 2.5 every minute for the entire school day. At the end of that time, what we found was that the most highest exposure that these children experienced during the entire school day occurred when they got on their school bus. So we then became concerned about how bad were school buses and did this Connecticut school bus report. I'm going to leave this behind because I want you to see it, but I'm not going to talk extensively about it. If that could just be up there for one more minute we could

get going.

MR. BLANDO: Did you say you found rates 24 percent --

DR. BROWN: We have a school of 24 percent. It happens to be under Interstate 95.

MR. BLANDO: You're saying 24 percent of the kids --

DR. BROWN: Carrying inhalers.

CHAIRMAN BERKOWITZ: 24 percent of the kids carrying inhalers?

DR. BROWN: Yes.

MR. BLANDO: You're saying that was in a well-to-do area?

DR. BROWN: No. It was Bridgeport Connecticut.

MR. BLANDO: Which is?

DR. BROWN: It's not a well-to-do area.

So if I can start, what I want to talk to you about is how public health systems should work with uncertain but plausible health systems.

The first question I would pose to you is, can we assume that compliance with the Federal Clean Air Act standards protect against

short-term health impacts? The reasons we should be able to presume that are listed in these bullets. We set the standards with experts, we build in safety standards you have to have a bright line for attainment, which is why Charlie showed you what he just did and we monitor compliance.

What we know is PM 2.5, these sorts of things happen and that these are significant public health risks. Dr. Lippmann talked about these, so I'm not going to go into them into much detail. These are premature health deaths, aggravation of lung disease and possibly cancer deaths and things at the bottom.

Why do we think particles are toxic? There's a lot of reasons why we think particles are toxic, but here was a great toxicologist named Mary Andor (phon) when I was in her -- an undergraduate student going into her lab, I said, Mary, why are toxins-- I said, Dr. Andor (phon), why are particles dangerous? She says because they absorb water, then they absorb gases on them and the particle with the acid gas on it, it's carried deep into the

lung. And when they're deep in the lung, they produce effect. She demonstrated that I think in and around 1955, but that is why particles are so dangerous.

We know there's data talking about fine particles being a problem. You can see these four causes, this is significant data, it was done by Dockery, so we know as we increase particles in cities, they get more dangerous.

Two very important studies occurred in the last four years. The first study is the Peters study. What she showed was a PM 2.5 was associated with myocardial infarctions in Jamaica Plains. She had odd ratios that I'm not going to talk about, but I want you to know the time. Two hours after they went up, the heart attack rate goes up. I think Dr. Stern may have mentioned this to you. This is not funny. The rates didn't go up very far, they went up to 25. We also saw the next day the ratios are back up. But the levels are only around 20.

The next study that's important comes out of Yale, Dr. Gent's study. They looked at severe asthmatic living in New Haven,

Hartford and Springfield, Massachusetts and they kept track of what was happening to them, the pediatric groups were keeping track of what was happening to them every single day. And what they found was that 35 percent had an increase in weeze one hour after 50 parts per million of ozones and 47 percent had increase in chest tightness one hour after ozone and 1.24 odds ratio for chest tightness after 12-18 micrograms per meter cube PM. This is serious stuff, because at no time during that study was any standard exceeded ever anywhere in Connecticut. But these with asthmatic kids so we may not be quite as worried about them.

I teach ethics in the environment, Fairfield University, and I would like to just make a couple of points. Why do we think about things the way we think about things? We must ask ourselves. We have two theories in this country. We operate under Deontology, we make decisions from duty; we operate under Utilitarianism, we make decisions from outcomes and the value of that act is found in those two pieces. This has not gone on forever. This started between 1600 and 1700 by these first

two men, Bacon and Newton I'm not going to lecture in philosophy right now. Third name is Kant. Kant said when this discussion was going on, you cannot take things apart and understand the whole. I'm going to try to prove to you that Kant was probably right. And Bentham said this, you ought to do this because you serve society.

We have a paradox. The paradox between good science and public health. I have trained dozens of graduate students and good science says, if you don't have the correct answer you go back and do more research. That is the preferred outcome. In public health we assume that something may be true based suggestive, but statistically inconclusive evidence in public health if we have a good reason to think there's a problem, we stop the exposure.

Because we didn't do the latter, we have these disasters to put into our history; smoking, dioxin, asbestos, chordane and mercury, we're doing good science. I hope we don't do that with particulate and I would like to suggest that the asthma epidemic at the end

of the twentieth century discovering that the evident epidemic 25 years we're into it suggests that we're not doing the best job in the world.

I focused on schools to try and explain this. I'm going to explain this here. We were interested in what sort of the things happened in schools. I'm showing you this, three top things happened; accidents, colds asthmatic heart attack. I went to schools in New Haven and I said, give me the relative ratios of these things and they laughed at me. They said, you don't see any of them when you put asthma next to them. If I made a curve, a curve this high for everything else and asthma through the ceiling. Asthma is a major disease in our school.

Can this be environmental? We know it's hard to understand because health events have multiple causes, only few people respond, only a few asthmatics anyway. The exposures aren't known very well, we described that. The investigations are complex and we have troubles with complex stuff. Cause of the effects were sometimes not environmental, but environmental

causes make them last or they're worse, longer.

We do know that some environmental causes are caused by environmental factors; molds and/or factors in buildings. We found diseases related to 6 to 12 pollutants found in outside air and we know the two agents, ozone and PM. How do we respond to these agents?

First of all, we have to understand four things. One, we have to understand health effects that, in fact, are related to air quality. We have to know something more about the sources. We have to know that air moves in and out of buildings, which is a new concept. And then we have to know ways to reduce potential exposures.

Bad air quality in the United States means the following things. It's ozone, particulate, nitrous dioxide, sulfur dioxide hazardous air pollutants, lead, carbon monoxide. That's bad air to us.

Ozone has certain effects. You know what those are.

It also can worsen bronchitis. We have regulations on this. I don't want to

waste time on those. Particulate matter, just do the same thing please. These are the things that happen with particle matter.

EPA has revised the standard I could spend an hour discussing why I don't think they're doing it right.

Here's the air quality index. I want to now bring something to your attention. Those effects that I showed earlier on, they all occurred in the green and yellow range. Those health effects that were measured by the people at Yale, were measured when in Connecticut we thought the air was moderate at worst.

What does this mean? It means, first of all, that air exposure introduced plausible health risks from short-term exposures. It means we ought to try to bring science to the legal efforts. And, finally, investigation of quantitative health risks from localized short-term air exposure is needed.

What we're doing, if you have noticed the first line, we have centered our thinking around attainment. Attainment is everything. Where we should be centering our

thinking is about evoked responses. And we need to do more with statistical analysis.

This is a slide from Carmine Dibattista. These are the PM levels collected probably in New Haven over three months period. Carmine says, As part of the process to determine whether an area meets the EPA particulate matter standards, this three-month long series of hourly data -- would be collapsed to a single value of 9.2. Then Carmine says, tongue in cheek, Totally obscuring any content or structure within the data.

Here's some data from New Haven, Hartford and Waterbury. The colors are different whether it exceeds the standard or not. The right hand is the daily average. The left hand is hourly maximum and you'll notice this is the way data was sent to me by mistake.

That's what that data looks like when it's graphed out. Those sites are 40 to 60 miles apart. Those numbers are moving at exactly the same time. That is not a change in sources. That is a change in mixing and that's

a change that's region-wide and that's a change that I think is probably associated with the atmosphere and possibly with sunlight.

This is extremely exciting data because it means that if anything is going to happen, it's going to most likely happen here. It means it's going to happen across the entire State of Connecticut and you can forget any local or spatially related health studies in Connecticut because it doesn't change across the state. It changes from time to time and place to place.

This is a slide so you can see haze in Hartford and the bottom picture I got the 24 micrograms per cubic meter level on it. That is the level where we were seeing health effects. You can still see a little of Hartford.

If you are going to deal with this, we have to consider sources. And this is my slide to say that we need to consider sources and I'm going to try to prove to you that we need to look at local sources and all those immediate sources.

These are our schoolgirls. That's

milligrams per meter cubes; so that's 20, 40, 60, 80. This is a schoolgirl in central Connecticut getting on the bus in the morning at 7:30. See where her PM level goes? She gets off the bus see it falls down; she gets on again in the afternoon, we see it goes up again.

Next slide. This is a girl in the central Connecticut, again, this is out of Hartford. You can see the very same thing happens to her again and again. Look at those exposures when she's on that school bus.

This is a girl down on the coast, she was in a bad day, we had 40 outside, showing 40 on her slide. She gets on the bus, value goes up to about 60, falls down she had a very short ride and then she's wandering around playing in the school -- she's in the playground right here, the teacher takes her off the playground, which is right outside her classroom, she comes inside and the school buses for the kindergarten roll up outside her classroom and unload their children. Look how long that exposure lasted. This girl and I play flute together, she now plays cello, but I

think this is a very important slide.

This is what the averages look like. If you look through here, these are the averages for these four, five, I guess it's five towns there. Look at the peaks and look at the 76 percentile. The averages tell you nothing. The two on the right, the Bridgeport children walk to school. They didn't ride a bus, but they walked under Interstate 95.

If you take this data, I'm going to throw a few things out for you, the blue is in the school average, red is on the bus average for the actual day we measured these values; the blue on this side, these are the average, these are the maximum to show you the differences, and, actually, ambient air somewhat drives that school bus level and it clearly drives the school level.

Same data, I'll skip it.

Here's a day where a student -- a full day, this is the average -- this is the daily maximum -- this is the hourly maximum, this is the daily average. This is what it looks like over the day exactly what Charlie showed us early, it comes high and then falls.

What I did is I took these and tacked them by different colors so you want to look at reds, yellow and whatever that color is up there, light teal.

That's what it looks like if you go from day-to-day with those exposures. They not only are higher, I have actually added the totalled exposure for the students that day. They not only are higher on some days, they build on some days and the time of day when they're higher changes as you go forward. If we are going to understand this effect of children running around outside, we've got to get a lot more clever with our data. We've got to do what Dr. Lippmann says. We've got to get hourly data and then we have to look at it.

I have data exactly like this for Fredericton New Brunswick. This just shows you, trying to say that the school is actually a box, it ventilates itself, the outside air falls down there, the school is going to stay there.

Next slide, please. This is a actual day in Connecticut. This value falls. Actually when that value falls, on the days

it's going to fall, it falls precipitously. The school doesn't ventilate more quickly because the air is blowing outside, it's the same slow almost imperceptible rate, 25 percent air change.

That's what we need to have if we didn't want to have this effect. This is the average -- this is a summary of the averages one year and the peak here of the three-hour maximum during those averages.

This, again, shows the average. Charlie just showed this. This falls here. Charlie, I think the reason this falls is because the sun comes up. When the sun comes up in the morning, the air stops mixing; the hot area transfers over instead of doing this (indicating), it does this. So the mixing level falls from 500 feet, like a thousand feet to 500 feet. That's part of the reason the peak goes up.

These are events that actually are causing air to be high within our schools.

This just tells you -- these are the fine particle distributions in Connecticut. Again, I think we have to look at

micro-scale exposures and we may have to look at downward bias.

These are the lessons I think we learn from that; 5 to 15 percent of the days driving on our health risk.

Six ways to reduce the pollution. Identify sources; restrict emissions; reduce idling engines during the three hours prior to student occupancy of building; increase make up air during the clean period; prevent stagnations of air in the school.

Conclusions. We need more robust reporting statistics in addition to attainment levels. The weather variable is important. There are four types of weather in Connecticut, in the northeast. Actually, I'm looking at the northeastern continental United States, there are four general weather systems that are existing. We need a -- national analysis for New England are absolutely worthless because we are on the eastern side of a high -- on the western side of a high, they're on the eastern side of a Pacific high. The averaging time is critical and the health outcome should drive the risk analysis.

I don't know whether I got back on time.

CHAIRMAN BERKOWITZ: Thank you, Dr. Brown. Questions?

UNIDENTIFIED SPEAKER: As a result of the study that you did in Connecticut relating to the increase of air pollution exposure problems for the children related to school buses, did you present the information to the school boards and was there a change in policies?

DR. BROWN: We not only did that -- school boards immediately reduced the idling before we even presented it because our group tries to not sandbag things and so they already had a policy in place. The State of Connecticut already had an idling policy in place and it already suggested changes of fuels on buses and are now in the processing of retrofitting buses across the state. And actually we sent this to the former governor of New Jersey and she decided that it wasn't a priority for EPA, so we're quite proud of that work.

MR. FEYL: Are we getting a copy of

this slide presentation and my slides are yours.

We actually are repeating the school bus study in Fredericton, New Brunswick. We have 83 buses, so it's a much more robust study than the Connecticut study.

MR. MAXWELL: In Connecticut you said you were retrofitting, is that the entire state?

DR. BROWN: Our goal is to retrofit the entire state. First of all, we are going to get them on low-sulfur fuel, which gives us tremendous advantage right away. We're asking that the buses be tested and we're asking that the drivers be trained so that they can reduce the effect. The levels of people who are exposed on the bus are related to how the driver drives a bus, whether the windows are open or closed; they are not related to how new the buses are. I have no idea why that's true.

MR. MAXWELL: Just to follow-up on that low-sulfur fuel. Is that 15 parts?

