COMMONWEALTH OF PENNSYLVANIA

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF AIR QUALITY

VERBATIM MINUTES

MERCURY RULE WORKGROUP MEETING

TIME 9:00 A.M.

Rachel Carson State Office Building
400 Market Street, Room 105
Harrisburg, Pennsylvania 17105

OCTOBER 14, 2005

REPORTED BY:

Esteban L. Diaz
Diaz Data Services

AGENDA TOPICS

October 14, 2005

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MR. FIDLER:

If you are a formal participant in the workgroup process, please feel free to take a seat at the table. If you're here to observe and contribute in other ways, there's still plenty of other seats available off to the side.

I'd like to welcome everybody to this first meeting of the public involvement process that the Department has committed to as part of our review of the mercury issue as we move forward through the rulemaking process. My name is Tom Fidler. I am Deputy Secretary for Air, Waste and Radiation Management. And I just wanted to start by saying that this process has been collaboratively designed with the Department's Citizens Advisory Council and also AQTAC, the group that we work with, work through difficult air quality issues, clearly rulemaking proposals, as well as other issues of concern to the regulated community within the state.

I'd like to provide Sue Wilson of the Citizens Advisory Council an opportunity to make some opening remarks.

MS. WILSON:

Thanks, Tom. As Tom said, I work for the Citizens Advisory Council. Gail Conner down here at the end of the table is actually going to be our representative here at the table. She's a member of the Council. For those of you who aren't familiar with us, we were created at the same time DER was created back in the early '70s. We got a very broad charge of advising the Department on all aspects of its programs, policies and issues. The Air Pollution Control Act gives a specific charge for us to advise on implementation of regulations dealing with the Clean Air Act. We have five representatives that sit on the Environmental Quality Board and all five voted in favor of initiating this process. We want to try and resolve some of the issues that are related to implementing a state-specific regulation.

One of our major priorities has always been to promote public engagement. This is a great example of it, so we're real pleased to be here. We're pleased to be partnering with the Department to get this process started and we're looking forward to hearing everybody's

perspectives. Thank you.

MR. FIDLER:

And Roger Westman is here from AQTAC. Roger would like to provide a few opening remarks as well.

MR. WESTMAN:

Thank you, Tom. I'd like to thank you all for coming here and participating. We're very pleased that you've committed the time and the energy to do so.

AQTAC, the Air Quality Technical Advisory Committee, is a 15-member diverse group appointed by the Secretary. I'm vice-chair and we're very interested in this, not only because the mercury rule when it's developed will come back to AQTAC but because this is important to the citizens of Pennsylvania. We're talking about public health. We're talking about impact on the environment. This is important and I appreciate your concern as well for them.

AQTAC with 15 members of course has a lot of diverse views among its members and I would expect the same around this table. And that's good. What we really want to do is to have a cooperative process, an open process. If you

have concerns, please bring them to the table, and a respectful process, where we listen and engage and look for common ground where we can. It is a process where we've been given some parameters by DEP to work with. If you've looked at the background materials, you know what those are, such things as new versus existing sources. We're not going to look at something based on coal, but lots of things are still open for us to consider and look for and within those parameters I'm sure we can come up with a very good regulation for the citizens of Pennsylvania.

As I said, what we're looking here for is common grounds so that we can come up with the best regulation that meets everybody's needs. Again, thank you very much for your participation. Tom?

MR. FIDLER:

Thank you very much Roger. Before I begin to try to set the stage as to how we got to this point, I'd like to have us just go around the table and introduce ourselves so that everybody has a chance to understand who is here and potentially the organization or interest that they represent. Joyce do you want to start?

MS. EPPS:
Joyce Epps, Director of the Bureau of Air Quality here at DEP.
MR. BIDEN:
Doug Biden, Electric Power Generation Association.
MR. SALES:
John Sales, Lehigh University Energy Research Center.
MS. GOODMAN:
I'm Cynthia Goodman, Pennsylvania Department of Health. I'm with the Environmental Public Health Physician in the Division of Environmental Health.
MR. TRISKO:
I'm Gene Trisko. I represent the United Mine Workers of America International, and I'm here also on behalf of all of the UMWA local districts in Pennsylvania.
MR. CLEMMER:
I'm Reid Clemmer with PPL Service Corp.
MR. BRISINI:
I'm Vince Brisini. I'm with Reliant Energy.
MR. WESTMAN:
Roger Westman. Besides being Vice President of

AQTAC I'm the manager of the Air Quality Program for Allegheny County, Pittsburgh.

MR. CANNON:

David Cannon with Allegheny Energy.

MS. PARKS:

I'm Nancy Parks. I'm a member of AQTAC and I'm with the Sierra Club Clean Air Committee.

DR. LEVIN:

Leonard Levin, Electric Power Research Institute. I sat in the wrong place.

MR. WELSH:

Mike Welsh with the International Brotherhood of Electrical Workers.

MS. CONNER:

Gail Conner. I'm a new member to the Citizens Advisory Council. I'm a licensed attorney in the State of Pennsylvania and I'm President of G & C Environmental Services in Newtown Square.

MR. GRAYBILL:

I'm Lowell Graybill. I'm here with the Pennsylvania Federation of Sportsmen's Clubs.

MR. BARR:

I'm Gene Barr, Pennsylvania Chamber of Business and Industry.

MR. LYNCH:

I'm Jim Lynch, retired professor from Pennsylvania University, and for many years I've managed the DEP supported atmospheric deposition monitoring program in the State of Pennsylvania, including the mercury deposition program which I'll be talking about today.

MR. DAVIS:

I'm Don Davis from Penn State.

MS. WILSON:

Sue Wilson, Citizens Advisory Council.

MS. JARRETT:

Jan Jarrett, Penn Future.

MR. WILCOX:

Nathan Willcox with Penn Environment.

MR. ARNOWITT:

Myron Arnowitt with Clean Water Action.

MR. STAMOULIS:

Arthur Stamoulis with the Clean Air Council.

MR. BURKE:

Frank Burke with Consol Energy. I'm also here on behalf of the Pennsylvania Coal Association.

MR. HANSEN:

Rolf Hansen, Petroleum Industries of Pennsylvania.

MR. CHALMERS:

Ray Chalmers, EPA Region III.

MS. WITMER:

Pam Witmer, Pennsylvania Chemical Industry Council.

MS. RAMSEY:

Billie Ramsey from ARIPPA.

MR. FIDLER:

If we could just quickly introduce ourselves to the side.

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[Introduction of audience.]

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MR. FIDLER:

I'd like to thank everybody for their interest and for your willingness to participate in the process. Just by way of some background and chronology, on August 9, 2004, the Department received a petition from the Citizens for Pennsylvania's Future, Penn Future, and eventually 61 other organizations basically asking the agency to consider a rulemaking process that required 90-percent control of mercury emissions from coal-fired power stations. On October 19th of last year the EQB accepted the petition and that petition was published in the

Pennsylvania Bulletin on October 30. As part of that action, DEP was provided 60 days to analyze the petition and respond back to the EQB. On January 18 of this year the Department requested a 120-day extension to allow further review and analysis of the petition and issues that were evolving at the time. Many of you know that the federal Clean Air Mercury Rule was released on March 15. We clearly wanted to get an understanding as to what the federal program would look like and as part of that we did complete a report following an analysis of the federal rule. We also took a look at the authorities that currently exist in Pennsylvania under the Air Pollution Control Act. We took at look at the New Jersey program, which was specifically identified in the petition by Penn Future, and we also analyzed the cost effectiveness and availability of control technologies for reducing mercury emissions from power stations. That report was completed in May of this year, actually May 18, and what that report basically recommended, and the reason we're here today, is we did recommend that in fact we move forward with the rulemaking with the

goals as follows: The rulemaking should examine mercury emission reduction strategies for electric power stations and other major mercury emitters within the Commonwealth. We should provide a mechanism for examining the issue of hot spots, deposition locally of mercury emissions from all major sources. That rulemaking process should encourage repowering or the construction of efficient or clean-burning coal technology. And many of you know that we're working on a strategy to accomplish that already. The rulemaking should encourage the use of clean Pennsylvania coal and discourage fuel switching to dirtier coal types from the Powder River Basin and sources to the West. And we're very concerned about the capacity of our coal burning power fleet within the state and the reliability of that fleet. And all of those issues need to be carefully considered and reviewed as we move forward with this rulemaking process. And we'd certainly like your input, advice and assistance on all of those issues as we proceed.

The report indicated that we do not believe that the model that was referred to with respect to the New Jersey program is a model that we can

replicate within the State of Pennsylvania. We believe our coal burning fleet is much more extensive and different than what exists in New Jersey. We also indicated that we do not believe that it's appropriate to regulate mercury emissions under Section 111 of the Clean Air Act as proposed in the clean air mercury rule.

So that's really where we are at this point. We're looking forward to a lot of good discussion, a lot of different points of view. And that's what this process is all about, to provide us with as much information that can be offered and fed into this rulemaking process as possible to come up with a rule that is Pennsylvania specific, recognizes all the concerns and constraints that we've identified and recognized within the report and encouraging all of you to contribute openly through this process.

I'd like to mention that at each meeting we will have a resource table with as much handout information to provide background on the mercury issue as we become aware of and we are already aware of quite a few sources. That information is readily available. Please make use of it,

review it. If you have any questions, please get back to us.

We will be recording the proceedings of every meeting through use of a stenographer. That's not to replicate a hearing format but instead it's to provide a very clear and accurate record of what is discussed at every meeting so that nothing is lost in translation by our staff in trying to replicate what's on a recorded tape.

Probably every meeting will involve some presentations to set the stage for discussion, but I just want to remind all the speakers here today and clearly articulate for all of the participants in the process at future meetings I'm going to be very diligent in keeping presentations within the timeframes established because my clear goal is to hear from the participants around the table as far as reactions to the materials presented and other thoughts you may have on related issues. There is time at the end of this meeting, and what I would like is for everyone to have several minutes to relay to me and to others here involved in the rulemaking process what your expectation is for this process and what are the greatest issues of concern for

you or your organization as part of this process. So that's the extent of my opening remarks. Thank you for participating.

What I'd like is for Joyce Epps, our Air Program Director, to review for you the public involvement plan that we've designed for this process. Joyce?

MS. EPPS:

Thanks Tom and good morning. As Tom has indicated, we really welcome your participation and your willingness to serve on the Mercury Rule Workgroup. In August the EQB basically approved by a vote of 16 to 3 our recommendation to develop a Pennsylvania-specific mercury rulemaking to reduce emissions from the electric generating units in Pennsylvania. With that approval also was a directive that the rulemaking should develop in consultation with a diverse group of stakeholders. I will not identify all of the stakeholders at this time but to name a few the petitioners include Penn Future, Clean Air Council, Clean Water Action, Penn Environment, the Air Quality Technical Advisory Committee, the Citizens Advisory Council, the Electric Power Generation Association,

Pennsylvania Coal Association, PA Chamber of Business and Industry, the United Mine Workers of America. Those are just a few of the stakeholders that were identified during that August 16 meeting. In response to that directive we also moved forward with developing a mercury rulemaking public involvement plan, which you should have received a copy of earlier in the mail, and if you did not receive it we have additional copies available. That particular plan outlines the process that we will use to seek your input to develop this proposed rulemaking. As set forth in the plan, the primary objectives of the public involvement process are, one, to discuss key information relevant to a Pennsylvania-specific mercury rule; and, two, to obtain recommendations on the technical aspects of the proposed rulemaking. And those recommendations should include control levels, testing, monitoring, record keeping, reporting and compliance schedules. The initial stages of the workgroup process will focus on the discussion of relevant information that we will use to discuss topics of interest. We have identified topics and I'm sure there are others

that you will want to identify, but we really believe that there's a need to focus generally on mercury emissions, the transport and deposition of mercury emissions, the global and local impacts of mercury emissions, hot spots, speciation, control equipment, electric system reliability of course is a major concern, costs and benefits of the rulemaking, compliance timeframes and any other topics germane to the mercury rulemaking process here in Pennsylvania.

After we get through the discussion of available information we will focus on those issues that are pertinent to the development of a Pennsylvania-specific mercury rulemaking. We will also agree if there's a need to meet with individuals or groups that feel that there's a need for one-on-one discussions with us. We want to ensure that everyone has a chance to participate in the development of the rule. We went to the EQB with a recommendation for an enhanced public participation process and we are committed to a public participation process that will consider the views of all stakeholders. An independent record of the meetings will be made to allow the Department to focus on the

discussion and regulation development. All materials related to the mercury petition and rulemaking process will be posted on the mercury website currently under development. The posted material will be made available also to the general public.

There are a few givens that have been identified in the work plan. One, I need to remind you that the federal rule is already in effect in Pennsylvania and that's because of the fact that we incorporate by reference the Section 111 requirements. So those provisions are on our books. Two, the EQB has directed the Department to develop a PA-specific mercury rule for electric generating units. Three, the plan is due to EPA Region III by November 17, 2006, a very ambitious schedule. The plan must be at least as stringent as the federal Clean Air Mercury Rule. Mercury removal will be obtained through different strategies dependent on specific combustion, unit and fuel mix. DEP staff will draft this mercury rule in consultation with the work group, AQTAC, the Citizens Advisory Council and other interested parties. In addition, we will also consider come

back to the Committee the workgroup prior to going to EQB. We are obligated to have discussions with our Air Quality Technical Advisory Committee, our Citizens Advisory Council by law. We will also come back to the workgroup to discuss the regulation that we intend to submit to the Environmental Quality Board for discussion.

Let me discuss briefly this very aggressive time schedule. The timeline is to in the months of October and November to hold additional workgroup meetings to focus on the technical and factual issues. You'll need to give me some sense of how frequently you can be available. Right now I'm thinking to give us time to get the record posted and complete that we might need to meet at least every two weeks. If that's not suitable, we can discuss an alternative. What we will also do is that we will hold workgroup meetings concerning the regulation, and we will want to do that in November and December to receive comments from the workgroup and from the Advisory Committees. What we would like to do in January of 2006 is to meet with the workgroup to receive input on the draft regulation. We would

then schedule meetings with the Advisory Committees to consider the proposed mercury rule. Late January we would like to submit the proposed rulemaking to the EQB for consideration. In March we would go to the EQB to have EQB consider that proposal. April of 2006 we would like to publish that proposal in the Pennsylvania Bulletin. May of 2006 we would like to hold three public hearings on the proposal and in June we would like to close a 60-day public comment period. That means in late June of 2006 the staff at DEP will be very busy summarizing the public comments and developing a final rulemaking package for submission not only to the Advisory Committees but also to the workgroup. In addition, what we will do in July and August is we will schedule additional meetings so that you can consider the final form version of the regulation. September of 2006 we'd like to go back to the Environmental Quality Board with the final form regulation. October we would like to go before the Independent Regulatory Review Commission and if all goes well we would like to publish this rulemaking in the Pennsylvania Bulletin November of 2006. A very aggressive

schedule.

I'd like to remind you during the discussions if you want to provide comments or raise questions make sure you identify yourselves so that the stenographer can get that on record, and all those notes will be made available. With that said I'll turn it back to you Tom.

MR. FIDLER:

Does anyone have any questions on the plan and the aggressive schedule that we've established for ourselves for this rulemaking process? All right, we have...

MS. JARRETT:

Yes I do.

MR. FIDLER:

Yes.

MS. JARRETT:

What form do you expect the recommendations from this group to take?

MR. FIDLER:

I'm not sure that we are going to be looking for recommendations from the group as a whole as much as we're going to be compiling the comments and input from the various groups represented within the larger group. And it's going to be up to us

to weigh and balance and try to use our best judgment in gleaning the best possible comments/input/feedback that we receive as part of the process.

MR. BARR:

Is it conceivable at the end of the process the recommendation of the workgroup could be not to do a Pennsylvania specific plan? Or is the Department saying, “We’re doing it and we’re simply taking in recommendations in terms of how it should look”?