DR. BROWN: You're pushing me. If anybody here knows Carmine Dibattista and if you tell him 15, he'll usually divide it by

some number and --

MR. MAXWELL: Standard is 15?

DR. BROWN: They want to go below that. You're asking the wrong person.

CHAIRMAN BERKOWITZ: Dr. Turpin, you can't ask a question, but you can ask me and I can ask it.

DR. TURPIN: I guess I had a point of interest. Was that the particles from the diesel trucks are mostly carbon, but the sulfur interestingly, higher sulfur fuel results in more particles and I think it's related to some questions I'm interested in within the atmosphere.

DR. BROWN: We found in New Brunswick that the breather tube, which is a major source of PM 1, breather tubes were doing that.

CHAIRMAN BERKOWITZ: Jim.

MR. BLANDO: I'm just curious about, you showed some of the levels that measured in terms of students getting on the bus and they were fairly short term. I kind of think in my own mind short-term exposure in terms of longer term exposures, has there been

any correlation between respiratory function in any of these children? I can look at the data and say, great, they get on the bus, of course of higher exposures, but is that meaningful in terms of health impact exposure so short? Is there anything, anything that I can --

DR. BROWN: -- done a study. I focused on the exposure piece. A student -- typical student in Connecticut on a bus for 40 minutes in the morning and 40 minutes in the afternoon, an hour and a half exposure during a day, I determined was a significant amount of air that student breathes a day, the worst student is on two hours in the morning and two hours in the afternoon and those values go up and stay up through the entire ride unless you open the windows and drive down the interstate in which case they fall back down.

MR. ZONIS: Dr. Brown, the personal monitoring devices the young students wore, are those bulky things or relatively simple? How difficult is it to reproduce a study here in New Jersey?

DR. BROWN: It's very easy to reproduce. It's the size of that tape

recorder. The bus company wouldn't let the graduate student on the bus. When the student got to the school, the graduate student actually had a particle free suit that he wore and he carried the instruments around for that period of time. It's not something I'd want to wear around for a day. It can easily be worn -- people in New Brunswick had no problem at all.

MR. ZONIS: One of the things that initially confused me but I think was straightened out is that the students had high exposures when they were riding the bus and then you pointed out that the PM numbers in Connecticut pretty much didn't vary from site to site, but then you said that did influence the reading set were on the personal monitoring the young people wore.

DR. BROWN: When they were in the school.

MR. ZONIS: And the school buses were independent because that was a very high number to begin with.

DR. BROWN: Yes. School bus wasn't much higher because some of the buses ran clean

and some didn't run clean and I have no idea why. But the indoor outdoor thing that Dr. Turpin was talking about is clearly driving the problem.

CHAIRMAN BERKOWITZ: One last question.

MR. CONSTANCE: A correlating study for students that either walk to school or driven to school, was there any difference in their asthma rates?

DR. BROWN: We haven't done the asthma piece. We can do that in Canada. We have the Canadian data because the Canadians have a health care system. We actually know the students, we know the ones who were on the buses, we can check with Canadian data in New Brunswick.

One thing is interesting, if you talk to the school nurse and you ask her, say, the word asthma, she usually says, it's always around 1 o'clock. So at 11:00 in the morning they line up outside her office. And one can imagine, they have the exposure riding to school, about 11 o'clock is when they find they're in trouble. But that's pure

speculation.

CHAIRMAN BERKOWITZ: That jives with information presented to this Council about the time lag exposure and onset.

Thank you.

(Pause in proceeding.)

CHAIRMAN BERKOWITZ: We're on the record.

MR. SUCHECKI: Good afternoon. I am Joe Suchecki, Director of Public Affairs for the Engine Manufacturers Association. And we certainly appreciate the opportunity to speak to you this afternoon on the subject of health effects and the ways that New Jersey can address the issues associated with PM Emissions in the state.

EMA is a trade association representing the major manufacturers of internal combustion engines. As an association, we represent our members on emissions issues and are the primary of the industry on regulatory matters with the U.S. EPA, as well as state and local government.

EMA represents 27 member companies as shown here, many of them would be familiar

to you from the equipment. And our members manufacture and market engines for a wide variety of products from lawn mowers and garden equipment through the heavy-duty trucks and buses, construction to farm equipment and locomotives and marine vessels. In addition to the variety of mobile source products, our member's engines are also used extensively in stationary sources such as power generation.

EMA sees today's meeting as an opportunity to open a dialogue with you on the PM issue to provide you some pertinent information on current state of engine technology and controls applicable to mobile source and stationary briefly. I briefly want to address the issue of PM health effects today to discuss the significant improvements that have been made to engines to reduce emissions, identify why emissions from diesel engines should no longer be considered an issue, and, finally, make some recommendations on the ways and types of programs that can be developed to further reduce PM emissions in the state.

On the health effects issue, especially with PM, I think Council should take

some time to closely examine the current scientific evidence. Although some may portray current ambient PM levels as a major public health issue responsible for many health problems, many questions still remain to be answered. These include the size, nature and scope of any suspected health effects the biological health effects, and the level of ambient concentration or exposure that may actually contribute to health concerns.

Some may argue that the evidence of PM health effects is in, recent observations deserve your attention before you make recommendation or take actions. I've listed just a few of these that have come out recently.

There's a recent report by the Health Effects Institute who at the request of EPA looked at the statistical problems with some of the short-term time series studies and one of their conclusions was that there was really an issue of model selection during time series studies and depending on what model you choose, you get different answers. So that's something that HEI, and I know EPA is also

looking at.

There's a recent paper from England by Koop and Tole indicating, again, that this modeling uncertainty overwhelms any of the very small associations found in many epidemiology studies.

The fact that the refinements in data analysis techniques have generally lowered estimates earlier estimates of health risks from PM compared to earlier estimates.

That newer and better controlled studies show smaller risks and higher uncertainties.

And finally, in some respects the epidemiology evidence available today is actually weaker than it was when the PM 2.5 standards were first proposed. That's not saying that for our health effects from PM, but a lot of this new research really demonstrates and raises questions with regard to magnitude of health risks that can be attributed to PM and certainly something that regulatory agencies and health practitioners need to look at with regard to PM.

So even if intelligent minds can

disagree and in extent and agree that PM may cause health effects, there is, as we heard and although national PM ambient 2.5 standard needs to be met. New Jersey along with other states, needs to meet that difficult standard, so really the actionable question is not whether PM causes health effects, but what can be done to further reduce PM emissions and meet the current air quality standard.

Although there are numerous PM sources to consider when addressing this question, I would like to focus attention on PM to issues related to diesel engines since; one, diesel engines are often thought of as a major source of PM emissions; as from my association, diesel engines are important. I understand that New Jersey is particularly interested in reducing diesel PM emissions.

Diesel is an important source of power throughout the world and are the primarily engine choice in trucks and buses, non-road equipment, small stationary power generation and are almost exclusively in locomotives and large marine vessels. Diesel's share of the market has grown tremendously

since the 1950s since they are very energy efficient, extremely reliable and durable and consequently are a very cost-effective way to reduce power.

Like other combustion sources, diesel produce emissions as a result of converting fuel to useable energy. These emissions include particulate matter. The amount of particulate matter produced depends on the efficiency and temperature of the combustion process, the quality of the fuel and the need to trade-off between the production of nitrogen oxide and PM. Over the years, concerns regarding emissions from diesel have developed and have centered around the health effects of diesel PM, the amount of PM emitted, smoke and odor issues, emissions of NOx and air toxics, and the mostly incorrect view that emissions from diesel engines are uncontrolled.

Today, engine manufacturers have addressed virtually all of these concerns regarding diesels, and today's modern diesel engines are very different from those manufactured even a decade ago. Virtually all

studies of the health effects of diesels derive from epidemiology studies of diesel engines and fuels prevalent in the 1950s and '70s. In addition, all of those studies were actually occupational studies where exposure to diesel emissions was not measured and participants were exposed to a variety of emission sources. A thoughtful examination of EPAs recently, two years ago now, published Diesel Health Assessment Document really gives a reader a good concept of what the real issues are with diesel.

It's also not true that PM emissions from diesel engines remain high and virtually uncontrolled. Diesel PM emissions levels have been reduced significantly since the 1980's and in many cases more than 90 percent. Despite the increasing market share and many more miles traveled by diesel vehicles, US EPA and various state ambient air monitoring indicate that the ambient PM attributable to diesel sources has steadily declined. So, contrary to the perception, PM emissions from diesel have been declining and generally make up only a small percentage of

annual PM emissions.

Other emissions such as Nox and hydrocarbons have also declined as we made improvements to diesel combustion and headed emission controls in response to regulations.

Diesel PM emissions from all mobile source engines declined significantly, as I mentioned and additional major reductions are around the corner. PM emissions from on-road trucks and buses have declined by more than 90 percent 0.1 grams per great horsepower hour today. As the new EPA national emission standards effective for the 2004 model year will reduce those emissions 90 percent to 0.01 per great horsepower hour, essentially, starting in late 2006.

On the non-road side, PM emissions have also been reduced, perhaps not as quick a scale. PM from construction and agricultural equipment have declined from greater than one gram in the 1980s to 0.15 grams today. EPA will soon publish, by the end of this month, the new non-road rule to cover all those engines and we firmly expect that PM emissions standards for those pieces of non-road

equipment will also be decreased to the 0.01 level, thereby assuring virtually elimination from all PM from heavy-duty mobile sources.

This just shows the diesel reduction efforts that the industry has done over the last 15, 20 years or so. And it also shows a companion graph on there, NOx emissions, all have been similarly reduced.

Again, for the non-road segment of the industry. Again, if we're following a little behind because technology moves from light-duty vehicles, heavy duty vehicles and then the non-road sector, again, similar reductions are there.

These PM reductions are being accomplished through improvements to the base engine, the mandatory use of ultra-low sulfur ppm diesel fuel and the addition catalyzed PM filters. These systems and control technologies essentially take PM levels to near zero and undetectable levels. An added benefit of this technology is virtually at the same time, although we're controlling the PM, this technology, the fuel and filters also reduce hydrocarbon and air toxics emissions.

With these new advancements controls, PM emissions are really no longer an issue with the new diesel engines and no additional controls are needed. While this solves the PM issue for new engine, there are still the large numbers of vehicles and equipment in the existing fleet that are powered by diesels and that are made up of older engines. And because of the well-known durability of diesel technology, these engines will continue to operate for some time without the emissions reductions that will be required of new engines. The question then becomes, what to do with PM emissions from existing in or-use fleet?

Emissions from existing diesels depend on a number of factors including the age of the engine, the level of emissions that had to be met when the engine was manufactured and new and the degree that the engine is maintained. Very old, poorly maintained engines will emit the most PM, including at times the black smoke that the public is very cognizant of.

So emissions reductions from the

existing fleet are possible and can be accomplished through a number of means. That includes replacing the vehicle, replacing the engine or retrofitting the vehicle with additional controls. And the type of fuel that is consumed is also an important factor in the emissions.

The options -- just to give you a little bit on the existing vehicles. The options available to existing vehicle owners depend on a number of factors, most important of which is the availability of retrofit controls that work and the economics of replacement. It is important to note that all existing equipment cannot be successfully retrofitted. Generally, engines manufactured before the 1990s with inherently high PM emissions cannot be fitted with catalyzed filters to meet the new engine standards. Also, in many cases there simply is no available after-treatment because of technology limitations, duty cycle or equipment design. A decision of whether to retrofit or replace comes down to economics. Does it make sense to invest thousands of dollars into a vehicle as

opposed to just buying a new vehicle? Reducing PM emissions from existing fleets is going to cost someone money and one of the public policy decisions is who is going to pay for those emission reductions?

I wanted to talk a little bit about stationary sources, because that is also a concern. Engines are used extensively to produce power and electricity using diesel engines and they are used in prime power applications. And, actually, I think we're missing -- can you go back a slide. Diesel engines are used both in prime power applications, which are designed to produce electricity for a specific need at a constant basis or in emergency standby generators. Unlike mobile sources, emissions from stationary sources are primarily regulated by the state.

For prime power applications, generators should be treated as any other stationary source and should be required to meet the applicable New Jersey emission standard and permits.

I want to mention a few things on

emergency generators. Diesels are a critical power source that are capable of meeting very stringent performance standards to assure safety and prevent economic loss in the times of emergency and disaster. In addition, since they operate very infrequently, often less than 100 hours or per year, their contribution to PM emissions is unusual.

As a consequence of having to meet these very stringent performance standards really to ensure life critical safety functions, emergency generators deserve special consideration. Additional PM control requirements should not be required that affect the function controls the function or performance of the generators or that would likely added -- result in their failure. After-treatment devices such as particular filters generally should not be used in emergency engines.

So with that background, what should New Jersey do to reduce PM emissions from diesel sources in the state? EMA believes that there are a number of reasonable and viable PM reduction efforts that can be

implemented.

On the mobile source side, the good news is that the U.S. EPA, Engine Manufacturers and the Petroleum Industry have solved the problem for new engines. New federal standards for on-highway and non-road heavy-duty engines will reduce PM emissions to near zero levels.

So really no additional action that's needed by the state, which for the state it's good news because state action with regard to mobile sources is governed by the Clean Air Act, and, essentially, any emission standards have to be developed either by the Federal Government EPA or California Resources Board, so there's not too much you can do about these vehicles anyway, but the problem is solved.

For existing fleets, EMA supports the adoption of voluntary retrofit programs. Because of the difficulty and cost of mandatory programs, and the real fact that not all equipment can be retrofitted, we believe incentives are the best option and the most cost-effective source of PM existing fleets.

State programs that encourage a more rapid fleet turnover, that provide owners

with money for either replace or retrofit engines and that working with fleet owners to promote retrofits will be needed to obtain any significant PM emission reductions. As I mentioned before, the critical issue on retrofit programs is identifying a source of money to fund these efforts. That has been a key issue both in California and Texas and nationally as to if you want to retrofit all the school buses in Connecticut or New Jersey, where do you get the money to pay for those?

Also, final issue is that in terms of the existing fleets, one option is for New Jersey to look at the need for enhancement of their inspection and maintenance program for heavy-duty vehicles and equipment. Poorly maintained and out-of-tune result in highly increased PM emissions and a program to ensure that engines are properly operating should result in significant PM emissions reductions.

On the stationary side, EMA would recommend that all new stationary standby engines be required to meet the US EPA non-road Tier 2 or 3 engine standards. We also recommend that existing standby engines not be

retrofitted since critical performance measures will suffer.

For prime engines, New Jersey is already working on PM requirements for small electric generators and placing reasonable and technically feasible standards on prime generators is certainly in order.

So in conclusion, EMA would be pleased to provide more information and is certainly available to have further discussion with you as the state develops its PM control strategies. We are happy to serve as a reliable resource of technical information for you and provide our assistance to the state to develop an effective and reasonable program to meet whatever PM reduction goals you determine is necessary. I'd certainly be happy to answer any questions. Thanks.

CHAIRMAN BERKOWITZ: Thank you very much. Questions?

George.

MR. CURRIER: You had mentioned emergency generators and the -- that you don't recommend adding any particular filters to emergency generators. How would that effect

their competitiveness with natural --

MR. SUCHECKI: Our companies that we represent have natural gas and diesel generators and generally, in a lot of cases, you are not able to use natural gas generators as an emergency sources because of rules and regulations and specifications about having a separate fuel supply and what have you. And also diesels do respond and follow-up better and start up quicker than the natural gas generators. And that's why emergency generators are kind of in a special category because they have to be in such strict form standards; federal fire codes, national fire, state laws building codes and what have you.

In terms of if there is a opportunity to use a natural gas engine and that it can meet the appropriate codes, PM emissions for natural gas engines is much less than from diesel. If that's possible, that would be one thing to do.

MR. CURRIER: If I may continue?

CHAIRMAN BERKOWITZ: Absolutely.

MR. CURRIER: In the designs that our office does, we prefer diesel because of

liability also. I was wondering why you were not recommending a particular filter.

MR. SUCHECKI: Two reasons. One is particular filters will work at certain temperature in operating and lower conditions and generally emergency generators do not operate enough to meet those conditions. So if your emergency generator has to be run for maintenance and testing for a half hour or hour every month, however much it is, generally that engine is not going to get up to temperature of speed enough to keep that filter working properly. If it's -- if there's not sufficient temperature and load on the engine, those particular filters don't work, they could get clogged and then you increase back pressure and affect the performance of the engine. It's really an operational issue where at this point in time we are -- we don't see a particular filter or after-treatment device that will work to meet the low standards of .01.

MR. CURRIER: Thank you.

CHAIRMAN BERKOWITZ: Irwin.

MR. ZONIS: Mr. Suchecki, a couple of points. New federal regulation standards

for mobile source application, that's the 2007 number that in an earlier slide of yours permitted at 0.01?

MR. SUCHECKI: Yes.

MR. ZONIS: New diesel non-road engines .01 grams, that's the one where you suggest that EPA may publish by the end of this month perhaps?

MR. SUCHECKI: Yes.

MR. ZONIS: That's the 2011 number?

MR. SUCHECKI: Yes. And it's simplified somewhat in that last year EPA published a proposed rule and at that time they had proposed limiting the new emissions standards to 0.1 grams per great horsepower hour and we fully anticipated after working with EPA on these and we certainly anticipate that that standard will -- the equivalent standard for the diesel on-road trucks and buses -- we expect them to have the same PM standards, 0.01 for more applications of non-road engines.

Non-road engines are a little bit different than on-road engines in that over the

years, the emissions requirements had been phased in based on the size of the engines, so that very small engines, large engines come a little bit later; that's the same here where 2011 is going to be the date where we expect the .01 to be required of most of the engines that you would see in tractors and construction equipment. Some of the very small engines, some of the very small diesel engines will have a later date, but still eventually reach the .01. Some of the very large engines above 750 horsepower that are primarily used in stationary applications or some big pieces of mining machine equipment out in Wyoming. There has to be a little more technology development in trying to get a particular filter that will work on that size engine that will be perhaps later. But 2011 is when this new standard will take effect.

MR. ZONIS: One more question, if you will, please.

Is it not the case that low sulfur fuel works for older engines as well as new ones?

MR. SUCHECKI: Yes. Let me explain

a little bit about the fuel standards and the low sulfur, because it's a little confusing. Right now there's two types of diesel fuel. There's on-road diesel fuel and non-road diesel fuel. And the on-road diesel fuel today is about 350 parts per million sulfur. And the non-road diesel fuel which is used in farm equipment and construction, that could be up to 2000 parts per million, 3000. The new on-road standard for diesel fuel which will come into effect 2006, knocks the sulfur level down a little to 15 parts per million. And then as we also anticipate the EPA is going to propose the same sulfur level, ultra-low sulfur diesel fuel for non-road equipment probably all starting in 2008. So eventually all the diesel fuel will be dropped down to 50 parts for the ultra-low sulfur fuel.

You can get PM emissions reductions by switching to ultra-low or low sulfur. There's a couple options. One, you can ask or require non-road equipment to use current on-road fuel so it will drop that sulfur level from 2000 down to 350 or you go further and say everything has to use the 15 part per million.

And generally from an engineering manufacturers' standpoint, we really don't have a problem; we believe that that fuel is going to work just as well in existing equipment as it does in new equipment.

MR. ZONIS: One additional thought. I'd like to ask if I may. Each of us as consumers recognize our personal passenger cars have a variety of equipment which leads to lower emissions with respect to NOx or whatever else and what comes to mind is exhaust gas recirculation and carbon canister, and, obviously, the catalyst chamber as well. I assume that there is similar multiple improvements made in the diesel engines made over the years get down to .1 gram or even lower?

MR. SUCHECKI: Yes. Over the years, up until the 2007 regulations, we could manufacture and design into improvements in the engine itself and fuels ways to gets down to that lower levels and .1 gram on the PM and, essentially, was 2.5 or 3 gram engine. And the most recent integration of that was in 2002 where most of the engine manufacturers adopted

exhaust gas recirculation in order to meet those NOx requirements. So there has been instrumental and somewhat drastic improvements in technology. We're now to the point of having exhaust gas recirculation on most of the work, diesel engines. And then meet the additional requirements both the PM requirement and Nox requirement, there's not too much more we can do with infilter engine technology so we have to go to the after-treatment devices, which for PM is pretty much settled on the catalyzed PM filter and they work well. You know, various EPA states have done tests and it just does a tremendous job in reducing PM. The Nox also has to be reduced in 2010 actually for on-road. And there's more of a problem with that, frankly, at this point in time manufacturers have not decided on a NOx reduction technology. Some we're viewing selective catalyst reduction as a possibility; there's NOx absorbers hopefully someone out there will have a nice black box to put on the engine that will fix the NOx problem by 2010. But that is a much more difficult issue to obtain. A lot of work is going on and

companies investing millions of dollars. And as an industry, we're confident that we'll be able to meet those levels.

MR. ZONIS: Mr. Suchecki, very helpful. Thank you.

MR. MAXWELL: Thank you. Presentation was very interesting.

How often does the fleet, the generic fleet turn over or I guess another way of asking, what is the average age of the diesel engine out there?

MR. SUCHECKI: I really don't have any good numbers on that. It really depends on what fleet you are talking about. I think large national long-haul truckers, like Schneider or Freightway or someone, is probably going to change their vehicles over every four or five years. Of course then, those trucks, get sold to smaller fleets. Then other fleets out there will last a long time.

We certainly know that school districts are notoriously short of money and there are California school buses from the 1960s that are still running out in California, and, obviously, if you maintain the diesel

engines and repair them, they are going to last that long. But the fleet turnover is really an issue.

As I said, one of the things that would be very useful is to find ways to encourage people to turn over the fleets earlier. The idea is really to get the most bang for your buck. Concentrate on getting rid of those really old 1970s, '80s engines out there.

CHAIRMAN BERKOWITZ: Michael.

MR. EGENTON: Joe, you mentioned recommendation as far as retrofits as incentives. Do you know what other states are doing? You mentioned California, Texas.

Also, does your trade association have any ideas as sort of whether there are financial incentives or what have you?

MR. SUCHECKI: I think Texas is probably the best example of another state to look at. They passed legislation, I think four years ago for the Texas Engine Emissions Reduction Program or TEERP, which was a wonderful idea, except it got thrown out because the state supreme court said it was

unconstitutional. The legislature went back and fixed it and they passed another bill last year and that bill, essentially, provides funds from the state that will go towards individual fleets or individuals owners who want to turn over or retrofit their fleet; there's a variety of options available. They can upgrade their fleet, they can put in new engines, new vehicles, they can retrofit if the technology is available and I think that has been very successful in terms of getting people to go out there and do that.

California were a little bit at odds at this point in time because at this point in time, they are looking at mandatory retrofits and we're trying to work with them to convince them that's not the best way to go; they are looking at mandatory retrofits.

EMA as an association, we have been working pretty heavily actually in congress trying to get federal monies available for retrofit. And we have been working on that legislation with the Union of Concerned Scientists and Natural Gas Coalition for about four years now; and, it gets pretty close and

then the energy bills doesn't get passed or the transportation bill doesn't get passed so we're still sitting there.

But we have been working in terms of school buses to try and get, I think it was on the order of $60,000 a year federal funds to be provided to school bus to go through retrofit. We have another program that would do the same for heavy-duty trucks as well. So those are the kind of things you have to go through. It really comes down to money. If you're out there and you're a small trucking firm and someone says, gee, I'd like to reduce my PM emissions but it's going to cost me a hundred thousand dollars to do that. I can find another 100,000 in the back safe here to use. So it's really an issue of trying to find the money somewhere and how you do that is certainly up to each state whether you want to do it.

The dreaded tax word or user fee or something like that to try and get money.

MR. EGENTON: Or a sales tax break. I know we did it with Freight Water Recycling here in the state.

MR. SUCHECKI: In addition to providing money, you can come up with some other programs; depreciations or sales tax breaks, a variety of different things that you could use.

MR. EGENTON: Thank you.

CHAIRMAN BERKOWITZ: George.

MR. CURRIER: I apologize in advance for this question. The Council certainly appreciates your participation and I personally am a fan of diesel engines. In the first part of your presentation you raised questions about the link between health effects in particulate matter and to me it sounded reminiscent of the tobacco industry about 20 years ago. Could you direct us to where we could get a copy of the Koop and Tole report?

MR. SUCHECKI: Actually, just recently published like about a month ago or so. I can't remember the Journal in England, some environmental journal in England. I'm sure -- I don't know if Barbara has seen a copy of that or Dr. Lippmann, I'm sure he has a copy. I can get you the citation for it certainly.

MR. CURRIER: That would be helpful.

MR. SUCHECKI: As Dr. Lippmann said, actually, I'm not a lawyer, so I guess I can get away with being up here and talking.

I think industry has had concerns about some of the evidence for PM and, again, not to say there's not a health effect; we're not saying that air pollution is not a health issue. Some of the specific studies and some of the specific relationships with regard to what level of PM might cause heart attacks or whatever. I think there are some questions and we have been actively involved with EPA and commenting to the Clean Air Scientific Advisory Committee on issues and I think some of the members there also have concerns about those issues and I think it still needs to be looked at.

One of the things, again, that EMA did is we had a cardiologist from New York State take a look at the EPA graph criteria document, get his view and you know he had concerns about what they were saying about the link between cardiac and PM. And he went down

and made a presentation to that group. Some of the independent members such as Dr. Lippmann and others said, hey, EPA, what about this? EPA went through and said, we'll look through the documents and EPA got their own consultant from the University of North Carolina who was also a cardiac specialist and he eventually agreed with the comments that were provided by the person we presented; there were too much exaggerations or one-sided reporting in the EPA criteria documents. And the cardiologist's view was, well, we do see changes in these various cardiac measures and enzymes and what have you, but that doesn't necessarily mean anything right now. It's not necessarily good and it's not necessarily bad. So we can't say just because we're seeing effects it's necessarily harmful effects. As Dr. Lippmann also said, if EPA is continuing this research I think that's just the idea that we'd like to get across is that, before we kind of indicate that PM is the cause of all health problems in the community, we need to take a close look at that.

But in the meantime, certainly in

our case, the regulations are preceding that determination and we're getting down to near zero levels on emissions from our engines.