MR. FIDLER:

The EQB has basically directed the Department to develop a rule. We will do that and it’s our hope that we can develop a rule that’s representative of as many of the interests gathered around the table as possible. If in fact there’s a recommendation that a rule not be developed, I just need to observe and see how that discussion would evolve. Our objective and our goal through this whole process is to provide a proposal back to the EQB.

All right, we do have a number of presentations scheduled for the agenda for this meeting. Dr. Jim Lynch is going to lead it off

with an overview of mercury deposition in the state. Jim is going to be followed with a discussion of atmospheric fate and transport by Dr. Leonard Levin. I've heard Dr. Levin speak before and present some very interesting points. We have a representative, Ray Chalmers, from EPA Region III to discuss the Clean Air Mercury Rule. And finally we really at the request of Sue Wilson and the CAC and the suggestion that we provide a profile of what exists with respect to mercury regulation or statute in other states, Bo Reiley will be presenting what we have collected by way of information in that regard.

Dr. Lynch?

DR. LYNCH:

Thank you very much. It's a pleasure to be here. I did retire, by the way. I wasn't kidding. I actually retired on September 30. I put down that I represent Penn State, but I really don't represent Penn State because I'm in a transitional period between being emergency rehired and being retired. They're hiring me back to work continue working on this particular project until they find a replacement for me.

What John had asked me to do was to present

an overview of the mercury deposition -- the whole mercury problem and mercury deposition. I've put that together and a copy of my PowerPoint are being passed out right now. There is a couple slides in there that are going to be duplications of what Dr. Levin will actually present as well. I actually took those off of the DEP website since they had some information there that I thought would be useful to you.

With that I will start off by the two people with this, Jeff Grimm works for me. Jeff is a data analyst. He's actually the modeler that's done a lot of the things I'm going to show you. And then Kevin Horner he's my technician out in the field and he's the one that does just about -- takes care of the whole operation.

I'd gotten involved in atmospheric deposition back in the late 1970s, actually around 1977, and have been involved with it ever since. It was part of the acid rain thing that we got involved with, and I've served in many capacities on the national level at the national atmospheric deposition program, past chair of that. So I have a lot of familiar -- a lot of expertise in the area of atmospheric deposition.

I know a lot less about mercury though and actually mercury movement, but I do know how to measure it out in the environment itself. So specific questions regarding you know mercury solubility, mercury chemistry and that really need to be directed elsewhere. I will present today data that have been collected though through the national network as well as the Pennsylvania network as well. Much of this data has not been seen by anybody, including DEP, so they're going to get kind of an eye opening shot on this as well.

Unlike sulfur and acid rain where sulfur was dominating the process and came from basically one or two major sources, mercury is a much more difficult problem to deal with. We have various forms of mercury in the environment, the gaseous elemental mercury shown up there, gaseous divalent mercury whether it's in the mercurous or mercuric form. We have particulate bound mercury both -- can occur and both of those can occur in either the elemental mercury or in the gaseous divalent mercury. And then we have many different types of organic mercury out there. One that we're mainly concerned with is the

methylmercury there. That's the one that's a main concern primarily because of human exposure and potential impacts.

The gaseous elemental mercury is less chemically active in the atmosphere, it's less soluble and as a result they believe it really forms the basis for much of the global circulation of mercury that takes place. And there's a global component to this unlike which we had with the sulfur, and Dr. Levin will get into that in a much greater detail. The gaseous divalent mercury is often referred to as the RGM, or reactive gaseous mercury. This can form many different organic and inorganic compounds. It is highly soluble or much more soluble than elemental mercury and is easily removed from the atmosphere during precipitation, and because of its solubility and relative ease of removal from the atmosphere it generally is considered to be fallen out within tens to perhaps a few hundred miles of the point source itself. Methylmercury itself is the most toxic component we have out there. There is some methylmercury in precipitation itself. We're not monitoring methylmercury in Pennsylvania right now for the

network that we have. We're only looking at total mercury. On the national scale there are a number of states and other participants that are involved in a mercury deposition network, which I'll talk about a little bit later on here, that do measure methylmercury and they do find methylmercury actually in precipitation. We don't have that kind of information right now for Pennsylvania. Most of the methylmercury that we deal with and gets into our streams really is in there primarily as a microbial-mediated transformation of mercury that has been deposited on the surface, gets into the stream, gets in exposed to the organisms and as a result is transformed into the methyl form which is then picked up by fish life and -- by aquatic vegetation and moves up through the food chain. We are concerned about it primarily because it is a neuro toxin and a teratogen and does accumulate up the food chain on an order of magnitude of ten to the sixth or more. And I understand Dr. Levin is going to talk more about this in his particular talk. It is, as I had already pointed out, a major concern.

Unlike the sulfur issues that we are dealing

with and the acid rain issues we are dealing with, we have many, many sources out there. This is a duplicate slide of what Dr. Levin will show, and I put it in just to illustrate the fact that we have anthropogenic emissions on a global scale, on a local scale and on a regional scale that contribute to what's up in the atmosphere. In addition to that, and unlike other things that we deal with, there is actually background emission sources both from a natural point of view, crustal or mercury deposits of venting submarine sources, sources from volcanic activity and so forth, and unusually -- which is unusual for a lot of pollutants. There is also a dormant or anthropogenic sources, re-emitted deposition sources that trees that can actually pick it up and transmit it back to the atmosphere. So when you're looking at the total amount of atmospheric mercury that might be in the atmosphere at any particular one time, there are a lot of different sources both global, local, regional as well as old sources as well as natural sources up there. So it's a very, very complex issue. It's not a simple issue, as we had had to deal with with the acid rain and the sulfur and that kind of stuff.

Some of the global scales, just some of the balances, I put this in to illustrate that the new and re-emitted anthropogenic sources relative to the national sources relative to the total that's coming out. There are a lot of different estimates. There's a lot of variability. A lot of people have come up with different numbers, and you can see this one here these four estimates here on the total emission sources vary anywhere from around 6,600 here down to around 6,000, about a ten, 12 percent variability. But if you look at how it's distributed between natural sources from land, natural sources from area, new and re-emitted anthropogenic sources there's a lot of variability in those estimates. So there's a lot of uncertainty associated with this. The re-emitted percent here, the 50 percent, 47 percent, represents really the re-emitted as a percent of the total anthropogenic emitted to the atmosphere. And again quite a bit of variability that you might see on these. And to a great to extent science is really evolving in trying to understand this as well. I also put this in for North America looking at the 2000 inventory here, the breakdown in the United

States between the utilities. And this is a source, I don't know if Dr. Levin has this one or not, but just a breakdown between utility; waste incineration, coal, mining, mobile sources and others. It's highly variable. There's a lot more sources out there than what we had to deal with relative to the sulfur issue itself. And from a North America perspective we really are the driving force. In this particular column down here, the last one shows the breakdown between what is elemental mercury, which is divalent mercury and which is particulate mercury. And again quite a bit of variability depending on who is looking at this and who is making these types of assessments. A breakdown again just from a continental point of view looking across the Northern Hemisphere, this is the Americas here, North America and South America 11 percent. The big players in this are China and Asia. They burn a lot more coal than we do. Collectively those two account for about 50 percent of the total anthropogenic mercury emissions. We're a major player obviously, but not as big as those. So this is a global picture when you look at this because we do have a global

cycle involved in this. What we don't know? Oh, there's a heck of a lot of significant uncertainty associated with these flux estimates. We know that to be the case. We're not sure about the role of soils and vegetation. It can be taken up. There's evidence to indicate that it can be actually re-emitted right off the surface of the soils that can be actually picked up by the vegetation, transpired through the tomato on the leaf surface itself. Are we missing certain things? We really don't know. There seems to be more sources than sinks or more sinks than sources. There's a lot of things that we don't know that's going on out here that we really need to look at. Is mercury constantly being recycled between the terrestrial ecosystem and the atmosphere? And if this is the case, it might suggest that the residence time of mercury appears to be long when in fact it's relatively short. Again we're not sure of exactly what role this might play, but it is important to recognize that there is an internal cycling process taking place in here. Now the National Atmospheric Deposition Program which started really back in 1977 was primarily an acid-rain driven type

program, although we looked at atmospheric deposition to cover a broad base. In 1995 I actually wrote a proposal that got the funding, or at least established the mechanism by which we could put together a national mercury deposition program. I was the chair of the national atmospheric deposition program at the time. I at that particular time went to the State of Pennsylvania, went to DEP in particular and said, "We ought to probably get involved in that," and some of the data I'll show you. We actually set up our first sites in 1997 and it's expanded ever since. But the actual national mercury deposition program started in 1995. We measure total mercury in weekly precipitation samples throughout the country, and I'll show you where they're located at. The system is designed to look and quantify the spatial and temporal patterns that we see across the United States. All the sites use the same sampling protocols. They all use the same analytical protocols. All the samples are analyzed at Frontier Geosciences out in Seattle, Washington. So we can look at data from Pennsylvania, compare it to data from Louisiana, compare it to data from out in

Washington for that matter without the inherent problems that you have when you have multiple labs and multiple sampling programs. So the data are very, very comparable.

This is the distribution at the end of last year of the mercury monitoring sites. I think there's about 85 of them now and it's expanding every year. Pennsylvania because of the support from DEP has a cluster of sites here, many more of them than most states have. It is also primarily located within the Eastern part of the United States, much like the acid deposition program was, although there are some sites located out here in the Western part of the state up in Alaska and down in Mexico. Unlike the acid rain program where the Canadians put together their own program, they didn't do that this time. They actually joined forces with us, so these Canadian sites that we see up here as well as the sites down in Mexico are part of the National Atmospheric Deposition Program. They're actually cooperating with us. So we can make direct comparisons with their data as well as with ours, which is really nice to do because the Canadians had a different system than we had with the acid

rain. It made it more difficult to look at. This is a Pennsylvania network here. We have a total of eight sites in the state. All of them are supported by DEP with the exception of PA37 down here in Greene County. This particular one is supported by the Department of -- DOE, the Department of Energy. It's run by -- I can't remember who runs the actual site down there. This here is Allegheny Portage working with the national park service. This is Presque Isle up here working with the State Park system. This is Hills Creek also with the State Park. I do a lot of cooperative deals with the U.S. Forest Service. This is on Gifford Pinchot's homestead actually right on the land. It's still owned by the family. They're cooperating in this program and have cooperated in this program since back in the 1980s in the acid rain part of it. PA60 is at Valley Forge National Park. PA47 is located at Millersville actually on an ongoing actual farming operation. PA00 is located in Arendtsville which is part of Penn State's apple research program, and it's located on top of a hill and it's clustered around with a tremendous amount of other monitoring activities going on

both within the wet deposition field as well as air quality monitoring. The PA26 here is a new site that we're going to set up sometime this month or early next month on Centralia where the underground fires are. We're actually going to do some monitoring at that particular site as well. It's not operational yet, we haven't put it in. I guess power is being run to the site right now. All of these -- the way I selected these out is I was interested in looking when I first set -- these are the two sites I first set up. This would be our most pristine area up in North Central Pennsylvania. Very little utility -- very little industry around that particular area. It's located in the State Park system itself. I don't -- I think the nearest sources might be you know 30 or 40 miles away. The PA13 on top of Crescent Mountain was purposefully put there. I thought it would be one of the dirtiest sites you might experience. You're looking literally down into the industrialized area around Pittsburgh, some very large power producers down there as well, as you all know. I wanted a farming community one and that's why we had PA47 and PA00, these two here. It was also

interesting in seeing how much variability we had over a relatively short distance, and I'll show you some of the results of that here very shortly. PA60 again I selected that I because I wanted urban influence and that's out in Valley Forge. It's very, very much of an urban influence type area. PA72 is one of our more pristine sites, although over the years that really has changed because that's really become a -- the whole Pike County is more of a bedroom community from people that commute from Pennsylvania into New York and New Jersey. And as I had indicated, the PA26 here is to look at the Centralia fire problems, the emissions coming from the fires itself. PA37 obviously where it's located at down there in the corner really would catch the bulk of the pollution coming in out of West Virginia and Ohio and so forth. Very large power producers down in that particular area as well.

This is just a typical sampler that we have out there in the field. Everyone uses the same sampler. This has two particular vents here. One is designed to collect a mercury sample itself, a sample of precipitation for mercury

analysis. The other one if you want, and we do this at selective sites in Pennsylvania, we collect samples and we do other trace metal analyses like zinc, manganese, chromium, I can't remember them all, but we do about eight or nine other different trace metals in addition to the mercury one. It's a heated element here. This whole thing is heated inside during the wintertime, so we allow the heat to rise up these chimneys essentially and it melts the snow. So it converts the snow into liquid form so that it can go into a glass bottle. We keep that from freezing obviously so it doesn't crack on us. It has an acid -- the dilute acid in it to fix the mercury in place in the sample so it's not absorbed by the size of the bottle and so forth. So this just shows you three views of it. This is where the actual sampler sits. This is a heating element that we have in here. We keep the temperature -- we cool it during the summertime as well and heat it during the wintertime to keep the temperature basically running around 75 to 80 degrees. These are Teflon coated to prevent contamination. There's a sensor mounted on here that activates -- when

it starts to rain it activates a motor that brings the lid here, which is protecting the sampler from contamination, over to the dry side. And this bucket here is just used as a point to rest this platform. It's not -- we're not collecting anything on that particular side. Here it shows it in the open format. And then when it stops raining this sensor is heated, it closes back up and prevents evaporation, prevents contamination from bird droppings, leaves, insects, whatever might fall into the sample.

Now with the data that we have, and we had all eight sites in operation in 2004 in the State of Pennsylvania, and this is the first time I've actually tried to use a surface algorithm to create this type of data. It's actually took at the spatial patterns of it. Bear in mind this is done with not only the data that we have in Pennsylvania but I also use all the peripheral site data that I have available. Unfortunately we don't have a lot of peripheral site data. If I could go all the way back, I probably should have duplicated the national network. We don't have sites out in Ohio, although some of them are being established right now. We didn't have them

in 2004. There are limited data available up in New York State and also limited data over here in New Jersey, although sites are going in. So our peripheral -- our abilities to do this to show these types of spatial patterns is somewhat limited by our abilities to look at spatial variability around the state, samples outside of the state itself. Consequently when you look at that, you have to consider that the border effects are going to be much greater, much more affected by the spatial distribution than what we might see in the center part of the state where we have more data to work with and that. So this is our first attempt to actually look at the spatial patterns here, and obviously it shows on an annual volume-weighted basis of the mercury concentrations hot spots here. Its highest concentrations in 2004 occurred in the Eastern part of the state. The second highest was up here at the Presque Isle area. And consistently we've seen this generally tends to be the low part of the state. This is one year. I can show you a lot of different -- I can't show you a lot of different years because we don't have a lot of different years to work with, but this pattern

does change considerably. If I looked at the 2003 data, it might be different. To give you an indication of how much variability you actually tend to get -- oh, I forgot I have the national one. This is the national data. I'm sorry, I did have it in here. As I indicate, no sites out in Ohio in 2004. Nothing here in New Jersey. There's a couple sites in New York but they're quite a ways up there. And we're actually getting some now in the Chesapeake Bay region, so I can -- my southern border is a little bit better, but this lack of data up here really makes it difficult for us to look at the Western edge of the State of Pennsylvania itself from a modeling and spatial interpretation program. The data here is given in nannograms per liter. Most of the data you can see it runs between eight and up to the upper nines with the highest concentration here at Milford in 2004, comparable with the data that we see here in the Great Lakes higher than what we see in the Northeast. Fairly comparable, somewhat -- maybe a little higher than what we see in the South Central part of the state. Much lower though than what we see down here in the Louisiana area in the Gulf states and

what we see over here in Florida. Consistently over the years the highest concentrations have been in the Florida area. We believe it's probably related to waste incineration in Florida, which they do. It also may be related to petrol chemical production out in the Gulf. We don't know exactly why, but those are speculations from our particular point. I know Louisiana has been very much involved in this because of the potential impact on the fishery resources that they have, so they've been actively participating in this program as well. But this is a general spatial pattern. This is fairly consistent what we get from year to year, this overall spatial pattern. This is -- this data actually was sent to me yesterday afternoon at 3 o'clock. This is the first time this map has been shown to anybody, to my knowledge, in the country. So it's relatively new data from 2004, so Leonard your 2003 map is out of data already.