CHAIRMAN BERKOWITZ: Can I ask a question? What does a retrofit cost for an individual diesel, ballpark?

MR. SUCHECKI: Again, depends on what size and everything, but probably anyplace between two and $10,000. It's not cheap.

And then the other thing you have to realize, you also need the ultra-low sulfur fuel, because otherwise the sulfur in the regular fuel will poison the catalyst.

CHAIRMAN BERKOWITZ: You alluded to the fact and you make such a great product, they travel for four billion light years; how many miles do you get out of a normal diesel?

MR. SUCHECKI: Generally diesels will go for 350,000, 400,000 miles before they have to do any major overhauls. So over a million miles -- we have to, if I get the number right, we have to guarantee or certify to EPA if the emissions controls will last for 250,000 or 300,000 miles.

CHAIRMAN BERKOWITZ: You said that

it was very difficult, if not impossible, to retrofit certain diesel before a certain year, why is that and what was the year?

MR. SUCHECKI: Generally before 1990. And the reason for that is before there was electronic emission and some of the other changes in the engine itself, diesels were inherently very high in PM. So you get a PM level above one gram per great horsepower hour and a lot are probably higher than that, there's such an initial or a load of PM that's coming out of that engine, that the filters can't take that load; they're designed now to be based on a .1 gram engine. So eventually that filter has to work to get 99 percent more and they simply can't do that. Too much of a load for them.

CHAIRMAN BERKOWITZ: A lot of these 1990 vehicles are still on the road.

MR. SUCHECKI: Yes.

CHAIRMAN BERKOWITZ: If we can't retrofit them, we got to get them off the roads.

MR. SUCHECKI: That would be the best thing to do.

CHAIRMAN BERKOWITZ: Which is also a huge expense. It's just to the point now in New Jersey there's not much focus on stationary sources, that it seems that it's mobile source turned and a lot of us at this table represent different constituents who have paid the price to function and work in the State of New Jersey; seems to be that's probably going to happen to your state as well.

MR. SUCHECKI: Yeah.

MR. SOTO: Mr. Suchecki, has your company ever considered initiating any kind of technology like these cars that have --

MR. SUCHECKI: I represent the association -- the association doesn't make anything but our members are involved in developing diesel hybrids for heavy-duty use. I believe there are some kind of pilot programs, again, out in California and Washington state. And I believe it's Fed Ex who has some prototype diesel electric hybrids and those are going to work, obviously, the same way. You are going to get tremendous gas mileage out of those as well. Again, they'll be, because they are hybrids, reducing

emissions.

MR. SOTO: How can we get further information on this?

MR. SUCHECKI: I will see if I can gather information on this and send it in as well.

CHAIRMAN BERKOWTIZ: We've kept you long past your allotted time simply because the information you have is important.

MR. SUCHECKI: As I said, I'll be happy to come back.

MR. BLANDO: Quick clarification.

You mentioned the after-treatment of filters last 250,000 miles, but the engines typically get more than a million miles. Do I understand you correctly the treatment devices typically only need to be replaced about every quarter of the total life of the engine?

MR. SUCHECKI: Probably. The durability on the filtered something done by the manufacturers and after-treatment devices, but it's expected and they might last the life of the engine, but right now I think there's a 250, 300,000 certification that we would have to do so we would at least get it to that point

and then go for a major overhaul and then replace the after-treatment device.

MR. BLANDO: Are the people utilizing these engines aware of the fact that after 250,000 they have to replace?

MR. SUCHECKI: They will be. That will be part of the package.

The other issue is that we are working with EPA on some testing to make sure that the emissions benefits are long-term and EMA, EPA have just agreed to some long-term engine testing program that we are going to be initiating in 1995.

MR. BERKOWTIZ: Thank you.

(Pause in proceeding.)

CHAIRMAN BERKOWITZ: Again, I'd like to reconvene the hearing and go back on the record. And I'll introduce Dr. Kevin Fennelly. Thank you very much.

DR. FENNELLY: Thank you for the invitation and thank you especially for rearranging the schedule and allowing me to drive out.

Len Bielory is a colleague of mine at the New Jersey Medical School and he had

asked me to focus a bit on very general aspects of aerosols and particles in the air and how we breathe them, but I'll try to shed some light on how that I think they -- that general discussion interacts with particulate air pollution.

I wanted to tell you who I am and where I'm coming from. I had been doing research on particulate air pollution at the National Jewish Medical and Research Center at Denver, but at the same time had gotten involved in some research on tuberculosis. And for reasons of academic survival, I've decided to focus on one area, which is uncharacteristic for me, but I'm really doing research on TB transmission, so that's why I'm here. So I'm no longer funded for doing particulate air pollution, which is both a good and a bad thing. Bad is I may not be as up on the literature as other folks since I haven't been involved in the lab for a few years, I'm not depending on getting any funding from any sources so I can say what I want.

This is just an example of what we're doing now and basically we're trying to

study the aerosols that are created by human beings who are infected with tuberculosis.

This is just to show you at National Jewish, mostly people with multi drug-resistant TB, how we can study the amount of aerosol they produced and then follow them over time. All this is to say this is who I am now.

As part of this work we're able to measure the particle sizes and one of the things I hope to leave you with is the importance of understanding particle size in addition to the toxicity, such as looking at the difference between the particles coming from different types of engines. So with all that being said, as a pulmonologist and occupational environmentalist physician, I'll be up front now and tell you my bias is that there are very compelling data that there are multiple health effects from particulate pollution.

I think back in the early to mid '90s there's lots of debate in the scientific community about is this causal or not. I think now my impression is the debate has moved

forward and really I don't think the issue is as much as if it's causal as how big a problem is it? There's lots of competing demands. For example, I'm working on the global TB and HIV epidemic which I think is devastating and probably a bigger problem than particulate pollution around the world. But in areas like New Jersey, California where there's lots of particulate air pollution effecting lots of people, it may be a more significant problem.

Next slide. Let me start kind of at the beginning. In the '50s there were a number of disasters that kind of woke everybody up to the fact that air pollution can be a problem and some of the other speakers this morning might have alluded to some data like this, but this is the London Air Pollution Disaster that occurred in 1952 and on this access (phon) there's a number of deaths. Right now we're talking about fairly long numbers of deaths per day, but if you look at each of these days, what happened is, there's a severe severe temperature inversion and what happens is, this index of smoke, which is the old British marker for particles in the air and

sulfur dioxides both went up. Now there's a phenomenon called code (phon) in the area; it means things tend to track in the same way and the reason is; if you think of an air shed as a boiling pot of water and put the lid on it, everything's going to get trapped at the same time.

So in Denver what we saw is particulate matter and carbon monoxide went up in winter inversions. With that rise in air pollution, very closely following with a large number of deaths and the morgues were overrun with bodies during this disaster and in about 500 of the autopsies that were done, 300 of the individuals had co-existing heart and lung diseases, which is interesting for reasons I'll allude to later. This being wintertime another phenomenon that's interesting is this little tale here and it turns out there was a flu epidemic shortly after that and some people have wondered if there's an effect of some of these air pollutants on resistance to infection.

Let me go on to the next. This is where I came from. One of the reasons I was

late getting here is I'm still getting used to the New Jersey roads. I'm born and raised in Los Angeles, hence my interest in air pollution, but then moved to Colorado. This is an example known as the brown cloud in the Denver region and it's a result of wintertime inversions holding the particles in. I think the data is very compelling, mostly time series analyses showing cardiovascular hospitalizations and deaths associated with particulate air pollution, both PM 10 and PM 2.5, the two measures you probably heard about. Also hospitalizations for pulmonary diseases and deaths, cancer, asthma exacerbations. The one issue is that the biological mechanisms are still unclear, and I think, I would be the first person to say we definitely need more research to try to understand what's going on. Some of the data about ergonomic changes. Heart rate variability, I'm honestly skeptical about. In many animal studies, there are several studies showing consistent oxygen injury and various types of pro-inflammatory events that are incurring.

I alluded to this before, but these are very small risks. So it's about a half percent increase say in the daily death rate for every 10 micrograms of PM 10, and that wouldn't be a big deal except that we all breathe air, so these effects are spread throughout a large population.

One of the studies that we did in Denver, and I'm embarrassed to say that because of my transition to TB and New Jersey, haven't published this yet, but we presented this at the meeting, we did a time series analyses of several years of data, late '80s to early '90s, end of 1992, and as a pulmonologist I was saying, well, God, this doesn't make sense. Why should these particles be causing cardiac deaths? Now these crazy epidemiologists, they don't understand things as well as I do because I'm a very smart pulmonologist and surely it must be due to carbon monoxide -- carbon monoxide was causing the heart deaths and particles were causing the pulmonary deaths. Of course then I sort of realized that there's this pulmonary problem and it's very difficult in any one study to tease those things apart.

But then we realized that there's an awful lot of patients that have both lung and heart disease. What's the most prevalent particulate air pollution in the world? Cigarettes. So patients who inhale cigarettes commonly get both lung and heart disease. They get emphysema, chronic bronchitis, which we call COPDs and they get heart disease. What we found when we looked at admissions for primary pulmonary or primary cardiac conditions with or without respiratory disease, was a marked increase in the admissions only for the cardiac admissions associated with PM 10 only if there was a COPD type of diagnosis. So instead of a relative risk of about 1.05, there was 1.21. And this was even greater for the elderly subjects.

George Thurston's group has recently published a similar paper where they looked at the New York City data, and that's probably more similar to the air shed, if you will, to the air we breathe in New Jersey and they looked from '85 to '94 and they saw that if they added respiratory disease to diagnoses for circulatory or cancer deaths, that they saw

this increase. But death is a pretty insensitive end point. So you wouldn't expect to see a huge signal of deaths, to look at hospitalizations is a way to tease that out a little better.

This is just to remind you that we're talking about PM 2.5 or PM 10, but those particles are a lot of different things. The way I like to think of it is that all these gases, the nitrogen and oxygen and all the other gases we breathe, are really the solvent and then you've got all these particles that are in the air, and a lot of those, especially in Denver, are crustal elements, that is, dirt, silicone and various complements of the earth's crust. Combustion products are really what we're most concerned about. A lot of the data now seems to be pointing towards metals some of these metals, may be especially important and this is where we really need to continue a lot of the research. My focus now is really in the bioaerosol area, but we can't forget about that. And what we're finding is the things like ozone and particulate matter can act as agiment (phon), that is, increase the allergic

potential of some of the pollens and some of the bioaerosol matter.

I didn't highlight there, but depending on how active we are we may breathe up to 15,000 liters a day; we don't think about it a lot, but we're taking in a lot and, obviously, there's a pretty phenomenal mechanism to the human body to take care of all of the particles we breathe in. And please don't bother looking at this and trying to remember all these things. This is just to, again, remind you that there's a wide range of particles in the air. And some of them are bad. Cigarette smoke, particulate air pollution; but some are good. So there's a huge industry in New Jersey and elsewhere focused on administering medicines by the inhalation route. And we can actually learn something about how these medicines are deposited, cleared and sized and things like that. I'll mention that a bit later.

What happens to these particles when we breath them in. These are, obviously, microscopic particles that we're not aware of when we're sitting in a room like this and one

thing that sometimes is a little creepy for people to think about is that when we exhale or especially when we cough, particles are going out and then they drift over and so you may be breathing some of your neighbor's particles that they've put out or what's ever been vacuumed up from the carpet. So there's -- when we do air samples, there's an phenomenal amount of stuff in the air. And it comes down to one of the things that happens is this body is very well saturated with water, so if there's anything like a clay, there will be hyperscopic growth. Then there's different types of methods by which these particles land. So some of them will just kind of smack into the first surface that they come to; some may have an electric charge on them and so they're drawn towards the side wall, because of that, kind of like if you're pulling Glad wrap or something like that apart, now there's static electricity. So particles can do the same thing within the lung. Sedimentation can just be real small particles that fall out or ring out into certain areas. Then if you have real long particles like asbestos fibers, they

sometimes will get hung up on a wall so their smaller diameter maybe very important but then the fiber itself lands and then solubility is another key component. Water soluble components tend to cause more toxicity up in the upper airways because of all the water there. Whereas lipid soluble compounds will be more of a problem down in the deeper reaches the lung or the alveoli.

One of the changes during my career in medicine is that I used to be taught that the very some particles acted like acid. They just kind of went in and came back out. So when people first started talking about these ultrafine particles, these particles that were way less than a micron, people thought that was nonsense because those don't get deposited. But what we know now is that there is two main areas of deposition within the lung. So particles that are about two to five microns tend to land in the lung and then there's kind of a nadir of particles between the .1 and 1. And then there's another big area where particles this size here, about .01 tend to be deposited very well. Some of these particles

get exhaled out. So we've learned a lot about these. And there are folks working now on nanoparticles, so these are about 200 nanometers, that they put drugs in and they can readily be taken out by microfacias and it's a very efficient mechanism for delivering drugs. So we've learned a lot during the last decade or so.