DR. LEVIN:

They showed this in Wyoming.

DR. LYNCH:

Oh, they did show it out in Wyoming. I didn't

get to the national meeting. So they did show it out in Wyoming. I wasn't aware of that. But it does show the types of spatial patterns that we get across the country and our ability to look at the spatial patterns and over time be able to look at how these spatial patterns change from year to year. This is quarterly data here that I've done in Pennsylvania again showing how it varies from season to season. This is the winter season up here. This is the spring season, the summer season and the fall season. And this is one of the things -- I present it to show that there's a lot of spatial variability across the state and that variability fluctuates from season to season. A lot of it is probably related to storm tracks. A lot of it is probably related to climatic patterns, large climatic patterns that we have. We know for example that during the wintertime most of our storms come out of the West and Northwest. We know for a fact that during the summertime we have a lot of spatial variability in precipitation simply due to the -- most of the storms are not frontal storm systems but most of the storms tend to be from thunderstorms created across the state. We know

in the fall that we also have a tendency to get more precipitation occurring from frontal storms, particularly along the coast where we get like we had this like couple of weeks where we have a hurricane or a tropical storm coming up that gives huge volumes of precipitation in this area. This can also be affected in the summertime as well. So the climatic input here and the amount of precipitation that occurs plays a very key role in how much spatial variability you might get across the state from season to season. And obviously 2004 if you remember was a very wet year. It will be interesting to see what the 2005 data looks like. 2005 up through this recent month was a very dry year. 2003 was also very, very wet. In fact some of the highest precipitation we've measured in Pennsylvania and over the last 100 years. So we have this climatic variability pattern that really does affect deposition, it affects the amount and distribution that we see of deposition. Whether you're dealing with sulfur or whether you're dealing with mercury it does have a point. One of the areas though that consistently tends to show up fairly low is in the North Central part

of the state. Now if you know anything about precipitation patterns across the State of Pennsylvania, you know the wettest regions are down here along the Laurel Ridge and up here around Erie due to lake effect snows and that. There is an area within Central Pennsylvania, North Central Pennsylvania up here that gets the lowest precipitation. Annual -- average annual precipitation up there is around 30 to 32 inches. The whole statewide averages around 42 inches. And one of the reasons we get low deposition up here, as well as low concentrations, it's not only a very remote area and no localized emissions coming into it but it's also very dry up here. And when you look at the deposition maps you're going to see that there's very low deposition up here as well. So a lot of spatial variability. And I'm not going to stand up here and tell you I understand why all of this is taking place. It's a highly variable, very complex system that affects it. This is wet deposition again, the other one was concentration, again showing the very low concentration on an annual basis with low deposition rates in the North Central part of the

state relative to what's going on in the rest of the state, and then the highest deposition occurring along the Eastern part of the state. And this here is the national network showing deposition values down here in the extreme Southeast running 20, 21, 22, in the low -- upper teens to the low 20s. Our data here runs generally in the eight to 12, 12 in the East this year, but I've seen other data from previous years when it was highest in the West and not as high in the East. A lot of it may just be the way the wind is blowing and the way the sources are coming in where the precipitation actually occurs. From a depositional point of view we tend to be higher though because we get more rain in certain areas out here than we see up here around the Great Lakes, and we tend to be much, much higher than what you'd see up here in the New England area itself. Again a lot of spatial variability. A lot of it's related to climatic patterns and so forth. It's interesting in this particular year, this is 2004, I've actually seen -- the Hills Creek site is fairly high this year from a depositional point of view partly because the rainfall rates were much higher up there than

it normally is. But I've seen this site here as the second lowest site in the entire North America, including the sites located up in Canada. And I've seen it where this site here will be the second lowest in North America and this site here is one of the highest, not the highest in North America but at least the highest in the Northeast. A lot of spatial variability across a distance of, what, air miles maybe 120 miles or something like that. That's the kind of spatial variability that we might expect to see, and a lot of it though is influenced by the precipitation patterns, climatic patterns and so forth. This is a quarterly deposition in Pennsylvania. This is again looking at micrograms per square meter here with the highest concentrations -- the highest deposition occurring down here during the wintertime in the Laurel Ridge. They have a tendency to get the highest amount of precipitation. It's not unusual to get 50 to 60 inches of rain down there. This particular year that's probably where most of the rain, I have to look at the rainfall distribution map. Spring up here high over in the Southeastern corner and then for the

summer and for the fall it tended to be high in the East and actually relatively low over here in the summertime in the Western part of the state in 2004. So again it's -- you have to sit down and it takes an awful lot of information to decipher out just why these patterns are occurring. You've got to look not only at emissions but you have to look at the precipitation patterns, you have to look at the timing of events, you have to look at the climatic patterns. This year for example in 2005 we have had some of the lowest ozone. Now we're not interested in ozone. I was interested in it because our ozone concentrations have been very, very low this year. Why were they low? Most of the prevailing patterns came out of the West and out of the Northwest, most of our storms that we did get, and as a result we had the different -- an atypical year in many cases this summer given the low ozone type of concentrations. So there's a lot of things that enter into this that make this a very difficult problem to assess.

I did plot these data here. Again this is the annual deposition in 2004 and this is some mercury emissions that I got from DEP. All I did

was plot the location, the latitude and longitude of the emission sources that I was given. The dots here are the low very emission sources tend to be the blues or purples and then the highest emission sources tend to be the red. This is one over here. It's hard even for me to decipher which ones are red or approaching red here. Again I'm not trying to show any particular relationship other than we had some high deposition over in this particular area. We have a cluster of sources, which I understand tend to be more waste incineration, but all these are relatively low sources. Now maybe this relationship happens to do with the fact we have a lot of them that cluster together than the fact we have a lot of small sources collectively give this deposition level. I don't know. That's only speculation on my part. Since we have some very, very high sources over here you might expect to see higher deposition levels in this area, and we don't see it. Now maybe that's just a factor of climate for this particular year. Again a lot of questions and not a lot of answers to come up.

We started doing mercury monitoring in 1997

at Hills Creek and at Allegheny Portage on top of Crescent Mountain. We plotted this and I plotted -- the dashed line here is precipitation, annual precipitation. This is a bimonthly composite of weekly samples here and we're running a statistical trend analysis. There's obviously a decreasing trend here. It's gone down about 2.6 percent per year over this eight-year period. However, at this particular site it's not statistically significant. It's running -- the "P" value here, the statistical evaluation of it is .14. Generally we don't want to look at significance unless it's at least .05 or lower. So it's gone down but there is enough degree of uncertainty associated with this particular trend to say that we can't say in fact that it is a statistically significant trend as a result of whatever might be driving it. I put in the precip line here to show that the very high precipitation in 2003 and again in 2004 here acts as a dilutional factor. There's a certain amount of pollution up there, you throw a lot of water on it and you're going to get some dilution effects. So when you're looking at concentrations you get dilution that's taking

place. And part of this decreasing trend here might be actually due to the fact that we had a lot of precipitation that dilutes the amount out there so our concentrations are lower. And that's a factor that we have to look at and consider when you're looking at these types of trends. That's why I do precipitation trends concurrent with what we're doing with regards to concentration.

This here is the deposition value, wet deposition value here, and you see the influence here the concentration has gone down, not significant. In this particular case the deposition has actually gone up, and again not significant though. Part of it being driven by the high precipitation amounts that we had in this particular period that's increasing the deposition levels somewhat. Again a lot of data. To answer very difficult questions you need a lot of data to come up with because of the interactions between climate, which we have very little control over or in fact no control over whatsoever. Hills Creek trend here; this is a decreasing trend. It's highly significant .0001. That's a very significant decreasing trend out

here. We saw the same increase in precipitation patterns here in 2004 and as a result I indicated that site there, Hills Creek site, had a lot of deposition relative to previous years, and part of it actually relates to the fact we had a lot of precipitation in that particular year. Again decreasing trends though. Definitely going down and it is significant at that particular site. I was interested in what's happening -- I heard a talk. I actually attend the Electric Utility Commission conferences out in Tucson over the years. I heard a talk out there last year where they talked about the decreasing trends and I can't remember where it was at, and they said it was very similar to the sulfate trends. So I decided, well, let's take the sulfate from up in Hills Creek, I monitor it up there as well, and I plot the sulfate here which is given in the blue line relative to the decreasing trend that we see in the mercury concentrations. And you can see the two mimic one another very, very closely. The patterns are very, very significant -- are very, very similar and both of them are very significant. So sulfate is going down at that site and so is mercury going down. Now what does

that mean? I could say, "Okay, we're reducing sulfur to oxide here and part of the reduction in sulfur to oxide is reduced mercury emissions too someplace, whether in Pennsylvania or elsewhere and as a result this reduction here is just mimicking the changes in sulfur because some of the mercury is coming out and reduces the sulfur." Speculation? I don't know, but it's an interesting trend. I just present the data. You guys decide. Here is the deposition -- wet deposition here. Source/receptor relationships. One of the things that I think we need to do here in the State of Pennsylvania, and I think would be very beneficial, is to look at source/receptor relationships. We actually have the capabilities of doing that kind of stuff, and what we can do and gain out of this is to look at deposition at a particular point with our deposition monitors. And we can use meteorology precipitation patterns of vertical wind shear profiles, a lot of things, in order to come up with where does this pollution that's fallen at a given point come from. It's called source/receptor relationships. And things have really improved over the last ten or 15 years that makes this more of a viable type

of approach. With these kinds of things we can look at what sources contribute to most of the mercury deposition in Pennsylvania. Where does it come from? What areas are most impacted by emissions from Pennsylvania sources versus local sources? We can even probably put in and look at maybe even global contributions to it as well. Where would emission reductions be most beneficial to Pennsylvania, if in fact Pennsylvania deposition is the major contributor to the deposition pattern that we see? And what are the typical mercury deposition patterns that we see? Is there really a typical deposition pattern? Because I showed you a lot of spatial variability on a temporal time scale summarized on seasons. So there's a lot of variability out there, not only between seasons but also year to year. And this typical -- I don't know if there is a typical deposition pattern. We had one for sulfur. We could really look at the sulfur pattern and pretty well discern what it was going to be, but the mercury pattern has been very, very variable. But we have limited data. We only have a maximum of eight years at two sites and we're only now beginning to collect data at

enough sites to look at the spatial patterns. So I reserve judgment on whether we have a typical pattern or don't have a typical pattern.

This is just a hypothetical situation of how we can do this type of thing. There here is a hypothetical emissions occurring from major metropolitan areas around the State of Pennsylvania, and then what we did is just took this hypothetical data over these time periods, this is February, this is August, two periods in August, and this is a period in September, and then just used the model to say where would it go based on the meteorological observations that we had available? So that's all we're looking at. This is not mercury here; this is just a hypothetical situation. But it's interesting when you look at February, the winter period up here with emissions coming out of Detroit and out of Cleveland, where they end up. And if you remember the winter pattern I showed had relatively high deposition up in this particular area from a mercury point of view, so maybe we can point the fingers towards Detroit, towards Michigan and towards Cleveland and so forth. Usually in the summertime we get fairly benign

patterns from a climatic point of view, so the emissions that occur at various areas here they just don't do a lot because we're dealing with stagnant air masses and so forth. There's not a lot of transport. And this three or four-day period here showed that that was the case. They were kind of lingering around. But to give you an indication of how this can change from day to day and from period to period, this is a 24-hour -- or a three or four-day period here just a relatively few hours -- or a few days after this particular period showing a tremendous dispersion of the pollutants, the hypothetical pollutants that we had out here. So this kind of spatial variability and our climatic system and dispersion of pollution greatly affects the deposition that occur. If in fact we have a precipitation occurring during this, we're going to get a totally different pattern than if we had a precipitation event occurring during this particular time. And that's where the utility of this source/receptor relationship comes in. And this finally here was a September period of time we looked at. This is a transitional period from our summer climatic system more into a system

that is driven more by frontal zone systems, and it again creates totally different patterns than what we've seen on the other ones.

This is again an example of how you can do this. This here represents just a multi-level wind direction across the State of Pennsylvania and it's for August 21 of 2005. This is actual data showing where the winds were coming from at that particular time. This here shows vertical velocities within the atmosphere, and the red indicates that -- and in order to get deposition you've got to have the winds coming down. You've got to be bringing it down. Well this here shows the wind velocity going down wherein the other areas it was going up. This here shows, the next red, precipitation distribution across the State of Pennsylvania for a six-hour period during August of -- August 21. So it shows the distribution of precipitation. And this is our estimate. This is just an estimate, a guess on our particular part; this isn't actual data, of what the deposition patterns might look like. We don't actually have data here, but it shows at some of the highest precipitation we end up getting the deposition occurring over here. Up

in this particular region we see -- it's actually more in New York State here and it's actually moved off into the Eastern -- Central and Eastern New York. It's just put in here to illustrate how you can utilize data that's readily available. This stuff is on all the web. We collect this data on a continuous basis. We can use this information if we superimpose it with the precipitation, with the emissions that we're given, with the wind direction, with vertical velocities, humidity. A lot of other factors go into this. This is just an illustration. We can come up with I think much more reasonable deposition estimates across the state. This here is a log -- this actually is a logarithmic color scheme that we used here, so even though it shows black and there's no deposition there's actually deposition that could be occurring there. It's just a way to illustrate the higher areas. We used -- they're very low concentrations, very low deposition on an individual events type thing and to illustrate it we use a skewed -- log skewed type of color scheme on here to show you what might be actually taking place. So types of things that are available to do.

The other thing that we can do, and this is a lot easier to do and I don't have data to actually illustrate this so I put in my sulfate concentration, this is before the implementation of phase one of the Clean Air Act Amendments of 1990 Title IV to reduce sulfate deposition and this is what it looked like in 1995 through 2003. Again this is the type of analysis that we can do. If I have enough data over here before you implement your rules, we can then look at and make comparisons. And I can do a statistical analysis to say that this here is definitely different than this is over here. And the fact that we used in this particular case 11 or 12 years of data we take care of some of that temporal variability, not the spatial but the temporal variability itself. Obviously now we have a five, eight-year period of data here, nine-year period of data, and as a result these reductions here are very real. And you can see we went from high concentrations here particularly in Western Pennsylvania in excess of 3.5 milligrams per liter down to something in the order of about 2.5. In fact I have the 2005 data and we're actually below 2.0 milligrams per liter

of sulfate as a result of the reduction. So the reduction programs did work for sulfur. And we can do the same thing with the deposition. Again this was very high deposition zones prior to the implementation. These are still fairly high deposition zones over here because we do have high precipitation but we also have relatively high sulfate concentrations. So much of the state is around 20, but the Western part of the state does get up into the upper 20s, low 30s. Again this is -- a lot of this is affected here particularly by 2003 extreme precipitation events where we had some of the highest precipitation volumes. And precipitation is the second determinant in deposition. Concentration times precipitation gives you the deposition. So this high precipitation here and relatively high deposition is driven by precipitation more than it is by concentration itself. And that's something we need to really look at this climatic variability more closely. This is another illustration -- we have another -- we've been working for years trying to come up with techniques. We have spatial -- we have eight observations out there but we have a big state to

look at. And how do we actually present and look at this data? And I put it in for wet deposition as well simply because I don't have enough data with regards to mercury to feel comfortable presenting this type of stuff. But this shows you the effects of the mountain ranges here and this particular model we use incorporates topography into it and how topography affects the amount of precipitation in its distribution. Tremendous affects of orographic uplifting and shadowing and all kinds of things that take place, and as a result we ended up getting very, very high deposition along our ridges here coming up along the Laurel Ridge. And we get high deposition up here, this is prior to control, this is just 1992 data, simply due to the lake-effect snows that bring the stuff across the lake and give us high precipitation up here. We can explain a lot of these patterns very, very easily -- and this is what happens -- this is just 2004 data now -- after we had the reductions in place for sulfur dioxide. And again we're beginning to pick up. This is on the Laurel Ridge here where you pick up some relatively high, some down here in West Virginia, still the lake-effect snows

that are taking place up here that affect that particular region. But by and large we got pretty low deposition across a good part of the state, but there are regions that are receiving higher sulfate than other regions of the state. Now this is -- I know we're dealing with mercury here but we can use mercury data in the same fashion to do this type of analysis once we get more data, longer periods of data, and particularly when we get data located out here in Ohio because it's a much greater conference. Now if we're looking at affects type of thing, I think my last slide here is affects, if you're interested in the affects both from a terrestrial and aquatic point of view we can provide additional data, greater input, greater accuracy, higher spatial resolution, higher temporal resolution into the various ecosystems that might be effected, whether we're looking at the terrestrial community or whether we're looking at the aquatic community and how that might translate through the invertebrates up through the fish and into the higher trophic levels and ultimately into the human population which is of greatest concern to us. So with that I will end.