With all these particles going in, how come we just don't fill up and stop breathing. Obviously, it's a pretty good system. Whoever designed it, did a heck of a job. The clearance mechanisms are critically important and with all due respect to my humanology colleagues, mucociliary are the most important; but this is a clearance mechanism where the body produces small amounts of mucous, kind of acting like a moving fly trap, traps any particles that come in and then moves it northwards by the beat of bacillia kind of brushes the sweep northward and then we swallow it and it goes into the stomach where it gets digested by hydrochloric acid which kills most bacteria and other things we had to fight since we were in the caveman era.

The other major mechanism of clearance is cough. So if you have a large amount of mucous secretions from some irritation or whatever, there's a signal when the large amount gets near this corrina (phon), these areas of junction, and then the body coughs due to a reflex and then move things northward. But there's also some clearance directly in the lymph node tissue near the airways and then once the particles get down into the alveolar where the gas exchange takes place and there are even more efficient clearance mechanisms to move that into the lymph and move that into the bloodstream.

We know that these are just some comments about what happens with different types of drugs.

The message I want to give is that these deposition and clearance mechanisms are critically important for trying to understand the toxicology of any of these compounds and clearance has often not been studied to the extent it should be.

There's been a lot of confusion in some circles about PM 10, PM 2.5, should we

have PM 1 and this is a diagram to try to illustrate the large particles, what we call PM 10 scale from 10 microns down, so most of the really big particles are say from 1 to 10 are course particles, they're crustal elements. This is a picture of Mount St. Helens blowing in 1980. And this was the ultimate road sanding experiment; lots of crustal material airborne and then got transported to different places and one of the fascinating things from the research that went on is that these particles were not very toxic by themselves if you use the large particles. But when some investigators used very, very small particles of this ash, they were highly toxic. So size decrease will increase the toxicity of even fairly benign compounds. Then fine particles are really what most of the discussion when I was listening to the gentleman before me, the combustion products and that can be from natural combustion, from fires, which has been a huge problem in Colorado. Again, I was back doing research in March, they already have fires going because of the drought out west. But in industrial areas what we're mostly

concerned about is sulfates and nitrates and other compounds.

I was glad to hear some discussion about mobile sources because automobiles do produce a lot of these organic compounds and we need to do more homework in terms of the automobile.

An easy way to try to understand the importance of particle size is to look at what happens when we look at different drugs, so this is a medicine that's used to bronchodilate, to open up the bronchial tubes in asthmatic, as you can see this acts as an increase in forced expectory volume in one second. That's just a measure how much air you can get out quickly. And if you use particles that are 5 to 15 microns, you get a little bit of benefits, but when you decrease the size of the micron, you distribute the drug to more airways and get a much better effect.

We can look at this in terms of organisms as well. This was a study done way back in the early '50s and what these investigators found is that when they used these B-subtilis spores, they were trying to

study anthrax as an occupational disease, not in mail workers but in textile workers and what they found is that with large particles, most the deposition was in upper airway, very little in the lung; where if you used small microns as particles, most of it got in the lungs, some still deposited in the upper airway.

Unfortunately, we have had some recent tragic experience with other types of aerosols and many of the aerosols associated with smoke inhalation and other disasters like the World Trade Center are irritant in nature and they'll cause a lot of inflammation immediately due to the irritant natures often due to strong acids that are in there, but there's a large number of toxic compounds in there.

Another issue that many people don't appreciate is that the deposition of particles is not the same in everybody. So the drug companies are really good for showing these sexy pictures where you see inhalation of drugs, see this nice deposition; the problem is we hardly ever give drugs to normal healthy people. We usually give them to asthmatic or

patients with COPD and what they do is have various heterogeneous depositions of particles often sort of hot spots; a lot of it will go to one area. What we know is that these patients will actually have increased deposition, contrary to what might be intuitive but they'll actually be increased deposition and it will be more focused in one area. So this is -- part of this is what led us to our hypothesis that perhaps COPD was an underlying risk factors for some of these cardiac effects.

This is the picture of our inhalation chamber at National Jewish where the health care workers do have Latex allergy and we had a protocol where we would simulate changes of gloves and determine whether or not they had occupational asthma to the airborne Latex and one of the problems we face at hospitals like University Hospital in Newark is that we just don't have the research facilities or the clinical facilities to do this kind of thing. I think in New Jersey there are a few places that they have the equipment that we were fortunate to have at National Jewish. This speaks to the issue of research. And I

know that there's a lot of strength in New Jersey in terms of epidemiology and toxicology.

My personal, obvious, bias is I think we need to do more clinical research on humans, since there's not been an epidemic on mirroring deaths due to air pollution to my knowledge and I'd really like to see somebody run with doing more clinical research.

So what to do? I hate to pontificate, raise anxiety and say, we have this horrible health problem, what do we do? It's actually much easier for me to say, yeah, going through the literature over the few years, I think it's pretty conclusive that there are health effects from particulate matter. How big a problem is that and what do we do about it? Do we make everybody's house the equivalent of a computer clean room? I don't think so. That would be ludicrous and horribly expensive. But there's always competing in societal demands and we need to figure out what to do.

In terms of any action, do we need more research before we act? I don't think

so. Clearly we need more research, but it depends on where you draw the line in the sand. We still don't understand exactly how smoking cigarettes causes atherosclerosis or cancer, but I think most of you would agree that the data is pretty conclusive, that there's an association there. And as far as public health goes and medical practice, we tell our patients not to smoke cigarettes. I would never say, well, gosh, I really want to find out the molecular mechanism underlying atherosclerosis when I do the smoking so wait a couple more lifetimes and see what happens.

One thing I was -- so I'm a state employee. I work at the New Jersey Medical School and I was astounded, I wanted to take the train periodically but basically I couldn't because there's not an easy mechanism to get a benefit to taking the train. I pay the same price for parking no matter if I drive one day or every day of the year. And, of course, being an academic physician, the pay is not like private practice physicians and so there's not any kind of incentive. In Colorado and California where I was, there were a lot of

incentive programs to get people out of automobiles and into trains and that's just an easy thing to do.

I think I heard some comments about stationery sources. I have been asked to do a lot and none of us want to pay more taxes for our cars and we need to decide what's a reasonable trade-off.

One thing to consider for the Council is, if there's any way to work with the health department, often times the administrations of state government, in my experience, it's kind of like the FBI and CIA; gosh, they're both federal agencies, but they weren't talking to each other. Transportation is a public health problem. If not in air pollution from all of the trauma of automobile accidents. So does the Environmental Protection Agency talk with the health departments? And I don't know of any state that has a good system for surveillance of daily emergency department visits. These kind of data would be incredible helpful for epidemiologists and other investigators who are trying to look at a link between say daily air

pollution industries and any kind of health effects. We can basically scavenge the data and assemble data by codes and spit them out into a computer program. So these types of outcomes would be easy to look at.

There's some concern that infants have higher mortality on days of particulate air pollution. We don't understand why that is, but it's something that needs attention.

As I mentioned before, yes, we really need to understand the biological mechanism and that will help us become more cost effective. But my recommendation, if I were dictator right now, I would try to take as much action as possible to get people out of automobiles and to do what we could do to reduce particulate air pollution, because it is a problem. Let me stop there.

CHAIRMAN BERKOWITZ: Thank you very much.

MR. BLANDO: I was just going to mention that in terms of your recommendation about the ER visits, we do have a prototype system that's being sort of pilot tested at four emergency rooms within the state and I

think the intention is to expand that in relation to terrorism efforts. We also have a system that we look at the uniform billing code, we can look at hospital admissions. I think there is an interest of being able to utilize that data for public health protection and I'm sure that people at our agency are interested in doing that.

When you show the simulation pictures of deposition of the lung, I noticed that the farther down in that red area, was that the stomach?

DR. FENNELLY: Yes.

MR. BLANDO: Is that because they ingest more than actually get into their lung?

DR. FENNELLY: Yes. I wish you were one of our pulmonary fellows. I show that to some of our fellow and ask, what do you think that is? But you're right. Reflects what happens when we inhale things, the mucociliary clearance ends up in the stomach. Excellent observation.

CHAIRMAN BERKOWTIZ: Question?

MR. ALI: Just a quick observation. You're talking about this

biolitical (phon) agents like microsubchrondi (phon) and toxins and anthrax, you name it, all these things are coming through our body every day when breathing air? How come we're not getting sick?

DR. FENNELLY: None of the things on that list are there every day, so it obviously depends where you are. But if you were me working in Denver or when I go to Uganda to do my research, I breathe in air that has TB in it every day.

MR. ALI: Do you have any advise of hot spots or dangerous toxins -- do you have any area that has more concentration of this agents than others?

DR. FENNELLY: No. I didn't mean to misinform you or present data that misleading ways. Those are all agents that are potentially in the air. Just things airborne. Most of the time we don't think of various viruses and microbes and things, but small pox is transmitted by the airborne route, and, of course, there's been a lot of concern that that can be spread. Understanding some of these general principles helps us understand any

airborne agent to some degree.

CHAIRMAN BERKOWITZ: Dr. Fennelly, you as a pulmonary specialist are absolutely convinced there's no debate about PM particulate matter and human impact, that there is a negative?

DR. FENNELLY: I wouldn't say I'm convinced there's not a debate. There's always a debate. I find the data very compelling. And I, again, if you're talking about when and where do you draw the line in the sand, there are people still debating the asbestos question. So there will always be some individuals debating some aspects of things. I find the data very compelling. There have been scores of studies looking at time series reports, looking at daily particulate matter and hospital admissions or other things, mortalities. And they have been very consistent in very many locations, so why should that be? There's something in that complex mix that seems to be causing those things and now with more and more data coming out about taking some of those particles, sometimes people take residual oil fliosh

(phon) where they take particles that they've sampled from various urban environments and they appeared to exert toxicity in the animal models that they're testing it on.

Do we understand everything about that? Absolutely not. In my mind I think there are enough data to say that we should be taking action.

CHAIRMAN BERKOWITZ: Any further questions?

MR. BLANDO: I know there's been a lot of discussion about pediatric asthma-- we have a pediatric asthma surveillance program within our agency and we always notice a spike in October, end of September pediatric asthma admissions and so on. I know there's a lot of debate about -- I know Dr. Gelroy believes it's molds. I wonder about respiratory infections and also heard people talking about beginning use of combustion sources and air pollution and so on. I was just wondering if you had any thoughts or comments about that sort of spike that you often see in pediatric asthma in the early fall.

DR. FENNELLY: I think that's a

interesting observation. I don't know what causes it in children. But in Denver in our hospitalization data we saw a similar spike in September, October; so there are multiple explanations of what might be causing that and I just don't know.

CHAIRMAN BERKOWITZ: Thank you very much, Dr. Fennelly.

Bart Cezar.

MR. CHEZAR: I don't have a Power Point. I do have a handout.

My name is Bart Chezar. I'm currently a transportation consultant. I'm semi-retired. I left the New York Power Authority at the end of 2003 where I worked for 25 years; for 17 years as an R&D engineer and for the last seven or eight years as the manager of the electric transportation unit there. Prior to that I worked for a state organization called the New York State Energy Development Authority; always worked in the energy environment transportation areas.

I was asked to speak here basically because we've run an extensive school bus program in trying to deal with the emissions

from school buses, but we've also run a number of other transportation related projects that we think might have some bearing and interest to you in terms of some of the issues you're concerned with in air pollution.

I would like to say kind of at the onset, being I've dealt with transportation technology and policy for a long time that the extent that you come up with recommendations later, I really don't know how this process really works, I would encourage you to look at air quality, particulate, transportation in a broad context and not look at a particular pollutant, be it particulate, NOx or anything else because basically the emission is coming from stationary or transportation sources. And what policies can be implemented to deal with those issues? It's complex, but often it's not a technological solution. It could be a policy solution, parking, all sorts of things that one could come up with. I may discuss some kind of sexy technologies and stuff and I support them. I think when you're talking about transportation, you really should think quite broadly, because there's inter-related economic

air quality and energy consequences with all the things we're talking about both from the policy and technological standpoint.

On the school bus program, and I'll spend the most time on that. The reason the Power Authority got into this -- we actually did it to make amends. New York Power Authority built and installed 10 combustion turbines throughout New York City, basically to meet the summertime peak energy requirements within the New York Metropolitan area. You have to have a certain number of power plants in the City. You can't totally rely upon power plants outside the City. There was a need to get some installed within the City. The Power Authority has made a commitment that we would offset the emissions from those combustion turbines equivalently by various technology. There were two principal ones that were implemented.

One was the installation of fuel -- stationary fuel cells and sewage treatment plants where you take the waste gas put it in the fuel cells, generate energy and it's a good combination of technology in cleaning up the air.

The other principal program was school buses; and the program was set up as a six million dollar program with the initial objective of installing diesel particulate filters on 1,000 school buses in New York City and providing these buses with ultra-low sulfur diesel fuel to fuel those buses.

Just as a brief background; I'm on the New York City Department of Education, I better get that right, has about 5000 buses in service. About 3000 of these buses, 35-foot buses, that you're accustomed to seeing as your typical school bus and these are operated by about 30 outside contractors. So the Department of Education doesn't have it's own buses, they're contracted out, these services for these contractors. On an average these buses are kept from about 12 to 15 years; they get about 8 miles per gallon and travel about 9000 miles per year. So in the scheme of things there's really not that much mileage; remember this is an urban area, we're talking about bus service, but on the other hand it's a lot of stop and go travel in the middle of an urban center so it's important to look at the

emissions from these buses.

As soon as we got into the program, maybe we learned a lot more things that if we would have learned earlier, caused us to change the program. Just a couple of factors that we learned is that really the only buses that diesel particulate filters are appropriate for are buses 1995 and more current. And basically it's because after 1995, all engines became electronically controlled engines and most of them are four-stroke engines. And you can only use these particulate filters with those types of engines because otherwise they'll get all clogged up. Also, then you have to maintain a certain exhaust temperature to basically burn off the particulate from the diesel particulate filters.

Did somebody explain previously a particulate filter? Very basically, it's an after-treatment you put after the engine in the exhaust, you basically pull out the muffler, this replaces the muffler; it's a ceramic mesh that forces the exhaust air through this mesh and you really have to go through it. It's not an open cylinder; it goes through this ceramic

brick, so to speak, and it has catalysts on it that react with the particulate and enables them to burn up at a lower temperature so it completely combusts the particulates; but again, you have to have sufficient temperatures or it won't work on your particular filter.

So anyway, we learn we can only apply it to a certain population of these buses.

The second thing we learned is that we kind of naively thought you could just fuel the buses that have these diesel particulate filters; I didn't mention you have to use low-sulfur diesel fuel for these filters. And what that means is you have a fuel that has a very low sulfur contents; because with sulfur in the fuel, it's a poison to the catalyst in the filter. So if you don't use the fuel, you can't use filters but we thought we could just fuel the buses that have these diesel particulate filters in. When you go to a bus garage with 500 buses, only 20 percent or 30 percent or 40 percent may be appropriate for the diesel particulate filter, but you just can't fuel your buses, they don't work that

way, so you end up having to consider fueling the whole bus depot. So right away we learned that, if you're going to fuel a lot of buses beyond those that just use diesel particulates filters.

The third thing we learned is that, in focusing on the bus population out there, we were going to need to look at other technologies also, because really a relatively small part of the buses out there, maybe 30 percent or less than 5000 buses are going to be appropriate for diesel particulate filters. So the other thing that one could do is use diesel oxidation catalysts, which is a less aggressive after-treatment. Basically uses the same technology, but rather than having a filter, it has a canal, so to speak, so the air passes through this canal and reacts with this catalyst on the side of the canal, but the air being past through. So if it doesn't react, it won't get clogged up. So it reduces the emissions much less but still much more than we'd otherwise have it.

What are the costs of a program like this? We had six million dollars to spend

on this, just rule of thumb, oxidation catalysts are about $1500 per unit. Diesel particulate filter is $5,000 per unit and the cost of ultra-low sulfur diesel fuel, and, again, it changes; right now it's about 12 cents above the typical diesel used in commercial applications. So those are the costs of doing this.

Obviously, these things are less in volume, but these are pretty good rules of thumb. What are the emissions reductions resulting from? It's kind of a hierarchy because you actually can get an emission reduction with just using the fuel, so any bus that uses the fuel will see some benefit in its emissions. The first one with the reduction is with the fuel is kind of a number that's out there, I haven't seen real good studies substantiating and one of the best studies out there is New York City Metro -- the MPA, New York City Transit that has fairly long experience in using the fuel. But what they found out is you'll get a 10 to 20 percent reduction in NOx and particulate just in using the fuel.

The next level of hierarchy, you can actually use the oxidation catalysts without the fuel. If you did that, you will have about a 30 percent reduction in particulate and a 50 percent reduction in hydrocarbons and carbon monoxide. If you combine the oxidation catalyst with the ultra-low sulfur diesel fuel, you get about a 30 percent increase in that, so you'll probably get a 40 percent reduction in particulate.

The most stringent application is using the diesel particle figure with the ultra-low diesel fuel. In that case you're reducing your particulates by 95 percent or more, and some cases it's been much more than that; 95 percent is probably a conservative number.

An important thing to note here that's often brought up is a concern and it was probably discussed earlier, is particulate size. What they have found in the studies, diesel particulate filters will reduce on the same percentage basis, all the particular sizes, so a 10 micron particulate will be reduced at the same percentage as the 2.5

micron particulate, so that's good; you're reducing all the particulate sizes.

Also, you'll have abut a 90 percent reduction in hydrocarbons and carbon monoxides. And a 95 percent reduction in PAH, polycyclic aromatic hydrocarbons and those are basically the toxics and the carcinogens that are in very low concentration and all combustion fuels, especially diesel and have been -- claim to be bad actors in terms of air quality and health; it's a category that includes formaldehyde. So, obviously, these diesel particulate filters are very effective in reducing emissions.

Where is the program today? Right now the Power Authority is fueling 2500 buses wit the ultra-low sulfur diesel fuel. They have 250 buses with the diesel oxidation catalysts. And they have an RFP on the street for the purchasing of a combination of 1000 diesel oxidation catalysts and these particular filters. That would pretty much complete the Power Authority's commitment to the program.

I want to, and, again, I don't know how much was mentioned earlier, bring out

something and unfortunately I can't show the audience. If you look at the table at the back of your handout, there's two important dates coming up, and, again, if somebody has discussed this thoroughly, stop me.

Beginning June of 2006, all the diesel fuel you'll be buying, according to EPA regulations, will be ultra-low sulfur diesel fuel. So in terms of the fueling, it will happen by June of 2006 regardless, that's good news. Those are one of the federal regulations that have managed to not be removed and that's good news in terms of diesel emissions.

The second factor is that in the beginning of 2007, all heavy-duty diesel engines will have to meet a much more strict emissions criteria. Again, on that paper you'll see all the way to the right what the emissions criteria are for these engines. And basically all the things I'm talking about, the emissions reductions, will come into effect with all new heavy-duty vehicles, be they truck or buses or transit buses beginning with new vehicles, again, bought in 2007. So the good news is future trucks are going to be much

cleaner and you'll see according to these charts they have improved over time and I think beginning in 1994 they kind of rammed down pretty substantially. If one were to ask me what I might recommend, these are the school buses; unless you had tons and tons of money and were able to implement it immediately, I would probably not recommend what the Power Authority is doing because I know, given the difficulties of implementing, it's not going to happen quickly and you're working against these things happening anyway. So what I might recommend is: Number one, a strategy to get rid of pre 1995 school buses, get rid of the old buses. They're heavy polluters, they're not going to be helped by the new fuels and new cleaner engines, so the sooner they're off the road, the better. Those buses that remain I would focus on the diesel oxidation catalysts; they're cheaper, there's no issue with the fueling to deal with, they'll work a long time. If you took a 1998, 2000 bus, it will be out there for another 10 years or so; it's not going to be changed in 2007 so you're going to get a nice benefit from it.

Third thing is, do look at the opportunities to maybe accelerate the introduction of the ultra-low sulfur diesel fuel. I know in New York City there's a couple of agencies that are buying the fuel right now it's the MTA, all its fuel is being bought ultra-low sulfur fuel, department of education soon will be mostly using it, department of sanitation and a couple of other large agencies, New Jersey Transit, things like that; start to buy the fuel, we'll get it out there sooner, we'll get the infrastructure in place the more people who buy, the cost differential between that and typical diesel fuel will change and that will be a good thing. And like I mentioned before, it will lower emissions just with the fuel alone.

That's pretty much what I wanted to say about the school bus program. I was going to discuss other things, but you can stop me any time you want.

I'd like to mention a couple policy and technology. As I said before, policy planning is critical in terms of transportations and emissions amenities

associated with it.

I guess I have three things I would throw out there. One is zoning and land use planning. If you are going to have a intelligent transportation plan, you have to have intelligent zoning and land use planning. I live in Brooklyn; and I believe that one needs to try to redevelop our urban centers in our nearby suburban areas and not encourage development in the far-out suburbs in the rural area and we need to develop zoning and land use planning that encourages that. What people I think don't always understand, it's not just the cars that people have that go out to these -- "The Times" was running an article last week about people living in the Poconos and working in New York City. It's just not the cars these people use; it's the delivery services they require, it's the infrastructure, it's all the utility services that are required. So you have a downward spiral both in environmental, energy and ultimately economic factors. So, again, land use planning.

The second is the cost of energy.

I believe if the cost of energy is sufficiently high, you will enable people to make intelligent transportation decisions. New Jersey has very cheap gasoline. It's a strong distance center for people often to make the right transportation choice. It's easy for me to say, but I would put a tax on that gasoline and use it to encourage some of the things that you have been talking about today and that I'm mentioning today. That would be money well spent, not only for those purposes, but even people in the car paying taxes would get some of the benefits. If you wanted to look at it in a much more holistic way what you really should be looking at, like a carbon tax. That looks at all fossil fuels and applies it to all its applications. I do believe one day our country will look at that, but I don't think it's ready for it yet.

The third thing is transportation planning. Such things as congestion pricing. I know they're starting to do some of that here in New York City, but it really has to be put in place at a level that really effects people's decision making. The use of HOV lanes

and the effective use of HOF lanes. Everybody has them out there; but how many are being effectively utilized? You don't do it by just adding another lane. Maybe take a lane out of service and encourage people to use those HOV lanes. The parking and I have -- go to your typical suburban high school today and look around; is that the future you really want us to be having with the Expeditions, Suburbans, Excursions? They should be able to use the parking, fine, but they should have to pay for it. The bigger the car is that they have there, the more they pay for it. If they have small compact, hybrid, park in the good locations; otherwise, back of the bus, Gus.

Again, there's got to be incentives and disincentives for what is socially a way to go forward.

Technology. Couple things to think about that I think have some application here. One that we have been doing in New York City is called, truck stop electrification. What this basically is about is trucks, one-third of the time, are parked, but their engine is operating. When they park overnight, they

don't turn off the engine. Using the engine for heating and air conditioning within the cab in which they stay, something called the REFER, that's the air conditioning on the tractor trailer. They have to keep the engine running to run a tractor trailer. There's a lot of emissions from that, not to mention fuel use.

At Hunts Point Meat Market in the Bronx we put in 25 bays that have low truck stop electrification. I won't get into the technology itself. But it enables these trucks to hook up, turn off engines their engines; they have TVs, computer access, they have heating, cooling. It works out great for them. We're going to expand them from the fish market to the produce market. Look at New Jersey in terms of major truck route up to the northeast; major shipping terminals major distribution points, must be numerous opportunities in New Jersey for truck stop electrification. I think it's a good application. I think it's cost effective. I mean, the trucker wins because he saves on fuel costs. The air quality reductions. There's many opportunities for that.

The second technology is hybrid electronic technology. New York City we've done a lot with hydroelectric transit buses; New York City Transit is getting 350 buses. It's working out real well. It gets twice the fuel efficiency; very, very low emissions and quieter ride, actually, better operation. New Jersey Transit, the commuter lines in serving New Jersey, this would be an excellent application. Also hybrid drive for cars, trucks and delivery trucks. Federal Express is looking at hybrids and applications. New Jersey should be speaking to them about that. What about us? If you put it here, how can you encourage it? All village, municipal and state vehicles should be hybrid electric vehicles; they're cost effective. They should set an example for the public in the type of vehicle that they use.

I'll just mention the last three things very quickly. Bus rapid transit; basically providing good bus service so people will get out of their car and use the bus.

Electric station cars; I won't go into this but it's small electric cars for

people to go from their homes to the train station. Based on the concept that a family has a fleet of cars, big cars, little cars, we should use the right cars in the right application. It's actually a case where a small electric car makes sense. If you give them priority parking, which is gold in many locations and they must do that. We did a hundred of those in the New York suburbs and they loved it. And, unfortunately, the car companies working to the extent we can, but then, if policy makers push for it, it will happen.

The last thing is vehicle replacement. The biggest filter you can achieve in terms of reducing emissions is getting old buses, trucks cars off the road and if they're not going to use transit, put them in new vehicles. The emissions reduction that you achieve that way are tremendous.

That's basically it. Be happy to answer any questions.

CHAIRMAN BERKOWITZ: Thank you Barry. Thank you very much for coming.

Questions? Comments?

MR. BLANDO: I have one question.

You just mentioned the station cars and this concept of a family having a fleet of cars and I know we have had a lot of discussion on the Clean Air Council on smart growth and one of the things that we seem to often hear is sort of the frustration people have in trying to use mass transit. If you don't live right in the city where you can walk to the actual station or bus stop, often times it's a huge disincentive to use mass transit.

MR. CHEZAR: Because you can't get parking?

MR. BLANDO: You can't get parking and also you kind of figure, okay, it's going to take me 25 minutes to drive somewhere, take me half an hour to take the train, but to drive to where I have got to pick up the train is going to take me 15 minutes, what am I really gaining? I'm just curious as to, you mentioned there's this station car is one option. I'm curious if you have any comments on other innovative ways that issue can be addressed. I tend to wonder with the station cars is it really realistic for a perspective family with

a fleet of cars.