I'm almost on time. That's unusual for me. I know I gave you a lot of information very quickly. I speak very fast.

MR. FIDLER:

Thank you very much Dr. Lynch. I'd like to invite questions, comments, reactions from the group. And please remember to identify yourself.

MR. BURKE:

I have a question for Dr. Lynch. My name is Frank Burke out of Consult Energy. You showed one graph where you compared sulfate deposition to mercury deposition for one site. Do you have similar data for the other sites? Is that available?

DR. LYNCH:

Yes I do but I just didn't have -- we just generated that yesterday when I did this. I can get that. I'll do that. All of this is part of a report that I'm preparing for the State of Pennsylvania for DEP. They haven't gotten the report, although it's been relatively done because of the problems they had with the national. Some of the data that was initially published on the NADP website was in error. They had some problems down in the Florida area

because of the hurricanes. They misestimated the amount of precipitation down there and as a result they pulled the map off. I always put the national maps in so they're comparable so you can get a sense of where Pennsylvania is relative to the rest of it. The trend analysis is also included in that report and hopefully by the end of if not -- well probably by the middle of next month I'll have it to them now that I have the corrected versions. That will be available. That's on -- they put that on the website if I remember correctly, so it's on DEP's website. So all the data will be there, the trend analysis, including that with the sulfur versus the mercury.

MR. BURKE:

Do you see the same correlation to the other sites?

DR. LYNCH:

I didn't do the analysis yet. We haven't done it. I just did it with Hills Creek because I knew Hills Creek was significant. I didn't do it with Allegheny because Allegheny's trend wasn't significant. But we will do that. It will be in the report.

MR. FIDLER:

Yes, Nancy?

MS. PARKS:

I have some chemistry questions for you.

DR. LYNCH:

Oh, wrong guy.

MS. PARKS:

Lucky guy. First of all, can we expect the conversion of both elemental and divalent mercury into a methylmercury form since we know that that's the most problematic form for us in terms of human health?

DR. LYNCH:

That question might be better answered by Dr. Levin there. My understanding is probably not.

DR. LEVIN:

No, it's only the divalent form that gets methylated. The elemental form has to be oxidized first before there is a bunch of chemistry going on with that.

MS. PARKS:

Okay. And Jim also on your, wherever that slide was, on the trends associated with both sulfate deposition and mercury deposition and downward trends, are you suggesting that these are both

particulate bound forms you were looking at in that particular analysis?

DR. LYNCH:

I can't make that statement because we're looking at just total mercury up here. We didn't try to speciate anything out.

MS. PARKS:

Okay.

DR. LYNCH:

It's just total what the makeup of that might be, what percentage is elemental, what percentage is particulate, what percentage might be of some other form. I don't really know. All we have is the total mercury concentrations. We don't have a speciation at any of the sites in the State of Pennsylvania.

MS. PARKS:

Okay. And so what was your conclusion from that, from those trends?

DR. LYNCH:

I wouldn't call anything conclusions. I'd call them speculations. From a speculatory point of view?

MS. PARKS:

Yes.

DR. LYNCH:

How do we reduce sulfur dioxide? Some went to scrubbers. You could probably scrub out some of the mercury when you go to scrubbers. Some went to low sulfur, what, oil and gas. There's a lot of people around here that know a lot more about that than I do. But those are low mercury sources as well. And the combination of fuel switching, scrubbing probably reduced the amount of mercury emissions. That's speculation. I'm not saying that it's the truth, but it could. And the fact that the sulfate patterns trend and this is occurring in other areas and I wish I could remember where that might be. That paper was presented out...

DR. LEVIN:

The same thing in Florida.

DR. LYNCH:

Was it down in Florida? Okay, the paper was presented out at the Electric Utility Conference out in Tucson, Arizona, last year. And I thought, oh, that's interesting. I'll take a look at the Pennsylvania sites where we have the long-term data. And they've speculated, too, that it was probably related to various -- no

they didn't, I'll take that back. They were speculating it may have been related to -- I don't remember now. I'll just let it rest there. I don't remember the conversations that took place after that.

MS. PARKS:

Okay, Jim. So you're thinking maybe there's a secondary benefit of mercury reduction from the sulfate reductions you're saying?

DR. LYNCH:

That's a possibility, yes.

MS. PARKS:

Okay.

DR. LYNCH:

That's a possibility.

MS. PARKS:

Okay, and when is your report due?

DR. LYNCH:

I'm retired.

MS. PARKS:

I know, I heard you say that.

DR. LYNCH:

I'm obligated to get it to the state -- it actually was due June 30. It was -- I mean I don't produce data unless I feel very, very

comfortable with it, and I had some problems with the national network data. In fact, I'm the one that brought it to their attention that there were some problems out there. I go back and I do a one hundred percent inventory of all the data that's done in Pennsylvania -- that we collect in Pennsylvania. I look at every sample to make sure that we are correctly interpreting the data that is there. And I picked up a couple of discrepancies. Most of them deal, not with the concentrations, but deal with the precipitation. This precipitation parameter is so important in what we do from a depositional point of view that we must get a better handle on how we measure precipitation. It's a simple device to measure but it's a very, very -- a simple parameter to measure -- it's a very, very difficult parameter to measure accurately and to show the spatial patterns. And everybody wants to look at spatial patterns, but it's all based on point estimates. And if I move from here to across the street I can get different precipitation patterns just because the buildings affect the distribution of precipitation. And that's what I'm trying to capture is some of the spatial variability in the

modeling because we're never going to have enough money to do enough data to collect enough sites to get the spatial patterns, so let's use the data that we have available both from a meteorology point of view as a source/receptor type relationship but also the model that looks at the dynamics of precipitation as affected by topography. And that's very important in Pennsylvania. Topography is very, very important in Pennsylvania.

MS. PARKS:

That's for sure. Tom and Joyce could we have copies of PowerPoint presentations available to us on the website?

MS. EPPS:

It will be posted, yes.

MR. FIDLER:

Yes.

MS. PARKS:

Thank you.

DR. LYNCH:

I want to take that back and send it back to John. I used some slides that came from EPRI as a matter of fact and I did not cite them on those slides. I didn't get a chance to get it all

done. And I want to provide -- I don't want to plagiarize anybody here. I give a listing of the number of people who actually collect -- did the research and I need to get in a table form or a tabular form the complete citations so people know where that data came from. I just didn't have it done. I said I'm retired here. I'll get that done as soon as I get back next week and get it to John and then he'll post it on the website.

MR. FIDLER:

Let me just say that we tried to get this meeting scheduled and arranged pretty quickly. We tried to get everybody's presentation in advance. There are copies of some of the presentations. I'm not sure if we did get copies of all the presentations, but as a matter of course not only will copies of presentations be available the day of the meeting from this point on but they also will be posted on the website.

Other questions? Yes, Vince. Please identify yourself.

MR. BRISINI:

Vince Brisini with Reliant Energy. As part of this program did you do anything to look at if there was any difference in the analyses of

samples collected immediately after a precipitation event or for samples that were stored or collected less frequently than that?

DR. LYNCH:

Well all of our samples are collected on a weekly basis every Tuesday. Tuesday to Tuesday is the collection schedule throughout the country. Obviously if you collect a sample on Tuesday and it rains on Wednesday, that sample won't be collected until the following Tuesday. So it's going to sit in the deflection container for a period of six days or even seven days if it occurs on Tuesday right after you collect it. So there is an age factor plus the samples then are air lifted. We actually ship them by two-day Express mail to Seattle, Washington. So there isn't a long lapse time from the time the sample is collected until it's actually sent out to the lab. Once the lab gets it and processes it, the sample could probably before the analysis is done be as old as ten days, maybe 11 days. It depends on when -- we collect Tuesday. They usually get them on Thursday. They process the samples and they're analyzed the following week. So there's probably a lag time between -- maximum lag time

between the actual sample collection and the analysis of probably ten to 12 days would be the maximum.

MR. BRISINI:

The question I'm asking is that of any concern relative to the integrity of the sample?

DR. LYNCH:

Well, from my understanding of it from the people that actually look at this kind of stuff is because they use an acid solution that affixes -- reduces -- eliminates the biological -- potential for biological transformation within the sample collection bottle itself there shouldn't be any absorption and leaching occurring out of the collection vessel itself. So my understanding is it probably is not. The sample should be pretty well preserved and there shouldn't be any changes, or -- like very small changes that might take place between actual collection and analysis.

MR. BRISINI:

I had multiple questions. Do you want me to do one question at a time and let others ask their questions or...

MR. FIDLER:

Go ahead.

MR. BRISINI:

Okay. Now you talked about the spatial variability that you were seeing with mercury and I want to -- and I'll ask the question just to see if the answer is what I thought it was. Do you see the same spatial variability with sulfates that you do with mercury?

DR. LYNCH:

No.

MR. BRISINI:

Okay, so you don't see the same sort of variability?

DR. LYNCH:

No.

MR. BRISINI:

Okay.

DR. LYNCH:

No, the sulfates tend to be in the -- we only have two years, Vince, of data that we can look at spatial, 2003 and 2004.

MR. BRISINI:

Okay.

DR. LYNCH:

I only presented 2004 here. Historically the

highest sulfate concentrations always occur in Western Pennsylvania and decrease across the state to the lowest concentrations in Eastern Pennsylvania. That's been -- I have never seen a deviation in that particular pattern. What we've seen over time though is that the sulfate concentrations have come down in Western Pennsylvania as well as in Eastern Pennsylvania, and the two are more closely associated. They used to be almost, oh, probably 30 to 40 percent different from West to East. Now the difference between West and East are probably in the order of 10 or 12 percent. But there is a decreasing pattern across the entire state, but the sulfate concentrations also tend to be highest in the -- always in the Western part of the state. Now that was not the case with regards to the mercury. The mercury concentration, at least for 2004, were highest in the Eastern part of the state which have the lowest sulfate concentrations. So there isn't a direct correlation between those.

MR. BRISINI:

Okay. As I looked, as you can imagine with great interest, at the Allegheny Portage National

Railroad site, the data, there was an insignificant downward trend in mercury and an insignificant upward trend in precipitation. Based upon your presentation could one basically say because they're inverse that it's kind of a flat line?

DR. LYNCH:

Yes, it's pretty much of a flat line at that particular...

MR. BRISINI:

Over the '97 through 2005?

DR. LYNCH:

Yes. The effects of -- it's not a simple -- I presented annual data there, but it's much more complex than annual data. You have to look at the precipitation patterns more on a monthly basis. To give you an example of how things can get messed up by precip, you know we've been in a drought pretty much most of this particular summer, but if you look at the annual precipitation at the end of this year you're going to find that we're probably above normal precipitation in much of particularly Eastern Pennsylvania because of the very, very high precipitation amounts that we got this last

storm. That distorts -- it doesn't take away the fact that we've had low deposition prior to that because we've had very, very low precipitation from the drought. Now we have high precipitation. This shift climatic in particular the amount and distribution of precipitation has a tremendous effect not only on concentrations, on chemistry, but as well as on the deposition itself. There's a certain amount of dilution effect that takes place. A very good illustration of this when I did the first assessment of the effects of the Clean Air Act it showed that out in Ohio -- we had three sites, NADP sites in Ohio -- it showed a 18 micro equivalent per liter reduction, almost a 40 percent reduction in sulfate concentrations at those sites out there. Was that a success for the SO2 reduction program. But when I looked at sulfate deposition, when I looked at the deposition it was actually going up and one of them a statistically significant increase in sulfate deposition despite the fact that we had this big reduction in concentration. So I said, "Okay, what's going on here?" So then we looked at the precipitation pattern and what we found at

that particular site was there was a 25 percent increase in that -- in the 1996 data which I was evaluating relative to the historical database for the year. Well that creates two things. That creates a dilution effect. So part of the reduction in concentration was due to dilution, part of it was due to the actual reduction in SO2. The increase in deposition though was due almost entirely to the fact that we had a lot more precipitation. The same scenario applies to mercury as well. And you have to look -- any atmospheric pollutant that has an effect, a concentration and precipitation volume relationship, can have a dilution effect. And the only way you can tease these things out is to have a long-term database covering the wide range of precipitation patterns that we have in the State of Pennsylvania. We have a tremendous range of precipitation patterns. I've seen it as low as -- less than 30 inches, down in the 28-inch area and we've been up above you know 68, almost 70 inches in parts of the state. And it's not always the same statistics that we see as variables. That's what enters into it. That makes it very difficult from an assessment point

of view.

MR. BRISINI:

I'm done.

MR. FIDLER:

Were there other questions?

MR. TRISKO:

Thank you Tom. I'm Eugene Trisko for the United Mine Workers of America. Professor Lynch, you mentioned near the end of your presentation Penn State's ability, I guess your department's ability to perform some modeling to measure the effects of any proposed rule that might be developed by DEP. I have a question -- a couple of questions about that and then a comment. My workers of course have urged DEP to engage in appropriate, technically competent modeling to assess this issue. Now if Penn State, you and your colleagues or others, were to undertake an assessment of the environmental effects, the deposition effects and potentially other effects of a DEP rule, you would need to first take into account in your base case so to speak, your reference case, all of the mercury reductions that will result under the EPA mercury rule and the related EPA Clean Air Act Interstate Rule

throughout the United States and the impact of those reductions in Pennsylvania before looking at an incremental change. And we're maybe talking here about a change of 100 pounds or less against a 150-ton inventory. You would need to take all those factors into account wouldn't you?

DR. LYNCH:

The way I presented that there was looking at just not an environmental point of view, just the depositional patterns. And we can look at the total change in depositional patterns and tell you whether they're statistically different today from what they would have been prior to the implementation of any rule.

MR. TRISKO:

The point I'm getting at is this that rule in Pennsylvania would be incremental to a very large national rule...

DR. LYNCH:

Uh-huh.

MR. TRISKO:

...that will have the effect of reducing mercury emissions by utilities on the order of 70 percent nationally and by more than 90 percent in Pennsylvania as measured from the coal content.

So in your modeling you would need to take as your base case the existing regulatory requirements in effect.

DR. LYNCH:

That's correct.

MR. TRISKO:

Okay.

DR. LYNCH:

We would look at that. That would be looked at. We'd use the national map -- the national network to look at that. We did the same thing with the sulfur. We didn't just look at Pennsylvania, we had looked at everything around.

MR. TRISKO:

Right.