MR. CHEZAR: I'm glad I'm given a chance to answer that. The idea with the family fleet, I have one car I park on the street, it's difficult; but most people in the suburbs have a few cars and they tend to have different cars, there's a small car, bigger car. If they had the small electric car as one of those cars and they used it as a station car, it would be many other application also. We've looked at a curve of the number of trips people take and the distance of those trips. It turns out that 70 percent of your trips and 70 percent of the miles that you -- total miles you do are small trips. They may be going to pick up the laundry, going to the station, doing all these trips. Well, doesn't it make more sense many of those trips to do it with a small electric car rather than the Suburban. And if you could get good parking at the mall or at the train station or other location, you're then incentified. And you combine that with congestion pricing to make it a disincentive to maybe use that car at certain times or the lanes are congested, unless you

have the right car in the HOV lane, it becomes a combination of all those policies. There's going to be many cases where it just doesn't make sense. We were able to lease these hundred electric station cars, not because they were all green people, but when we told them they had a parking spot right in front, step out of that car get right on the train, that's worth a lot to a lot of people and that becomes a strong incentive.

The opposite part of that is you're coming in with a big Suburban, you take up a lot of room, you're not a good neighbor, you go into satellite. It's easy for me to say, obviously. It's controversial when you try to do, but you've got to think along those lines if you're going to get sensible development and there is going to be a point where gas prices go up and the roads can't carry more people, better to try to do some of this initially with a car than later on with a stick.

CHAIRMAN BERKOWITZ: Irwin.

MR. ZONIS: Bart, good presentation, thank you.

I want to make sure I understand

the expected emission reduction for the various alternative. Ultra-low sulfur diesel fuel 10 to 20 percent reduction of NOx and particulates and then for diesel oxidation catalyst you said DOC 30 percent reduction without ultra-low sulfur fuel, 40 percent reduction with, 50 percent reduction HC and CO; 30, 40, 50 percent reduction of these things and particulate in each case?

MR. CHEZAR: No. You caught a mistake. The 30 and 40 percent are particulates. I forgot to type in particulate.

MR. ZONIS: And the 50 percent is hydrocarbon and carbon monoxide.

MR. CHEZAR: Yes.

MR. ZONIS: It seems to me that diesel catalyst is a third of the cost of the fancier device and should be attractive to a lot of people. You talk about suggesting DOC for older buses; can you generalize and say by and large older buses can accept the --

MR. CHEZAR: There's bus you can't put a DOC on.

MR. ZONIS: So that the argument that we can only us electronic --

MR. CHEZAR: Right. I mean DOC may not be as effective with one engine versus another, but it will never prevent its operation. It's very similar to the technologies used on cars, though, I think current cars use more of the filtered type technology, it won't waste the catalyst.

MR. ZONIS: Particularly ultra-low sulfur fuel is available, something approaching the 40 percent reduction in particulate, it seems to be for a third of the cost and considering the older --

MR. CHEZAR: Get rid of the older buses, you're moving in the right direction.

MR. ZONIS: Good. Thank you.

CHAIRMAN BERKOWITZ: One last question.

Michael.

MR. EGENTON: Bart, I was just sort of -- a recommendation to you. I was involved with the advisory group, the Congestion Busters Task Force with the New Jersey Department of Transportation and I would invite you to go to their website. A lot of the web --

MR. CHEZAR: Nothing in here is

similar --

MR. EGENTON: Is similar to the recommendations -- we've put some controversial issues, though maybe not politically feasible right now, obviously, going to come a time where certain tough decisions are going to be made, like maybe you're only allowed to take your vehicle four days a week, one day a week you're going to have to figure out another method.

MR. CHEZAR: Look what they did in London.

MR. EGENTON: It's too bad that we ultimately may get to that point. I'm very interested in truck stop electrification, if you have any other information.

MR. CHEZAR: When I looked into it, the company that's doing it is called Idle Air. You can go to their website. I noticed there's one plant in Paulsboro, so things are moving in that direction. But I come across the Polaski Skyway and I look down and see thousands of containers and stuff there, I don't know enough about how the trucks are used there, there's got to be opportunities.

MR. EGENTON: Just a couple quick assessments. Bus Rapid Transit, looking at the Route 1 corridor for implementation on that. I'm my own critic of the HOV lanes. We had people abusing it and putting manikins in their cars just to drive in those lanes. It's interesting that I think a lot of recommendations are worthwhile and I, again, invite you to look at the congestion bus reports as well.

MR. CHEZAR: I have yet to see in this country somebody really doing a good job of Bus Rapid Transit. I'd love to see a really good application where all the advantages in terms of traffic like controls and prioritized lane to the point at which people say, why the hell am I in a car when this bus is flying through here? Once we do that, I think that's going to be really proliferated. It's not that expensive to implement and gets someone where they want to go.

MR. EGENTON: Jim's point about it, you have to make it accessible for people to want to take transit. It's easy to build it and they will come. Hamilton train station is

a perfect example. You go there, you drive around like you're in college waiting for a parking spot. We have to make it accessible for people to use these systems. We're a victim of our own success.

MR. SOTO: I didn't catch completely when you mentioned in June 2006 all diesel fuel engines would be what?

MR. CHEZAR: June 2006 is when all the fuel will be ultra-low sulfur fuel. They have to switch over to that fuel. They had to do that before the 2007 requirement, because the 2007 requirement where the engines have to have much lower emissions, basically needs to have the lower fuel sulfur contents, otherwise those technologies wouldn't work.

MR. SOTO: Thank you very much.

CHAIRMAN BERKOWITZ: Thank you very much.

CHAIRMAN BERKOWITZ: Peg Hanna.

MS. HANNA: Thank you. No Power Point again. The original agenda had me speaking for 101 minutes, so I have 10 minutes worth of stuff to say.

Just two seconds of background

about myself. I have been with the Department for almost 13 years, most of that time in the enforcement program working for the various assistant commissioners, short time in the commissioner's office. 13 is an unlucky year, so I decided I better do something different. And I'm really excited about particulate and diesel. It's kind of strange to say, I think it's a really cool opportunity for the Department to do something that has very tangible environmental benefits.

The Commissioner spoke this morning about trying to identify the cost effective measure to achieve reductions of PM. He spoke about looking for a mobile source structure. Our team strategy is multifaceted. There's a common denominator throughout our team strategy which is outreach to education and partnerships, which I can't emphasis how critical that is to develop a really good program.

The easiest thing I think we're tackling or the one that is a no-brainer is idling reduction and there's an anti-idling component in our campaign. Melinda Dower was

here, she is heading up that event and she's starting school buses. Idling is a no-brainer because it costs nothing to stop idling, but the benefits from health perspective and environmental perspective are huge, so it's a very obvious place to start. We are going to move forward with the anti-idling campaign under our existing regulations and existing authorities. We're targeting a few different sectors. We are going to start with schools, because of the sensitive population at schools. Dave Brown showed some really good evidence and studies from Connecticut that show the level of particulate that children are exposed to when they get on the bus after it's been idling for a while.

Our strategy with schools is, again, to reach out and educate the school bus drivers, the teachers, the boards, the PTAs, whoever is involved with the students, try to educate them and empower them to take things on themselves, because unless somebody has a pot of money that I don't know about, no matter how many inspectors we hire, we're never going to be at every school yard every day at 3 o'clock

when they let out to make sure they're not idling. We need to convince the school administrator and children that this is an important thing to do and let them do it, let them police themselves and motivate school bus drivers to shut off their engines.

We're also going to be looking at other idling sources such as charter buses and short-haul delivery type trucks. There have been some problems identified down in Atlantic City with the charter buses dropping off their customers on the piers and then finding parking lots which we've identified and idling for very long periods of time. We have taken some force in action, but again, we like to couple that with education in the form of a compliance alert, which should be issued very shortly.

The long-haul truckers idling at the truck stops is also a significant issue in terms of idling, but as the Commissioner said, we'd like to look at viable alternatives like truck stop electrification. The truck stop electrification that's going in in Paulsboro and Bordentown with 170 spaces electrified between the two truck stops. The money from

that came from a federal grant, C-Mac grant. It also came from some penalty money that a violator was willing to donate toward this beneficial project. The cost of that is approximately 1.6 million dollars, so for each truck stop -- for each truck space that's electrified, it's approximately $10,000. So we'd like to look into other funding opportunities and try to install more of the technology throughout the state. There's a funding opportunity right now for $800,000 and we're looking to maybe apply the truck stop electrification in the northern part of the state.

Then, of course, after all the outreach and education will come enforcement; not to trivialize the importance of enforcement, but we will have a enforcement campaign using existing inspectors and hopefully new staff and prioritize the urban areas.

We also envision making some statutory and regulatory changes that the Commissioner also alluded to, to increase the penalties for idling violations. Right now

there are 100 to $200 for first offense, meaningless for a commercial. We'd also like to eliminate some of the exemptions and possibly extend the enforcement authority to some other agencies. Since we're never going to get enough inspectors to catch everybody that's violating the existing three minute standard. That's the idling piece. That's the easy one.

The more difficult one, but also the more important one in terms of reductions is a state-wide retrofit program, which the Commissioner again mentioned. The new round of federal engine standards that are going to take effect in 2006 coupled with the ultra-low sulfur fuel will go a long way. But our program will address existing on-road engines, sometimes on the road for a very long period of time; maybe not necessarily the long-haul truckers, but the shorter-haul truckers keep their truck engines on for a longer period of time, and we're going to finally address those. For those efforts we need legislative authority and support from partners. There's currently a prohibition in the Air Pollution

Act which prohibits us from requiring retrofits, that's why we need a legislative change to make this happen.

The program that we envision is going to get at the low hanging fruit. The most cost effective resources of reduction, where you get the biggest bang for the buck. By that I mean, we are going to look at, hopefully with a lot of people's help, the horsepowered engines, the model years, the types of equipment and vehicles that have the biggest emissions and that are compatible with the different types of controlled technologies that are out there; be that all supplied fuels, diesel off site -- diesel particular filters. We tried a couple of those too so that we can really get a cost effective source of reductions for the low resource sector.

There have been projects done throughout the country demonstrating the application of retrofits to both on-road sources and non-road sources and we are going to take advantage of that and learn from those. EPA in California, a resource board also have a program to verify technology, we

would also take advantage of that. This is somewhat new ground that we're breaking in terms of making it a state-wide mandatory program, not to say it has not been done before and not that there's not the technology, it's not been demonstrated before.

The third part of our program, which someone mentioned earlier, I forget who, said they hope that we address this, is the roadside inspection program, existing program. We'd be looking to tighten up some of the standards with that.

The fourth component pertains to school buses, which right now we do not envision making part of the state-wide mandatory program. We'd still like to pursue some of the voluntary efforts to retrofit school buses. The reason it's not -- according to our current calculations, we don't believe it's cost effective to retrofit school buses because in New Jersey there's a 12 year law. A school bus can only operate in New Jersey from the time it's manufactured until the time it's 12 years old and then it goes out of state. We have suspicions which states they're going to.

For that reason alone, it's not cost effective so it's kind of a double-edged sword. It's good that buses only operate for 12 years in New Jersey, but it also prevents us from really being able to say with a lot of confidence that this is a good type of vehicle to retrofit.

There's a lot of funding that EPA is making available through the Clean School Bus U.S. A. Program to retrofit school buses. We have applied for some of it in the past but did not receive it. As EPA representative said this morning, 65 million dollars more that hopefully the Federal Government will approve in the next budgets round and we will be looking to apply for that. EPA Region II is, without doubt, a tireless advocate on our behalf trying to funnel some of that voluntarily retrofit money to New Jersey, and it's not for lack of trying that we have not received these grants. We need to do some more outreach education to the school districts so that they understand why is this an important thing to do even though it may not be cost effective. But when you're talking about somebody handing you money, I don't think you

need to worry about cost effectiveness. Another source of money that we can use for various projects, including the voluntary school bus retrofit is penalty money through a project policy that EPA has in which New Jersey also has somewhat conforms into a development rule of our own. We are looking for volunteers to come forward to install some of these retrofits on different types of fleets in anticipation of our state-wide program. We're also looking for people to work with us on idling campaigns. I'd be happy to talk to any organization including the Clean Air Council in more detail as the program develops or help us develop the program.

Like I said, I can't emphasis enough that feedback and participation is helping us develop all the aspects of this program is extremely important. Thank you.

CHAIRMAN BERKOWITZ: Thank you.

Questions. Steve.

MR. PAPENBERG: One of the suggestions that I have on the outreach program is to contact the local boards of health in the communities and make them aware of the program

and of the enforcement actions, because there's a certain communication that is much easier at the local level. Enforcement is also in some ways easier at the local level, but there may be some political issues that may actually make state enforcement a little bit easier, depending on which community you're talking to. Given the local municipality, local police departments, local health departments at least the option of doing enforcement may save the state a lot of money because, again, we're there. We're driving by the buses at 3 o'clock, whether we want to or not, whereas somebody could be at Trenton or whichever office, it may be more cost effective to do it.

MS. HANNA: I absolutely agree. That's the basis for county health programming, we delegate a lot of our enforcement responsibility to the local health offices because they are closer to the problem.

CHAIRMAN BERKOWITZ: Michael.

MR. EGENTON: Peg, I commend the work that you've done. I know you've met with a number of us on this issue and I appreciate the education component of it.

I'd also invite you to New Jersey Education Association, New Jersey School Board Association to do that outreach. I agree with you, the education component, you can't do it alone, but trying to utilize some of those groups in addition will help.

CHAIRMAN BERKOWITZ: I'd chime in on that. There is going to go a session on the League of Municipality on Urban Air Conflicts. It might be a good place to segue into.