DR. LYNCH:

All the major pollution sources that were affected by Title I of the Clean Air Act Amendments itself. So we looked at the bigger picture, not just what's going on in Pennsylvania itself.

MR. TRISKO:

Okay, and by the same token it would be important also, wouldn't it, to include changes in the global background, or in modeling parlance the

background, the boundary conditions, so that you would be taking into account in your modeling changes in deposition in Pennsylvania that result from the increased emissions of mercury in China, India...

DR. LYNCH:

Uh-huh.

MR. TRISKO:

...and elsewhere globally? You would need to take that into account.

DR. LYNCH:

Well, right now my understanding of that aspect of it is we have a background level, which is considered to be part of the global cycle of about 1.6 nannograms per liter. I think that's what they generally use right now. We can use that background information to back out of our calculations that what would be considered the global contributions of the State of Pennsylvania, or to the region for that matter. We can back that out. And then hopefully what we're looking at doing that would be the regional contribution as well as the local contribution that might be taking place. This is a very difficult -- it is a very difficult situation to

deal with. To my knowledge I'm not aware of any databases, and maybe Dr. Levin could address that, that would indicate that there has been an increase in the global cycle.

DR. LEVIN:

Yes, there are.

DR. LYNCH:

There are some? Okay, he can address that issue. If that is the case and that's documented, we can look at that increase and then use that increase, whatever the trend might be, to back out of the calculations of what's going on in the State of Pennsylvania, yes.

MR. TRISKO:

Okay, thank you. Finally, and if I might just ask as a procedural matter, not all of us will have the opportunity to give presentations of the nature that we're observing today. For the sake of the record, will you have a mechanism -- for example we would like to submit excerpts out of U.S. EPA's mercury modeling, deposition modeling that are relevant to Pennsylvania that were developed in the mercury rulemaking. May we submit those to you for posting on a website or however you plan to handle it?

MR. FIDLER:

Certainly. Certainly.

MR. TRISKO:

Okay, good. And also to finally make this request; that as many of us here today are aware U.S. EPA has been engaged in an extensive reanalysis of the combined effects of the Clean Air Interstate Rule and the Clean Air Mercury Rule. And EPA expects to release the results of that latest, newest modeling within a matter of days we are advised, and we would hope that DEP would invite U.S. EPA representatives to provide a briefing to this group on the findings of this new modeling because it's the first modeling that will take into account the combined effects of both of these major rulemakings.

MR. FIDLER:

Clearly a co-benefit of the installation of the controls associated with the CAIR rule need to be factored into any program that we would initiate. And I would certainly like to make arrangements for that type of presentation. I think that would be very helpful.

MR. TRISKO:

Good, thank you.

MR. FIDLER:

Roger?

MR. WESTMAN:

Western Pennsylvania has a particular problem. We've been talking here about mercury and wet deposition. Any help in understanding the particular contribution to what's in the air as well as what might be deposited dry through impingement of settlement particles?

DR. LYNCH:

Well, that's one of the big uncertainties. The dry depositional component we really don't have a handle on, and I'm not so sure there's many, many people have looked at that at all. There is a dry...

DR. LEVIN:

We're trying. It's just there's no field capable method of measuring dry deposition that you could use as a routine network...

DR. LYNCH:

The only information we have is what is soluble precipitation itself, not the dry component. I've seen some talks where they think there might be dry deposition taking place to the surface and it's part of the re-emitted part but again, very,

very little information. Really we're in an evolving science here in many cases when it comes to mercury.

MR. WESTMAN:

Okay, thank you.

MR. FIDLER:

Yes.

MS. GOODMAN:

Cynthia Goodman from the Department of Health. You made a statement about an equation and I missed it a few times. Something about precipitation times concentration equals something.

DR. LYNCH:

Deposition.

MS. GOODMAN:

Okay, thank you.

DR. LYNCH:

The concentration plus the volume combined gives you the weight of the material that's coming -- the mass of material that's coming in.

MR. WILLCOX:

Nathan Willcox with Penn Environment. I just had a quick question on the major point sources, the graph that you displayed with the different dots.

I was just curious as to what your source was for that. I know there's TRI data out there.

DR. LYNCH:

It was EPRI.

MR. WILLCOX:

Was it EPRI?

DR. LYNCH:

I'd have to go back and look at the slide. I -- that particular slide I took off of -- out of the conference out in -- there was a reference to that. I think there was a reference in Science and Technology. Do you remember that?

DR. LEVIN:

Environmental Science and Technology, yes. It's been published.

MR. WILLCOX:

Okay.

DR. LYNCH:

Oh, I'm sorry. This one here?

MR. WILLCOX:

Yes.

DR. LYNCH:

That was DEP. Tom where do you get that data from?

MR. FIDLER:

All the companies who sent data into us.

DR. LYNCH:

I'm sorry, that was DEP emissions data that they've compiled here, they shared with me and I just plotted it in that particular fashion to look at the spatial -- we're talking about the one that shows -- the map of Pennsylvania with the major point sources that DEP has identified.

MR. VANORDEN:

But if I remember, the data we sent to Dr. Lynch does not include data out of Allegheny County or Philadelphia County.

DR. LYNCH:

Correct.

DR. LEVIN:

Each -- every three years EPA is supposed to issue the national toxics inventory based on the collation of data that the states get from counties, from sources, and bring it altogether. And the '99 one, which was due in 2002, is still not out because they yanked the mercury inventory from it because they felt it was too error prone at this point. So it's a real issue. Different numbers coming that route versus the TRI route versus other routes. They all come in in

different amounts.

DR. LYNCH:

I could also point out that the modeling that EPA initially did showing the mercury deposition patterns across the United States, particularly in Pennsylvania, I remember I put that slide in, they showed something on the order of almost approaching 20 -- I think it was also 20, wasn't it, micrograms per square meter coming into the state? The actual amounts that we base on our own measurements are 30 percent lower than what was estimated by the EPA model. So their model showed a much higher level than what we actually measured, and it was pretty uniform across the entire state. It wasn't just located in any particular region, so their model was a high estimate based on what we have from actually observed data.

MR. FIDLER:

To provide Dr. Levin some time to set up for the next presentation I'd like to thank Dr. Lynch for his fine presentation, interesting information. Let's take five minutes and regroup around 10:45, please.

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[Recess]

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MR. FIDLER:

I'd like to get started with Dr. Levin's presentation and I've asked him to just present a little bit of background about his organization and himself before we get started. Dr. Levin?

DR. LEVIN:

Thank you, I'm Leonard Levin. I'm the Technical Leader and Mercury Issue Manager at the Electric Power Research Institute in Palo Alto, California. EPRI is a non-profit research organization founded in the mid '70s and engages in research in support of the energy industry. And we receive our support from members and support from a number of private and public organizations, electric utilities, government agencies at the state and national level and many international groups as well.

I'd like to talk today about -- try to focus on the atmospheric fate and transport of mercury. I will touch as well on aquatic cycling and the other aspects of mercury after it leaves the atmosphere and in some cases goes back into the atmosphere from other media, but the central

focus will be on its atmospheric processes.

Mercury is a chemical element. It is found associated with many other minerals in the earth's crust and its primary occurrence as a mineral is cinnabar sulfide shown here in the rock sample. And it's probably familiar to many of you who were high school chem lab geeks, as I was, and played with the liquid metal which can be -- look like this in bulk form. This is in fact a mercury sculpture done at Oxford University that they use to illustrate a chemical table that they have provided. In the background of it is a dragon eating its tail, which is an old medieval chemical symbol for mercury. It's a little hard to make out there, but that is what's shown behind it.

The pathway of concern for mercury is through the food chain, almost exclusively fish in the United States. This food chain cycle is heavily influenced by the particular biogeochemistry of the ecosystem, that is not only the water quality but the geological setting of the water system and how the fish and the other aquatic life interact with it. In the case of marine life where there are many, many unknowns about mercury

cycling in the oceans, the same things hold. In humans it's taken up obviously through consumption and eventually may make its way as methylmercury or elemental mercury if that's taken in through breathing, for example, to the brain. And it's thought that the most sensitive receptor individuals are fetuses growing in women of childbearing age and the development of the neuro system in those fetuses. It's not known for sure at what point in development that's most sensitive. It's thought to be the last trimester, but that's fairly uncertain at this point. There appears to be no evidence, from data that have been taken now by the Centers for Disease Control, there appears to be no evidence of post-birth exposure to mercury through fish of young children representing much of the threat. It appears to be all pre-birth through the mother taking in fish that may have excess levels of mercury in it. And there are, there is some evidence as well that there maybe some adult effects of mercury health later in life. That evidence is still a little shaky, it's not, not a clear case yet made for perhaps cardiovascular or immune deficiency effects but nonetheless its

felt that still, the most sensitive receptor, that is the individual that would show effects at the lowest doses is still felt to be the developing fetus. Mercury measurements are very difficult to do. They're all very small to begin with, the highest numbers are perhaps in the parts per million range in fish going up perhaps to 10 parts per million in samples in the U.S. But the samples we have to deal with go down to one part in a trillion or one-one-millionth in some cases as concentrated if you deal with mercury in seawater or in coastal atmosphere. And these are some citations of work of these actual measurements. So we have to be able to measure it at all these different levels all over the place. This has always been a fairly good measurement at least since the '70s or so when the bias due to lab -- existence of mercury in lab atmospheres for example started to be taken care of. Measurements here have improved over time and down here they're still very shaky.

Okay, the global background of mercury is important. This is the hierarchy that Jim showed earlier. I've added some illustrations in here of some actual sources of mercury that have been

measured, and it's important to keep in mind that when we talk about industrial or anthropogenic sources just arbitrarily I've divided them into global and local scale. They can be divided otherwise as well. But background emissions are an important source and increasingly thought to be more important than we had thought earlier as new measurements come in of what those background sources might be. In fact we have new findings now about re-emitted deposition, that is mercury that comes from an existing source, deposits through wet or dry deposition to some location perhaps not far away and then re-emits to the atmosphere. We now have new data from field measurements in two locations that shows that this may not be as large an amount as we've used before in modeling or as we thought was actually taking part in the global cycle.

This is one depiction of -- in the Eastern United States. This is for 1999 I need to point out and that means it predates the compliance of many waste incineration sources with their mercury -- MACT rule, maximum achievable and control technology rule. So this is from Mark Cohen at NOAA in Silver Spring who provided quite

a bit of information to us. And this is his plot of sources arbitrarily in the Eastern U.S. divided by source type and by magnitude. Now again this is '99 and so there have been some changes since then, particularly in the waste sources. One of the known effects of the imposition of the MACT rule was that many of the smaller medical waste and municipal waste sites closed down and some of the larger ones grew, at least temporarily, until they later went with the MACT rule. And the big one is currently and prior to this back in '99 was the one in Baltimore.

The basic understanding of forms of mercury, as Jim has already mentioned, is that there are two broad classes of forms, inorganic and organic mercury. The inorganic form is divided into the elemental type. There are different names used for each of these in different settings, particularly divalent, which might be referred to as the ionic form, the oxidized form, reactive gaseous mercury. This is the form that combines in the environment fairly easily with other substances to form salts, inhalants. And it's about a million times as soluble in water as the

elemental. So it's divalent almost exclusively that shows up in wet deposition and it's divalent therefore that shows up in the mercury deposition network since that's measuring only wet deposition at this point, almost exclusively. There are some sites that are now getting methylmercury measurements from the atmosphere, but these concentrations, this divalent in the atmosphere tends to be about one percent or less of the total, elemental being the balance. So it's hard to measure in the gaseous form in the atmosphere. And methylmercury when it occurs is about one percent of the divalent, so it's very, very hard to measure that accurately even in wet deposition. Particle mercury is particle bound mercury. It is not particles of mercury or floating droplets of mercury. You need to get that out of your head if you thought it was. It's not. Not at sea level. Rather it's mercury zero, mercury two that's bound to substrates, either crustal or byproducts of combustion. So it could be silicates. It could be carbon particles or other things, but it's basically on the surface of these other particles that carry it along and deposit it out.

Organic mercury there are two main forms -- or actually many main forms. There's a third one not shown here, which is the ethyl form which is the component in Thimerosal, the preservative that's been used and is still used in some vaccines. The two-methyl forms are mono and dimethyl. Dimethyl is a compound by itself. It tends to break down rapidly in the atmosphere. It's highly toxic but it's very reactive, so it breaks down quickly. It's been actively measured currently in the active phase of landfills in Florida and elsewhere as being emitted from those landfills. We don't know how it's formed. And there's been some reports of it in marine mammals in the North Sea. But it's monomethylmercury which primarily combines with chlorine or other inhalants that's of concern. That's the kind that may be formed in aquatic systems and may wind up in fish. So this is the substance that is primarily the one that's taken in by women of childbearing age.

This is a cartoon again by Mark Cohen to show you the complex cycling of mercury through the atmosphere out and then back in. Re-emission of mercury occurs only to the elemental form. So

if you have wet deposition of divalent mercury, at some point it has to become chemically reduced in the receiving waters or in the ground before it might re-emit to the atmosphere. So there has to be chemistry going on before the wet deposition form goes back to the atmosphere. Lots of stuff can happen in clouds. This is still an unknown. Lots of stuff can happen in polar, North and South polar atmospheres. There appears to be enhanced reactions with bromine going on there. And all of this makes up part of the global cycle where mercury is emitted primarily in mid-latitude locations around the Northern Hemisphere but may wind up depositing in polar regions or in the global ocean.

This just shows the chemistry in more detail that we've incorporated in our models, and it's important that we -- we have to keep in mind that there's different chemistry going on in the gas phase part of the atmosphere, in the heterogeneous phase, which is clouds, ice droplets, water droplets and so on, and on the surface of particles, solid substrates as well.

Okay, now one of the issues that's constantly being mentioned is the fact that the

divalent form, which makes up part of the emissions from most power plants and most other combustion sources, may drop down near the source and so if you put out more divalent mercury you may be adding to nearby deposition substantially and causing what has been called hot spots, although hot spots have also been defined in many other ways as well. This is again from Mark Cohen showing model results but these are results that have also been shown in data that when we talk about divalent mercury depositing close to its source that is not true. Okay? That you have to go out basically to about 500 or so kilometers or 300 miles for even half of the divalent mercury in a source plume to have been deposited to the ground by wet and dry deposition. So it does deposit more rapidly than the particulate form shown here in green or certainly the elemental form in blue, which has to go out a great distance before you get much deposition through dry deposition. But nonetheless it's still only a very, very small fraction that deposits at this local scale which is in modeling terms 50 kilometers, or thereabouts, or 30 miles. You're still only

getting about 20 percent. On Mark's graph -- our modeling shows that it's closer to 15 percent actually that may deposit of the amount coming out. Now of course the amount coming out of mercury, too, the fraction from a source might only be ten or 20 percent of all of the mercury coming out or it might be 90 percent. So this is you know of any unit amount only a small part deposits nearby. So you don't get patterns of a lot coming out you know next door and then the rest going out into the atmosphere. It all disperses fairly widely.

Okay, this is a combined graph showing U.S. sources by category and global sources by continental totals. Most of the world's emissions are increasing. The ones that are decreasing are Europe and North America primarily, although we're still in doubt about Mexico. Mexico might be increasing. China estimates are that it's increasing its emissions, increasing at a rate of about five to eight percent a year based on the increase in its coal use year by year. Why is that? Because China's national policy has been to not put on controls on existing sources, even though they're putting

in new sources of generation of industrial heat, and so on, that use coal and those new sources are often well controlled, not for mercury but for sulfur particulates. They're using modern methods on those. The many thousands of older sources there are not being retrofitted with controls even for sulfur and PM and those sorts of things. And one estimate is not only this national split in mercury increasing per year -- one estimate recently published in the Journal of Atmospheric Environment is that emissions of nitrogen oxides just around Shanghai are predicted to double in the next 15 years or so because of this increased activity in the use of energy sources in just that part of China. In the United States -- now you'll see different numbers on different slides here by different people. Which ones are correct? The answer is either all of them or none of them or some of them because we do estimates in different manners in different ways from different sources and for different years and there are many year-to-year variations, but roughly speaking these will all be consistent. Everybody agrees that Asia makes up about half of the global emissions, in the

U.S. that power plants make up about a third to 40 percent, something like that, of emissions depending upon which year we're talking about. In this one we've tried to include in our inventory all of the sources. For example, automobiles, trucks, mobile sources in general, are a fairly large source when added up, although individual sources among them are fairly small. And mobile sources tend to grow with population, so this is basically a large disperse source but dispersed around population centers such as cities rather than these others, which are mostly point sources.

Okay, this is the slide shown before. It's from Alexi Rivashopko (ph) in Moscow, estimates they did of the Northern Hemisphere broken down into sub-continental, regional and country size consistent with the previous one where China is a big one. And this is for the Northern Hemisphere countries only. Central Asia is fairly big here. I believe that they're underestimating India, which is probably in this pie slice here, because we believe India is actually much larger than this. We have -- versus almost no data in China we have no data from India. And so that's

changing now with some work by the State Department and the Agency for International Development to get measurements in India, but very slowly. This is the balance that Jim showed earlier. There are a couple of things that I wanted to point out here. One is that we've always been puzzled about how much mercury was moving through the environment atmosphere to -- surface back to atmosphere before the rise of industry and compared to how much now. And the ratios all come in between basically three and five in the different estimates that have been done. The global estimates all come in around six to 7,000. This is metric tons. So increase these by ten percent to get U.S. tons and you're up to easily 7,000 or 7,500 U.S. tons per year. This re-emitted percent however, 47, 50, the numbers that we were using are in the range of 50 percent or so, now seem to be high and that's based on the new direct measurements that we have from Canada and from Nevada that seem to show that the re-emitted fraction may be closer to 20 or 25 percent rather than 50 percent. And that makes a difference when you do these balances because the implication is if you're re-emitting

less to the atmosphere than has been shown here and that is being deposited then some of the other parts of the balance have to change. And we think that our estimates of natural emissions from land and ocean may be low because you know the anthropogenic one although it's highly uncertain is the least uncertain of all these other guesses. The others are much more wild guesses.

We do know from a number of measurements, and this just shows some of them here, we do know for sure that mercury deposition away from sources in background, regional and global sites has declined sharply since the mid 20th century. These are some numbers from Yonnie Benoid (ph) and coworkers done in upper Wisconsin in the mid '90s. There are newer data now done in mid ocean areas by Fritz Slemmer (ph) and coworkers that show that these numbers have continued to drop. And it's sort of indicated here, but he's finding a leveling off of this drop of emissions in the '90s. It starts to level out here. But he does show this basically 70 percent drop from mid 20th century to the present day and then a leveling off. What is that leveling off? It's a data --

appears to be, again this is an assumption -- it appears to be a data confirmation of the growth of non-Western emission sources, non-Western, non-European emission sources primarily in Asia, that the drop from the use of mercury in Western areas has now been -- started to be compensated by the growth in China, India and other sources and it's showing up in the middle of the Pacific Ocean.

Okay, we don't trust models completely. We like to have data, so in 2001 and 2002 EPRI flew aircraft flights off of the East Coast of Asia, mostly in the China Sea, but to get there we had to pass by a volcano in Japan and we caught Mercury emissions from that volcano. I don't want to try the name. It's something like Hachijojima (phonetic), which is a volcano Southeast of Tokyo on the coast, and we flew through the plume and sampled mercury coming out. A year later we did flights off the West Coast of the United States down to Mexico and we picked up the plume of mercury that when it was tracked back by NOAA meteorology models, it was tracked back across the Pacific around a high pressure system here and back to Shanghai. It took about

two weeks to get across the Pacific going in a circuitous route, but we found it at around 18,000 feet coming across the United States. And we found another plume higher than that at about 25,000 feet that was tracked back to Central Asia. This is a puzzle because we don't know of any big sources in Central Asia, although China may be developing sources there. This is probably an Eastern European source, even further West, that we basically lose track of it in Central Asia because we don't have any wind data beyond that. So we have found this mercury. Now it's a big deal? Well, last year Dan Jaffi (ph) at the University of Washington and Eric Presco (ph), frontier geo-scientists, did similar measurements. They had two locations. They weren't using aircraft. They measured one in Okinawa, which is down here, part of the Japanese archipelago, and another one on Mount Bachelor in Oregon at about 9.000 feet and again they picked up the plume from Shanghai, backtracked to Shanghai. And their estimate is 700 tons a year -- U.S. tons a year coming into the United States. Our estimate was about 660. The difference may represent just differences in

measurement or it may represent growth in the sources in China. We don't know. But it's a lot of mercury, a great deal that we've now measured coming into the United States. Now it's going over the United States, all right, but it's oxidizing as it goes. As it enters the oxidizing environment in the Continental United States, or any industrialized continent, some of it will be depositing out by wet deposition, some by dry deposition. So it is adding to our deposition, as we'll show you. And this just shows some of the flight tracks we actually flew. We followed this plume, this is in 2001, we followed the plume 400 miles out over the Pacific flying up and down through the atmosphere and tracked it. That's how we did these estimates. The prior understanding, as I showed you in the table, is that there were about 7,000 metric tons a year being emitted, and just from measuring concentrations in the atmosphere through the atmosphere up to the troposphere; we know it's fairly well mixed. We think there's about 7,000, there's 6,000, well 7,000 U.S. tons roughly. In the atmosphere pool at any one time. That gives a lifetime of about one year if you put in each

year about as much as is there at any one time. That means you have to remove each year the same amount basically to keep it more or less constant. And it is, it is now, more or less constant, based on Fritz Slemmer's measurements, although it has been dropping. The problem is that new measurements from these volcanoes, and from other background sources on the ground, we now have too many of these background sources, too many sources and not enough sinks. Even if we did find more sinks, the implication is that the lifetime of mercury in the atmosphere is shorter than one year. And the current estimate is that it's down around six or seven months and maybe less than that. I'd like to think of it as something similar to a pot of boiling water. The lifetime, if you put an open pot of water on your stove, and it starts to boil, and just leaving, letting it boil, the lifetime of any one bubble in there is only a few seconds. The lifetime of the pot of water can be hours depending on how big it is. And that's the situation with mercury. That a given atom of mercury, such as mercury 2, might last only a few days in the atmosphere before it gets rained out. That's why

the concentrations are larger near the ground for ionic mercury than they are further up in the atmosphere. Whereas (inaudible) is well mixed because it's removed more slowly. So the pot of boiling water may last for hours even though each bubble, or each divalent mercury may only last for a few days. So this is in essence a pot of boiling water that we're adding water to and taking water out of through this boiling process or deposition. And we have the new data that I've talked about already.

Now, re-emissions, this is what's called the grasshopper effect. It's been used as a term for persistent, organic pollutants like PCBs and dioxins because they break down very slowly in the atmosphere. Mercury is quite different because it changes form more readily than these other substances. Nonetheless there's been a measurement of mercury increasing, deposition of mercury in polar regions. Very slow, very slow rate of increase of the deposition and it's in very small concentrations compared to mid-latitudes. Nonetheless, it's been increasing. But we think this grasshopper effect from mercury, that is, how much of that's deposited

goes back to the atmosphere after some chemistry goes on may be smaller than we thought. Direct measurements now in Canada show that it's about 20% and new measurements that were published literally yesterday, that showed up just yesterday in environmental science and technology, the Journal of Science and Technology, from Nevada show a re-emission rate of only about 6% or so. So we're starting to bound what this number is and it's coming in smaller than the modeling 50% or so which has been used. And that has implications for how long mercury lasts in the atmosphere and how many sources there are that we haven't found.

This is my old 2003 data, which looks, you know, a bit different because of differences in rainfall primarily, this is just deposition I'm talking about here. But the, the interesting point here, and you'll see this in the maps of the other year's worth of data as well is that the gradient, that is the, the increase of the slope of mercury deposition, its increase, goes from north to south, there's more deposited here. The Everglades is always the highest because, we think, because of its location. Its far enough

south on the Florida isthmus that the, Florida peninsula rather, that it's in the trade winds. So primarily its winds come from off the Atlantic, carrying mercury from the ocean and the eastern hemisphere basically, Europe and Africa, into Florida. And because of its subtropical climate there are a lot of convective storms, during the summer particularly, over south Florida, that basically explains the atmosphere. They pump water, water vapor, clouds through the atmosphere all the way up to 50,000 or 60,000 feet and bring down a lot of mercury in short bursts. So most of this is coming down in big bursts. The rest of this is probably also seasonal rains as well that are fairly heavy in this region. Nonetheless, if you look at Pennsylvania in 2003, and the numbers here which are in the range of 7 to a bunch of them just over 10 or 12, and look at the numbers out here to the west which are 7 or 8 or so. They're not that different. And this coloration was added by the National Atmospheric Deposition program computers in Illinois. This is not my coloration. But this is the first year they've done their own Isoplus for deposition and

concentration. But if you look at these numbers there's no evidence from these numbers, on the face of it, of clusters of sources are you go from west to east. And certainly in the United States as you move from west to east, you start to his a lot of sources as you get to the eastern side of the Mississippi Valley, and the tributaries into the Mississippi such as the Ohio. But there's no strong evidence in the data of those sources. And instead you see big sources down here and it's a puzzle why that's happening. It may be rainfall differences, but how come these places, which are downwind of not very much at all in terms of sources until you get to Asia, look very much like these places which are downwind of a lot of sources.

This is modeling results that we've done for particular locations: the Everglades; Devil's Lake, Wisconsin, which is a TMDL site if you know what that is; and a background site in New York, mid-state New York, which we felt would be a receptor for Ohio River sources. In all cases, you have to keep the coloration in mind here, because the ocean pie here looks like the North American pie to its right. But basically the

left side of each pie is non-U.S. sources and the right side is U.S. sources over here. And this is how much mercury originates in these locations that's depositing in these locations based on global and regional modeling that EPRI has done. And it shows that basically non-U.S. sources make up a big piece of the deposition at these sites. Now these were chosen to be background sites, they're not sites, they're locations on our grid, okay, but they represent sites in the real world that are far from mercury sources. Okay, so this is one set of modeling results that shows we may need to consider these background sites to be fully comprehensive in our assessment of mercury sources.

This shows our modeling of mercury deposition for last year, 2004. This is our 20 km Fine Resolution grid and if you look at Pennsylvania, you know, we're getting these patterns that, you know, maybe look like the ones that Jim was showing and maybe not. But we do have a kind of a low spot, or a low band, in the middle of the State. The lowest numbers are in north central Pennsylvania. And we have higher numbers to both the east and west. And that's

pretty good, I think it's good, but it's my model so what do I know? All right, anyway, not bad. This is a problem because we don't have data sources for 2004 emissions necessarily, we do for utilities, we can do those pretty well. But for the other sources we're still guessing a lot and the one in Baltimore is still a problem because nobody, and that means the State of Maryland, EPA, EPRI, no one is sure how much mercury that waste incinerator is actually putting out in present day. So these numbers are right I think 19, sorry, 2002 numbers that we're using, so they may be higher for its emissions than it currently has. It may have further implemented its map rule. But this shows the general pattern we get present day.

Okay, now, when we do that global modeling again and basically take out other countries one by one, we get this pattern. And this is on a relative basis. The prior slide was absolute, this is micrograms per square meter per year total deposition, wet plus dry, of all forms of mercury. This is how much of the mercury at any one location in the U.S., and this is at 100 km scale now, is made up mercury from other

countries outside the U.S. And as you'd expect, most of it in the west comes from outside the U.S. and as you move east and start to pile up sources upwind of you, more and more of it comes from the U.S. But, except for about the eastern third or quarter of the country, most of the mercury is from outside of the country. Now, these are big percents of relatively small numbers out here. As you'll see, these numbers are not high in terms of deposition and these are higher, some of them high in an absolute sense. You can pick out sources here that we've modeled, in particular this is up northern Utah, a smelter. This is due to of all things the geysers geothermal development north of San Francisco which, at the time this was modeled, was a fairly big mercury source. Natural source venting to the atmosphere. But the other sources, most industrial, are grouped back here, and deposition shows that. This is EPA's same modeling, okay, they did it independently of us, and in the broad sense, although their scales are different and their coloration is different, they get the same kinds of patterns. Okay, the west is dominated by non-U.S. sources, the east begins

to be dominated by U.S. sources, but who knows which ones at this point. So you flicker back and forth.

We're getting the same answer, we don't know if it's the right or wrong answer, but we're getting the same answer from different approaches. And you can basically think of this as a question. Is there a floor below which the floor acting alone won't be able to manage mercury deposition? It's pretty clear that in the western part of the country, no matter what the U.S. does unilaterally to its own sources, nothing much will happen to the deposition out here because it's dominated by non-U.S. sources. And it's clear that in this piece of the U.S. over here along the Mid-Atlantic States and New England, southern New England at least, there may be a chance to make management differences by managing U.S. sources. It turns out less so than you would think. And in between it's kind of a mixed case that the deposition, we're talking now about deposition not sources, but the deposition in this band between basically the near mid-west if you want to think of it that way, is, and the upper south, this band is possibly locations that

can be ameliorated by U.S. actions but will still have a fairly big input in this range from non U.S. sources. So there will be a floor below which the mercury won't drop. And, in fact, because China is increasing at 8-10% a year or so in emissions and because India is increasing at some unknown rate, mercury deposition in here and in here may go up. And in fact in here may go up as well.

Okay, what did mercury look like before industry arose? The question I asked earlier. This is data from the, the Arctic, Canada, measurements in peat bogs there dated by lead isotopes. And it shows that mercury measurements there were micrograms per square meter per year absolute value, on the order of between 1 and 2 or thereabouts, and in many cases below 1. And the dates go back to the B.C. period, back to about 4,000. So if you think in periods of around 2,000 years ago, if you think of a 1 to 2 micrograms per square meter per year range, that's roughly what deposition was at that time. And other data from other locations around the U.S. and around the world show the same kinds of numbers. You get numbers for pre-industrial

periods, where you have to look back to the 1700s and earlier, that are below 1 and in some cases or just above 1 up to about 10 or so. And so if you think of a range of 1 to 10 micrograms per square meter per year, that would be representative of what much of the mid-latitude area looked like prior to the rise of industry. Where did the mercury come from? Volcanoes or deposits, natural ore deposits. Native Americans and first nations in Canada actually spent a lot of time burning down forests for arable land, particularly in the east, and forest fires we know are a big source of mercury if the land under them has mercury in it or if there's been mercury deposited to the under story. Wildfires in general appear to be a big source, currently estimated to be around 900 or so tons a year in the northern hemisphere - a big source. We don't know if it's all new mercury. That's one puzzle we still have that we're doing experiments on this year - is that mercury from wildfires new mercury that's exposed because of the fire and brought up by the heat, or is it mercury that would get back to the atmosphere anyway over a longer period if that forest didn't burn. We

don't know that answer yet. Okay, so if we look at these numbers and then look at the current, or the old current, 2003 data, we see that there are a lot of places in the west, we don't have many stations out here obviously, and we have more now but we don't have data from them yet, but the ones we had data for for at least a full year 2003, there are many that had numbers that are below 10 micrograms per square meter per year. Even up here in the, the northwest. Now some of these are obviously under urban influence. This one near Seattle clearly is. And yet the deposition of mercury 2 is representative of what we were getting before industry.