MS. HANNA: In November?

CHAIRMAN BERKOWITZ: You might include a booth.

MS. HANNA: Right. We have that on our list.

CHAIRMAN BERKOWITZ: Any other question? Comments? Thank you.

Is Jeff Tittle here. Jeff's not here.

Dave Pringle is not here. And Dena Mottola is not here.

Why don't we take a 10 minute break and if we're not here, at that point we'll adjourn. Thank you very much.

(Pause in proceeding.)

MR. EGENTON: Jeff, thanks for being with us. Jeff's with the New Jersey Sierra Club and keep the record open and see if David and Dena comes.

MR. TITTLE: I will put in more written comments, unfortunately, I was busy flying around today.

Quite frankly, when we look at air quality in New Jersey, even though for so many people, whether regulators, business community, the permanent community, the environmental community, people who are affected by air, which is everyone, we've made a lot of progress, but yet at the same time, we're on the treadmill. We try to fix one problem or as we clean up one thing, turns out we're not getting as clean as we should be because we're either driving farther or moving further away so we're not getting the benefits that we should be getting. I think the Clean Air Council needs to look at ways that we can get at some of these real serious problems we have in the state because we don't have a county that's noted for its containment for the PM standards. For example, we have serious,

serious problems, especially in our urban areas with particulates and going after some of the sources we really need to focus in on. Especially, I think diesel, which has become critical to the state. We have not only a tremendous amount of old diesel equipment running around in urban and suburban areas, many of these pieces of equipment are 20 and 30 years old and they're really having a major impact. And I think the biggest culprits tend to be construction and buses. New Jersey Transit is probably one of the biggest culprits. The state is looking at coming forward to addressing legislation to try and retire the 20 percent of the dirtiest diesels in the state, I think it's a critical funding source to put support behind that type of legislation because we really need to do it. We also need to find funding mechanisms to help some of those industries to do that, whether it's through some kind of motor fuels or licensing fees, whatever it is, to delve into, because we can't necessarily allow the businesses and give New Jersey Transit -- hit them with brunt of retrofit. We also need to

be pushing cleaner technology even ahead of the federal rule trying to come up with encouragements for tax breaks to try and get cleaner diesel engines and to try to help schools in particular, retire older buses and replace them with cleaner buses. A school bus is supposed to retire after 10 years, which means five years from now half the buses, five years from now we should be further along than just half the buses, if we're actually doing that. That is, to me, the top priority that we can get at within the next year.

The next tier below that, to me, is to look at trip reduction. I think we made major steps in clean air last year with the passage of California car, but we also need to do more. New Jersey is still a state that is very auto dependent and it's important to clean up those emissions, but we also need to start to get people to car pool, van pool, drive less. We don't really have a program in the state to do that.

I have a very good friend of mine who lives in Pasadena, California and works in an insurance company down in Orange County and

his company supplies him with a natural gas fired van and he picks up eight of his co-workers in the morning because what they did is they -- it's a major employer, they actually matched where their employees lived and tried to figure out ways to take advantage. He picks up his fellow workers, they commute every day, he saves on having a second car. He gets to use that back and forth since he's the driver. The company has pooled cars back at the office so that if somebody has to leave for family emergency, they're not stranded if he leaves with the van. I think we need to be looking at those kind of innovative programs. This has been around for a while, to help with the major employees. I look at the State of New Jersey and I'm in Lambertville, so many states workers live in Lambertville, 95 percent of them take their cars down here to work instead of car pooling and van pooling. Some states have come up with other innovations where they limit the number of parking spaces and actually give you tax credits and money to take out parking spaces to actually help those companies to get their people to van pool and car pool.

Ten years ago I worked with Bergen County on the concept of what was called Computer Commuting, which was a Jitney system based on the computer; we generated route from people dialing in to be picked up from the train station in Hackensack. And it gets into a whole conflict, we have in many of our suburbs where we have good transit, then we have to build these giant awful parking decks that everybody opposes because everybody drives to the train station even though they live a mile away and really work the Jitney system things like that, a grant that can be done to help bring people to transit; having mass transit is good. Ninety percent of people have to drive to it, you're undercutting part of the reason you have mass transit. Jitney services and mass transits is a good way to help reduce car trips. I think we need to progressively come up with programs to do that. Whether they're mandatory, which I would like to see, or they're done on an incentive base from employers. I think make it mandatory for the State of New Jersey and incentives for private sectors. So many people when you actually look

at the census still live within five miles of their employers, about 50 percent. When you look at major employment centers, especially now within cities, there is not a lot of transit. To develop these kinds of programs would go a long way on air pollution but also deal with overcrowded and stressed roads that can't be expanded anymore. So I think there's a lot we can be doing. I'd like to see the rail system coming over to East State Street so instead of driving over here I could have taken the leg rail coming from my office.

There's other areas we should look at. One area on the business side, emissions that aren't regulated. There's solvents and cleaners or through process of -- try to help business tighten that up so that we can actually get rid of those types of emissions. I think the administration has made good steps in going after paint and varnishes and other things in industry, but future initiatives need to be looked at and tightened up.

The final area is I think in dealing with particulates, is really looking at California and what other states are doing with

vehicles like ATVs and jet skis, trying to force them into four cylinder engines versus the four cycle engine versus the two cycle. I think it's another area. It's also a water quality issue as well. When a jet ski goes by, you can smell gasoline. Some areas of New Jersey you're drinking that, especially on the Delaware. That's another area to try and change.

The state has done a lot of good things, but we also have a long way to go. And the biggest area left, really the development of alternative fuels. We really need to get behind the state and see whether there's technology for automobiles or generating facilities but also retiring the coal plants we have, we should be looking to retire them and going to natural gas. Even in the next horizon, going to pre buildings (phon) and buildings that are more intelligent, but also by using -- we have a city like Trenton where we're fixing up buildings and putting potable tanks, not only help bring the city new energy sources, but less reliance on coal and fossil fuels. It will actually be a source of income

to us, middle class working families living in those structures, it will actually help raise their standard of living. So it's actually another kind of innovation to be looking at to help clean up our environment.

I think we've got a great future ahead of us because I think the technology is coming forward for technology, but we need to do more. For example, a wind power, again, a hundred wind mills off the coast of New Jersey will deal with the clean gas plants, will eliminate the need for 500 tons of air pollution. We really need to be looking at both clean air and energy together because there's really an interrelationship. Thank you.

MR. EGENTON: Thank you, Jeff.

Any questions from Council members? Steve?

MR. PAPENBERG: I just have one.

Jeff, you didn't mention, I'm surprised you didn't mention, maybe because it's so obvious. The problem with interstate transport of pollution and specifically the particulate. Any comments about what New

Jersey is doing or what New Jersey is not doing that it should be doing in order to deal with that?

MR. TITTLE: I think New Jersey is trying and going after relying (phon) energy was a good step. Going after the Bush Administrations source review, we're doing a lot. The problem is that, as long as the federal government is doing what it's doing, it doesn't matter as much. It matters more what we can do here, meaning that we're here at the Clean Air Council talking about what steps New Jersey can take. It's very easy to attack Pennsylvania, we can't necessarily stop Pennsylvania unless we change the EPA. Meanwhile while they're polluting us, it's even more important for us to work on programs that clean up the air in this state and that's why I left it out.

MR. EGENTON: Any other questions?

Thank you.

I guess last, but not least Emily Rusch.

MS. RUSCH: I'll keep it fairly brief, as I'm sure one of the reasons you're

holding this hearing today, you all know that set pollution currently effects New Jersians, we wrote a report called the Public Health Impact of Air Pollution in New Jersey and I'll be happy to give anyone on the Council a copy of that.

I want to start off by going through some of the findings in that in particular. We use air pollution monitoring data from the US EPA, we use scientific literature and health statistics from the New Jersey Department of Health and Senior Services and using all the statistics together, we estimate that fine particulate pollution in New Jersey leads to between 2300 and 5400 premature deaths every year. We have also found that between 5100 and 7800 respiratory hospital admissions, at least 460,000 have missed worked days and between 330,000 and 1.4 million asthma attacks. In addition we found that children are especially vulnerable and I think that's no surprise to any of us, because we know their lungs are still developing. And just to give you a few case studies, in fact, Dr. Tracy Woodruff at the U.S. EPA and her colleagues

link pollution levels and the neonatal deaths by studying 86 metropolitan areas. She found that normal-weight infants less than one year old who were born at high soot areas were 40 percent more likely to die of respiratory illnesses, 26 percent likely to die from SIDS than in infants that were born in low soot areas. In another study, the National Bureau of Economic Research found that levels of particles fell during the recession in the 1980's, so did rates have death in newborn children. Specifically in Pennsylvania the researchers found that when total fine particulate levels dropped 25 percent newborn infant death rates from cardio pulmonary dropped 14 percent. An interesting one is a case study done that was in Atlanta during the 1996 Olympic games. Because they expected so many thousands of visitors to be coming into the city they developed a mass transit plan for that summer in the city. And it had some interesting results not only for decreased levels in people commuting in to the city every day, but also in correlated air reductions and pollution. They estimated that morning traffic

trips declined by 22.7 percent, despite the fact that there were millions of visitors coming into the city. Along with that, the maximum ozone levels decreased 28 percent that summer. And if we can only assume that it's because of the decreased air pollution from less morning commuters, because nearby cities didn't see similar reductions. At the same time, asthma related in emergency rooms visit for children decreased by 41.6 percent Medicaid data base and 44.1 percent in an HMO database and 11.1 percent in two major pediatric emergency departments.

I think all of these studies show and we know that air pollution, and, in particular, soot pollution does effect public health; and, especially here in New Jersey. We know that both the risks are even greater.

Diesel trucks, buses and construction equipment account for at least 70 percent of total airborne cancers, as well. New Jersey has especially high cancers, much higher than the rest of the country.

I would use this testimony today to say that Jersey took a strong step forward this

past January through the Clean Cars Bill. We certainly believe that's the best step forward that our state could have taken. Especially in reducing ozone pollution, smog pollution; that will reduce smog plus by 20 percent. Regulating diesel is the next logical step forward. We know that diesel equipment is producing large amounts of air pollution and we have an opportunity to clean it up. The governor has said that he'd -- committed to reduce -- to deal with pollution by 20 percent by 2014 and that's the next logical step forward. I'd say that federal rules, this could be something people testified to earlier today, federal rules just aren't enough because diesel equipment can last for decades, so we need to look at retrofitting equipment, whether it's school buses or trucks or construction equipment to actually reduce the problem.

I'll wrap things up for you guys to take.

MR. EGENTON: Thank you. I appreciate it.

Questions from Coucil?

MR. PAPENBERG: The static that you

just talked about, 70 percent of cancers are related to exposure to particulate.

MS. RUSCH: It's an airborne cancers risk and we estimate 70 percent of it comes from diesel.

MR. PAPENBERG: You talked about a specific cancer, are you talking about a specific cancer site, are you talking about lung cancer, cancer of the stomach? Which cancers are you talking about or can't you be specific.

MS. RUSCH: I believe we're talking about airborne toxins.

MR. PAPENBERG: Okay. Thank you.

MR. EGENTON: John.

MR. MAXWELL: Thank you for coming and thanks for your testimony and we're all in agreement with you that there's a soot problem.

In testimony, however, that we heard earlier today, the figures on premature mortality were several degrees lower. I think the DEP is estimating at the low end of the premature mortality score board about 300, which is equivalent to maybe the number of homicides. At the upper end, they're

estimating, I think what is it, about 1200, which is the equivalent of the combination of the number of automobile deaths and homicides.

MS. RUSCH: Right.

MR. MAXWELL: Maybe we should take a look at your report and look at the methodology there.

MS. RUSCH: I'm actually not the researcher on the report. I'm not going to be the most eloquent person. I'll leave a copy but --

MR. MAXWELL: And you represent them well.

MR. O'SULLIVAN: I'm Bill O'Sullivan. I think maybe John, the difference in the numbers is when Emily is talking about total risks, total deaths and the numbers Commissioner were citing is what would be the improvement if we met the air quality standard, what would be the improvement if we achieve the 20 percent reduction; so you could probably take the Commissioner's numbers and multiply them by five or more to get the total adverse health effect. I'm pretty sure that's the difference.

MR. EGENTON: Thank you, Bill.

Any other questions?

Thank you, Emily. Appreciate it.

MR. MAXWELL: You did good.

MR. EGENTON: If there's anyone else that wants to come.

This ends our portion of the verbal testimony for the Clean Air Council public hearing.

Sonia, we still have open for written comments as well until May 6 and we encourage that if there were other groups that could not make it here today.

I want to thank my fellow council members for holding in there, thank everyone in the audience here today for their participation.

Sonia, thanks for everything that you do and being the glue that holds everything together. Appreciate it. See you all at the next one. Thanks.

(Hearing adjourned at 5:15 p.m.)

C E R T I F I C A T E

I, JACQUELINE R. MATHEWSON, (License No. X101404) a Certified Shorthand Reporter and a Notary Public of the State of New Jersey, do hereby certify the foregoing to be a true and accurate transcript of my original stenographic notes taken at the time and place hereinbefore set forth.

_____

JACQUELINE R. MATHEWSON, CSR

Dated: May 6, 2004