So it raises the question of what was going on prior to the rise of industry if we currently get fish advisories in areas that have pre-industrial deposition. What was happening to native Americans that were eating fish in this same area when deposition down here resulted in fish advisories. These are actual locations of fish levels of mercury above .3 parts per million mercury in the fish, and it's almost all methyl-mercury and it's almost all in the flesh in fish, so it's basically consumable methylmercury from

the State of Montana, just chosen arbitrarily. Overlaid is this colored scale, the one we've been using all along, that shows that all the deposition in this region is modeled to be below 10 micrograms per square meter per year. So, the questions is, "Were native Americans eating tainted fish?" In other words, the answer is, "We've always been exposed to mercury because of natural sources." It's always been in the human background and in the fish as far as we can tell based on this surrogate approach of looking at current levels. Now, some of these sites may have direct discharge of mercury from old ground sources, old sources, along waterways for example. But not all of them throughout the State. And this was arbitrarily chosen in Montana where we had data, just to show you this, it's a question, not an answer. Why are we getting fish levels of mercury that are advisory levels even though the atmospheric deposition is very small?

Okay, now I'll talk briefly about the regulations. You'll hear more about this later from other speakers.

MR. FIDLER:

Dr. Levin you've got about five minutes to finish.

DR. LEVIN:

Okay, no problem, okay. This is the regulation that was passed by EPA and issued in May, issued in March, and published in May, it officially started. CAIR is the Clean Air Interstate Rule that affects SOx, NOx and PM mostly Midwestern and eastern States. The CAMR or CAMR, I'm not sure how it's pronounced officially, the Clean Air Mercury Rule, affects all larger coal plants and provides national and state mercury caps. Basically trading ensues in 2010. Every modeling shows that trading credits (inaudible) will all be used up two years after the target date of 2018, so that by 2020 the utilities nationally will total 15 tons a year of mercury, which is the target in the regulation.

Okay, this shows the deposition of mercury under three scenarios, two scenarios and the current state. This is the pattern. I'm not going to go into a lot of detail on it right here, but this shows, just to get an impression of it from the scale over on the right, the highest national deposition that we modeled for

2004, 383 micrograms per square meter per year. Okay, that's in the Baltimore area partially because of that incinerator. In 2020 under the current regulation, this is where we're going to get if everybody implements the EPA Rule as it's published. Okay so the pattern is from this to this. If utilities are zeroed out, made zero throughout the country, utility mercury, it goes from this to this. There's not much difference. And I'll show you why. This is a focus on Pennsylvania to show what these three patterns are. Currently, that's the model you showed before, different coloration but same model. Under the Clear Air Interstate Rule you get the same pattern, lighter in the center part of the State, higher in the east and west. And, utilities zeroed out, there are differences but they turn out to not be significant.

So if you go from 70% control to 100% control, it doesn't make much difference to the extremes, or the means for that matter, in deposition. And I might add, if you read the EPA published documents, the regulatory impact analysis where they talk about their modeling, they get the same results - numerically somewhat

different because of some assumptions they make about growth in emissions, but the patterns are the same. And here's why. The easy one to capture is the ionic or divalent mercury and that's captured substantially by scrubbers and the particle bound balance caught by PM ultra static reciprocators and so on. So that the ionic mercury, the divalent form which deposits more readily, drops fairly quickly under the Clean Air Interstate Rule, out to here, okay, and then drops further. Now this is 20 tons per year of the 48 or so tons per year emitted by utilities. That means about 40% or so is made up of ionic mercury nationally. And it drops in this sort of pattern okay. So that you're only left with 5 tons a year roughly after both of these are implemented. But if you look at the purple line, that's just suppose the Mercury Rule wasn't implemented at all. That's just the Clear Air Interstate Rule. You get almost to there just by implementing the SOx, NOx and PM control. So the cost to control mercury alone would be zero, but you actually would control a great deal of the ionic which is the amount that deposits more locally. The elemental is almost is almost,

captured almost not at all by the Clean Air Interstate Rule because none of this is designed to capture the elemental mercury. And it's only through the Clean Air Mercury Rule that that is required to be captured through the use of carbon injection or other means and that starts to go down only after 2010 in any substantial way.

So that's the reason, that the additional controls from the Clean Air Mercury Rule are capturing this elemental mercury. And if you were to go to zero emissions from utilities, you would only drop the ionic part which is the big contributor to U.S. deposition from 5 tons a year to 0. Whereas this would drop from 10 or so tons a year to 0. But it wouldn't make any difference for deposition because most of this, three-quarters of all the mercury emitted by utilities, leaves the country - never deposits in the United States. This is modeling, but this is what we find. EPA and EPRI used a similar approach to do these scenarios. We modeled industrial operations and electric operations. We got mercury emissions by individual power plant unit and stack and then fed that into the atmospheric models of chemistry and (inaudible), deposited

the mercury to 200 kilometers U.S. grids. At that point EPA's approach differed a little bit from EPRI's, but they're substantially the same.

We both used a cycling model from mercury to figure out how much of this coming down wound up in fish under current conditions and did the same thing all over again for future conditions and that difference gave us the change in the fish mercury nationally. And then we used data from Centers for Disease Control and other surveys to figure out from how much fish people eat, and assuming that they eat the same amount in the future, since that fish will have less mercury, they will have lower exposure to mercury. And it turns out that when you go through all of this, and it turns out hundreds of times, to get it right, our information, our conclusions are that the exposure to mercury, how much mercury is in the blood of the most sensitive women of child bearing age, the ones that might expose potential fetuses at birth, fetuses potentially exposed at birth I should say, they aren't potential fetuses, the greatest drop in exposure is only about 7%. And it turns out that this is in, our calculations show it's in the central part of the

eastern States, West Virginia. This is based on how much recreational fishing there is because we assume, and EPA assumes also, that the biggest impact from cutting utility emissions in the United States would be to the fresh waters within the United States and the fish that are caught from those waters.

But the influence drops off as you go out over the ocean. And it turns out that the fish that we eat in America, 70% of the biomass of that fish comes from that direction - the North Pacific. Some of the rest, but not all of it, comes from the Atlantic and Gulf States. Most of it is from distant sources. All of the tuna, all of the albacore, is from the equatorial Pacific which is way out there someplace, all of it. So that there's basically no impact from much of this marine fishing because the utility cuts will be dispersed into the global atmosphere. They'll show up as only about a 1% or so drop in global mercury in the atmosphere and therefore in deposition to this global ocean. So the marine fish won't change much. Well it turns out that marine fish make up about 80% of the diet of U.S. fish eaters. So the big changes to small

portions drives this.

Now, we also did some costing. I won't go into all the details, but I want to look at what you might call "the payback." If emissions drop from the 1st line to the 3rd line, which is the current proposal. There was a middle line that we and EPA looked at which was a MACT proposal, but you should pay attention to the top line and the last line. These are our calculations of emissions under 2004 from utilities alone and after the 2020 full implementation of the Clean Air Mercury Rule - a 68% drop in these calculations. These are up to the atmosphere. Deposition down from the atmosphere drops from 164 to 153 tons. So this absolute drop is about 30 or so tons down, this drop in deposition is about 10 or so tons down. 20 of these 30 tons are leaving the United States and depositing elsewhere in the world, outside of the U.S. Our models calculate deposition even from multiple passes around the globe in the global atmosphere. So this is an ultimate net deposition. And so the payback, in terms of deposition drops, is very small. For a 68% drop in emissions you get about a 7% drop in deposition. Now this is

nationwide. There are differences locally. Some locations may drop by as much as about 40 or 50% in deposition. But they're isolated, and as far as we can tell, do not overlay critical fisheries, critical fresh-water fisheries.

Okay, hot spots, briefly - we've done a lot of work on hot spots as has EPA. We've demonstrated, we think, that hot spots don't exist currently. We defined hot spots as locations in the U.S. where utility mercury is the dominate. That is, 50% or more contributor to the deposition. That excludes most of the western U.S. and basically focuses on the east. And we find that of the land area of the United States, only 0.4% has a utility contribution of more than half of the mercury coming down. A very small, and it turns out these are isolated spots around the eastern third of the country, not contiguous areas as well, most of the U.S. and certainly most of the western U.S. has very little contribution from utilities to the mercury coming in. There's now evidence, in fact, that some of the chemistry which is not currently considered in the modeling, that goes on in the plume itself after it leaves the stack, may

reduce, chemically reduce, some of this ionic mercury to elemental mercury. And that would affect the downwind deposition as well. So that our models may be over estimating utility deposition. This same evidence seems to indicate that waste incinerators may act in the opposite direction, to ionize, not ionize, to oxidize some of the elemental to ionic so that they may be underestimated in the calculations. This shows photographs of one experiment we've done so far in Wisconsin measuring those plumes. He was not in the plume here, the plume was going out this away.

Okay, where do we go next? First of all we have to monitor the progress. The whole point of regulation is to protect public health. Secondary, secondarily is to, to protect secondary effects such as ecosystems. But certainly this rule, the CAMR rule was passed to protect public health. How do we measure that protection of public health? Deposition may go down, this may be representing smoothing of the peaks in the deposition. We may look for drops in the fish levels of mercury over time. And there may be measurable declines in the blood

mercury of the most sensitive women of childbearing age. The question is, how do we find the progress? How easy is it to measure? Where do we look? Will global growth mask any local improvements in deposition?

The utilities, we'll talk about the utility regulation here. There will be other regulations, and there have been, on mercury as well. So all of this has to be considered, but the big recent cut is the one ordered for utilities.

Where do we look? Which are the most sensitive indicators? Work done by the Society for Environmental Toxicology in Pensacola, the meeting in Pensacola two years ago, tried to design a strategy for looking at the most sensitive indicators of mercury deposition changes. And it's still an open question. How do we look? Sampling strategy and analysis have to be improved to look for smallest changes. And, most importantly, when do we look? We know that water bodies with fish in them take a very long time to reflect changes in deposition. The full impact of a deposition drop on a water body may take 30 or 40 years to show up. There may be

an initial response of 20 or 30% of the change in those fish that will show up right away, but we can't be sure that that's not due to natural variation in the fish changes.

And finally there's what I call the puzzle of the NHANES data. NHANES is the Centers for Disease Control sampling of blood levels of mercury of women of childbearing age. What happened is that in a two year period, '99 and 2000, that was when they showed that something like 6%, or was it 16%, anyway, women of childbearing age had mercury levels that were above the EPA reference dose. And so that was the call that about 300,000 or so children were born at risk each year from those numbers. Well, the second two years of the data, 2001 and 2002, show that those numbers have dropped substantially - that there are many fewer women above the reference dose. The same data, which asked the women how much fish they've eaten, show that these women in the second group are eating more fish, more fish, and their blood levels are going down. It's a puzzle. It doesn't make any sense, but it's there and we have to consider it. Okay…

MR. FIDLER:

Dr. Levin, could you just cover the most salient points of the remaining slides and move through basic issues.

DR. LEVIN:

A multi-national project underway in Canada is trying to look at some of these. I'll run through them real quickly. Where we're adding mercury isotopes that we're showing here -- these are stable, non-radioactive isotopes - to different parts of a lake system in southwestern Ontario, and looking at the details of how the mercury is taken up from this deposit. This is where we found from a deposition done in an upland that only 20% or so of the mercury is getting back to the atmosphere, the rest of it is either staying here or moving down to the lake.

And the basic issues remain this - mercury health effects. We still need to reduce the uncertainties in this and look more at the adult onset effects to see if there's a lower threshold for those to occur. We have to look continually at the international inputs and how those change over time. Why is deposition across the U.S. from east to west similar even though source

characteristics are very different? And finally, due diligence. We need to monitor progress, or what should be progress, to see if we can detect it. Okay, thank you. There is my contact information if you have any questions.

MR. FIDLER:

Thank you very much Dr. Levin. Questions, comments? Yes Gail.

MS. CONNER:

Yes, I would like to…

MR. FIDLER:

Please, please identify yourself.

MS. CONNER:

I'm Gail Conner, CAC. I would like to go back to your deposition of inorganic forms of mercury versus distance from source.

DR. LEVIN:

Oh, that's…

MS. CONNER:

The hotspot reference that you initially made.

DR. LEVIN:

That's two different things. That's not talking about hotspots.

MS. CONNER:

I know, but you made the first reference to

hotspots there.

DR. LEVIN:

Okay.

MS. CONNER:

So that's where my question derives.

DR. LEVIN:

Yes, that's Mark Cohen's modeling result.

MS. CONNER:

The first question…

DR. LEVIN:

The one that has the three curves on it?

MS. CONNER:

Yes. It's like the 6^{th} or 7^{th} slide. My first question is, "Does this slide take into account concentration of multiple sources in an area?"

DR. LEVIN:

No, it's a single source to show how mercury behaves from a single source. In your modeling you would have to do these sources, different locations, and add up the mercury from…

MS. CONNER:

Okay. So basically this slide represents a single source in regard to your first local scale reference to the 30 mile issue. Right?

DR. LEVIN:

This is treated as local scale in not only modeling but in looking at distance resources…

MS. CONNER:

But it's one source.

DR. LEVIN:

Okay.

MS. CONNER:

Okay. The second question, "Have you discussed or looked at the health effects associated with low doses considering multiple sources within a 30-mile radius?"

DR. LEVIN:

Yes. Oh, within, yes, we've done that in our modeling.

MS. CONNER:

And what type of health effects were those that you…

DR. LEVIN:

Well, in other words, we, we looked at, when we did this exposure work later on, we looked at using the mercury recycling model for a particular watershed, we tried to model how much fish in those watersheds would get mercury, not from multiple fictitious sources, but from actual sources that we'd located. So, you know, they

weren't necessarily grouped all 30 km. But we found that there were no waterways where these individual sources caused alone, individual utility sources, alone caused the fish to go over the EPA dose threshold of 0.1 micrograms per kilogram per day.

MS. CONNER:

Okay. And the last question, well actually more of a comment in that there are multiple definitions of "hot spots…"

DR. LEVIN:

Yes.

MS. CONNER:

…particularly when there are multiple sources taken into account, you may yield numerous definitions of "hot spots" and it tends to be that the, you can make a definition more favorable to your outcome. So, in regard to that label…

DR. LEVIN:

We chose, we chose, the definition that we chose was to look at the deposition that occurred in locations where utilities made up more than half of the total mercury coming down. EPA chose a different approach. And it's important, I think

it's very important that everybody look at the published on-line regulatory impact analysis that EPA has done. It shows their current modeling results, although they're doing new modeling results. They looked at "hot spots" somewhat differently. They said, "What's the statistical distribution of watershed mercury that utilities are contributing to?" And they found some where utility contributions were causing the fish to exceed this .3 part per million threshold. Okay, but everything goes away under the Clean Air Mercury Rule. All of those high points drop down significantly. In the upper case, the ones we looked at, all dropped. The highest point drops by about 80% or so in terms of deposition. The other, the other important thing to keep in mind in, in all of this is that the Clean Air Interstate Rule is the action that does most of that improvement to deposition because it's the one that captures most of the ionic mercury. Now that's nationally. I can't speak to what it would do in Pennsylvania.

MS. CONNER:

And then the part of the State that I live in, which is the red part that was on both

presentations…

DR. LEVIN:

The red, the central part or the outer parts…

MS. CONNER:

The east coast part, the eastern part. Are you saying, based on your conclusion at the end, that regardless of the regulatory changes that are made, there will be no substantive impact to that part of the State then? Is that what you were leading to?

DR. LEVIN:

No, not necessarily. I'm saying that, I'm saying that if the regulatory changes were to go further than the 70% cut, now that's a 70% cut nationally and our modeling, the 70% cut nationally, and that works out to different fractions locally and in Pennsylvania it's actually a higher percent drop than 70% because of the coals you're burning. But, all I'm saying is that the change in deposition, I was referring to the difference between, this is the Clean Air Mercury and Interstate Rules together, and this is what happens if you tell all the utilities not to emit any mercury. A hypothetical, we just took utility sources, U.S. utility sources out of the

model and ran the model all over again for the whole world. And the differences are small in the deposition. If you look at the coloration, the highest, the coloration gets bluer I guess or greener as you go up in this coloration. We chose this coloration by the way because it's always a problem when you Xerox these pictures into black and white, how do you get the gray scales to be differential, and it turned out that this sort of strange coloration where it goes from red to yellow and back to sort of red came out best in black and white. That was a consideration in the coloration. But if you look at these numbers here, these are all low, they get higher and hotter, but the highest numbers you get are in the 25-50 micrograms per square meter per year range in this eastern part of Pennsylvania. And they're still the highest numbers you get here. They don't drop very much if you zero out utilities. That's all I'm saying.

MS. CONNER:

Okay. Thank you.

DR. LEVIN:

Yeah?

MR. BRISINI:

And it's off of that slide, it actually goes back to the slide where it talks about Pennsylvania being the, you know, the portion of the U.S. where less than 20% is…

DR. LEVIN:

Oh, yeah.

MR. BRISINI:

Okay, no, leave it where you are. Those two tie together in my mind because I look at that though and I say okay, I see, you know, and the point you make there's little difference if you zero out all of the utility emissions. I'm just curious if we really focus on Pennsylvania to look at the incremental difference of a Pennsylvania-only Rule, would you, have you put together that particular slide? Not with the zeroing out of all electric generating unit emissions, but rather looking at a zeroing out all of the Pennsylvania…

DR. LEVIN:

I understand what you're saying…

MR. BRISINI:

…emissions and then having CAMR in the other area. Because I think that would be a fairer

assessment to say here's what happens because really what we're looking at and talking about is the incremental difference and the incremental benefit between CAMR and some other Rule in Pennsylvania and that's what we need to understand. What are those incremental benefits?

DR. LEVIN:

We haven't, we haven't done that for Pennsylvania because there are so many degrees of freedom for each State times 50 States, or 30 or so that will be affected by the Rule, that we haven't been able to get a handle yet on how to do it efficiently. We are going to do it. This is our National study and our experience from looking at it for other States, we've looked at one other State so far, is that the difference between this and this, assuming that all these other States around you are still on this, is very small. That your upwind contributors, if they're not zero but 70% less than current…

MR. BRISINI:

My particular interest is that that to me, that's kind of a defining piece of information relative to this effort.

DR. LEVIN:

I agree and it should be done in Pennsylvania. But EPRI hasn't been asked yet to do it so we haven't done it yet, basically.

MR. FIDLER:

Other comments?

MS. PARKS:

Yes, on these same slides Dr. Levin, can you tell me what the actual numbers are?

DR. LEVIN:

That's shown in the coloration.

MS. PARKS:

I just, I can't tell exactly which purple we're dealing with.

DR. LEVIN:

The dominate purple is the low purple, okay. And there are, the high purples really only show up here near Baltimore and I think there's one other here, you know, in the Delaware Bay area that are in this coloration. But the high-end purples are really not evident, they're, as I said earlier, they're isolated spots rather than blotches of areas.

MS. PARKS:

Right. I mean we, we know that very tiny amounts of mercury make a very large difference to human

health effects and I don't think that we can say that moving any type of source sector, like the utilities source section, out of the picture here, is going to be an insignificant change. When we, this is not the same thing that we were dealing with under ozone or acid rain. We're dealing with effects under smaller concentration differences. And, therefore, I'd like to see us all take a very close look at the benefits associated with small changes.

DR. LEVIN:

Well these are, these are only deposition we're talking about. This is not concentrations in fish. That's, that's a separate continuing model effort. That, that, that result is what we got in the, I can provide the fish outcomes for each of these States as well, but we found that for the fish differences, when you filter it through, we chose the most sensitive women. That is, the NHANES data from Centers for Disease Control gave us numerical data, as well as graphs, of what the highest blood level mercury women had for fish. So we chose those as the most sensitive women because they were at the top 90^{th} to 100^{th} percentile in terms of blood mercury. We took

their fish consumption and applied it in each of these States. So we applied how much recreational fishing went on and how much was marine fish. And for Pennsylvania, the difference in blood levels between, currently, between NHANES, and this is the first two years of NHANES which had the higher blood levels, and NHANES, what NHANES might show after CAMR and CAIR, was only about 3% or so for Pennsylvania. Now, it will vary across. In other words, their exposure levels, their dose in the blood, only dropped by 3% no matter what the deposition drop was because it's filtered through their fish diet and most of their fish is in marine fish. Most of those marine fish seem to be getting the mercury from either natural sources or non-U.S. sources. Those tuna in the South Pacific aren't getting their mercury from the U.S. The U.S. is 25,000, you know, 18,000 miles upwind.

MS. PARKS:

But do we know what people are actually eating? Are we monitoring the content…

DR. LEVIN:

Well, we know what they report they're eating. The NHANES study, there are different ways of

doing food surveys, and one of them is to send people, observers, to peoples' houses and watch them each fish for a week. That doesn't usually work out. You don't like people sitting around writing down what you're eating everyday. So they rely instead on diary studies which are "what did you eat yesterday and the day before?" "How much fish did you eat?" Now NHANES is looking at other things beside mercury. They're looking at arsenic, other things in the blood, all the different PCBs and everything else, so they're asking all kinds of habit questions including consumption. But they ask these women, well they ask everybody, men and women and children, how much fish of what kind did you eat over the past month. Well, I don't know what I had in my burrito for lunch yesterday, you know. How can you recall what fish you ate two weeks ago? So it's a real issue. But we think that they're correct in terms of distinguishing marine from fresh water fish in the kinds of fish they eat even if the species are wrong. And that's what we factored in to. If you look at EPA's modeling, they get very similar numbers. And I urge everyone, these are results that we got, you

know, a year ago. EPA's more recent results reflect similar kinds of numbers through a different approach. And you just go to the EPA, EPA.gov/mercury, and you've got a link to all of those reports that they did. And they got the same answer, not the same but, you know, the same ballpark answers.

MR. FIDLER:

Yes?

MR. STAMOULIS:

Arthur Stamoulis of the Clean Air Counsel. I just wanted to clarify, so your modeling shows that Pennsylvania and the States downwind of it have the lowest levels of foreign produced mercury deposition?

DR. LEVIN:

Not the lowest levels, the lowest percent.

MR. STAMOULIS:

The lowest percent. Okay.

DR. LEVIN:

When you have an air source and you move out hundreds of miles from it, like you're doing from China, thousands of miles, the downwind difference between being 4,000 miles away and being 5,000 miles away is very small. So the

absolute amount of deposition from China is very similar in both locations, but it makes up a smaller percent because there are more upwind U.S. sources.

MR. STAMOULIS:

Okay. And it seemed like one of the slides showed that areas of the State that have the highest deposition, according to the last presentation, have the lowest levels of, the lowest percentages of foreign produced.

DR. LEVIN:

Right.

MR. STAMOULIS:

That's correct?

DR. LEVIN:

That would be consistent, sure.

MR. BRISINI:

Off of this slide, just out of curiosity, is it a linear extrapolation relative to the percent reduction in methyl mercury update with control programs? In other words, if we went a national 90%...

DR. LEVIN:

No, no, no, it's not national, sorry, not linear.

MR. BRISINI:

Okay.

DR. LEVIN:

You have to put, we, we modeled every utility boiler in the country, so did EPA. One of the things we had to model, as did EPA, was what happens to generation over the next 15 years to 2020. And so we had to put in increased generations in some of those boilers to guess at where we'd be. So that increased some of the mercury coming out, only slightly because those would be new sources at a much lower rate. But we modeled every utility point source currently and then in the future. And we took the difference. So it's not like, what forced us to do a statewide estimate here rather than doing it by watershed, was that we simply didn't have watershed data at the time we did this. Some data has been developed since then, as you'll see in the EPA report, they've applied data, although it's still limited, to the whole eastern United States by watershed. But the numbers come out very similar.

MR. FIDLER:

Any other questions? Comments? Yes?

MS. JARRETT:

This is Jan Jarrett from Penn Future. Some of what you said has contradicted some of the studies I know that we've been familiar with. Particularly your statement that when there is a reduction mercury sources, local mercury sources, you don't see an effect in, in fish for a long period of time.

DR. LEVIN:

No, no, what I said was, "You don't see the full effect in fish for a long period of time." You may see a near term effect. In other words if you, let's just say arbitrarily, if deposition drops to some you know water body, a lake in here, (inaudible) no matter what it is, eventually the fish in that water body will have half as much mercury in them if they get all the mercury from (inaudible) deposition. To reach that half drop in mercury for the half drop in deposition, may take 30 or 40 years. What we don't know is what happens right at the beginning. How fast to they drop from 100% of their current level to 70%, 60% and so on. That first part of the slope is still uncertain. The recent data from Massachusetts and Florida have said that it's faster than people have been

guessing. It's not faster than we've been guessing because we haven't tried to guess at what it's going to be at the beginning. And those data are still not certain as well. But it appears that you may get a rapid drop to part of the full response right away, but to reach the entire response, the half drop in deposition, causing a half drop in the utility, in fish mercury, that may take decades. And we're certain it will take decades. And the reason is, the fish carry most of the mercury that's in the lake and it just takes, since most of the mercury is in the hot, the large piscivorous fish that eat other fish, it takes many years for those larger, older fish to basically die out. And the fish coming behind them, generation by generation, will have progressively lower mercury. But it will take many years for that to work its way through the system. So, you may cut down the mercury from a stack, and you'll see some drop in fish, but you won't see the full response for many years.

MR. FIDLER:

Gene?

MR. TRISKO:

A short question. Thank you Tom. Gene Trisko for the United Mine Workers. Dr. Levin, referring to Vince Brisini's previous question about a defining piece of information for this process, given that Pennsylvania has an allowance allocation under Phase II of the Mercury Rule of some 1,400 pounds of mercury, based upon your professional knowledge, experience and judgment in working with this model, do you believe that a reduction of that 1,400 pound allocation by, let's say just for example, 200 pounds of mercury, 200 pounds annually, would result in a measurable change in the results that you have calculated, the results that are calculated here for Pennsylvania blood mercury risk reduction? Would it, could you calculate the change based on that?

DR. LEVIN:

You want me to say what Pennsylvania women of childbearing age would look like in 20 years?

MR. TRISKO:

If, assuming, assuming a 200-pound incremental reduction below Phase II CAMR levels.

DR. LEVIN:

That's, that's a big stretch. I just, I couldn't

possibly guess at how that would show up. You know, it may, I mean, even in the deposition it would probably be hard to detect it and I certainly, I have no idea how it would show up in the women of childbearing age. They may all shift to eating tuna which means none of this would make any difference at all.

MR. TRISKO:

Okay, just so I understand your response to my question. You're saying that it would be extremely difficult to model it even for purposes of…

DR. LEVIN:

No, no, we could model it.

MR. TRISKO:

…for the deposition calculations.

DR. LEVIN:

No, we could model it, sure but we…

MR. TRISKO:

Okay. Thank you. We'll get to it.

MR. WENDELGASS:

Bob Wendelgass from Clean Water Action. Just to follow up a little bit on the conversation you had with Jan. This data, the slide that's up there now, the reductions that you're showing are

for what time period?

DR. LEVIN:

Oh, this is a, it's sort of a timeless period. We're saying whatever year all of these reductions have been implemented by the utility industry. That's, that's basically supposed to be a plateau point where no further reductions to existing plants will be required at that point. New plants would still be coming on line but their emissions are supposed to be much lower. So for 2020 when existing plants have all met these two requirements, CAIR and CAMR, after that works its way through all the fish, it will be another 20 or 30 years, suppose regulations just stopped in 2020, after another 20 or 30 or 40 years, and all the fish had reached their stable point to be new stable mercury coming down, this is how much drop you would see. You wouldn't see this in 2020. It would take many years for the reductions to reach this. And meanwhile, of course, China is doing something. We didn't try, we didn't try to model economic growth in China or other countries. EPA did the modeling a little differently. They did model economic growth in all sectors of the U.S. economy so they

had increases of mercury from waste incinerators and medical incinerators and other things just due to economic growth through the next 15 years. We did this as a, as a scenario. What if utilities were controlled and everything else stays the same as it is now, so it's just a utility scenario.

MR. WENDELGASS:

And then one other question on this slide. Are you using a, a sort of same number nationwide for fish consumption patterns or is it…

DR. LEVIN:

No, no, no these are…

MR. WENDELGASS:

…regionally…

DR. LEVIN:

…very different, we've done, we've used the deposition changes by those 20 kilometer grid squares.

MR. WENDELGASS:

No, I meant in terms of fish consumption patterns.

DR. LEVIN:

Oh, no. Oh, nationally? Yeah, we used the same fish consumption patterns, but what, what

modifies it in each State is what fraction of the State population does recreationally fishing. And then we assumed that most of that was in the State and then that would be then impacted by the deposition changes in that state. So there's a fraction of those women that eat a fraction of their meals from sport fisheries in that State and those are the fish that will show the most difference. We also included difference in marine fish mercury, but that's much smaller. So, even though it makes up a bigger part of the diet, it's a smaller change because of the risk changes in emissions.

MR. FIDLER:

Are there other questions, comments? Before we move on, Ray, if you'd like, do you have slides to present?

MR. CHALMERS:

Sure.

MR. FIDLER:

If you'd like to prepare your presentation, maybe we can take one or two questions yet while you're doing that. Who had, Doug?

MR. BIDEN:

Doug Biden, Generation Association. Dr. Levin,

you had talked a little bit about high deposition rates in South Florida and a lot of folks have talked about the, you know, the deposition in the Everglades study and whether or not the, you know, whether or not the study that was done there proves or doesn't prove the contribution of local sources to hot spots and, you know, the contribution of local sources, the local deposition rates. Has any of the EPRI research shed any light on that issue or the resolution of it?

DR. LEVIN:

I, I worked on the Florida study.

MR. BIDEN:

Well, can you share some of that with us because it's been discussed quite a bit in this State.

DR. LEVIN:

It's kind of hard to do it in a few moments. But, Florida instituted an incinerator (inaudible) back in the late '80's. More recently fish measurements done there seem to show lower mercury levels in the Everglades than they'd gotten from earlier samples that were done. What's missing, what we don't have data on, is deposition because the mercury deposition

network wasn't begun until '95 and didn't really get under steam until '98. So we had this gap of about 10 years between the change in emissions and when we started getting deposition data. So we don't have data on deposition during the time that emissions changed. And so we don't know what the input to the fish was in the Everglades. The data on the fish from different sub-watersheds, not just in the Everglades but in the surrounding waterways as well, is mixed. Some, looking back at samples taken over the years in these different waterway, and you always have to look at the same fish species at the same age of those fish in order to compare them because all the fish will accumulate mercury more as they get older. When you do that comparison some of the watersheds show an increase in fish mercury over time. Some show no change statistically and some show a decrease. And the conclusion by the State of Florida was that the ones that show the decrease are the most downwind, the most directly downwind, from those incinerators that cut the emissions. But there are a lot of leaps in there and the main leap is that nobody knows what the deposition was during the time those changes

broke. And our, our conclusion was that there's not statistical proof that there was a drop in the fish mercury. But Tom Mackison (phonetic), State of Florida, has concluded differently.

MR. FIDLER:

Is there one more question quickly?

MR. BRISINI:

Vince Brisini, Reliant Energy. I just got confused. The question I asked relative to linear extrapolation and methylated mercury, you said there was not a linear function, but then in a response you said, "Well, if you reduce 50% of the deposition the fish are going to ultimately have 50% less methyl mercury."

DR. LEVIN:

If that's the only way mercury is getting into those fish. Some of that mercury gets methylated, some fraction, and we're assuming that there's no sulfate limit, that there's always going to be enough sulfate around for the bacteria to be working. So the methylation rate should stay the same. So it will be acting on smaller and smaller amount of mercury over time.

MR. BRISINI:

So then my question relative to…

DR. LEVIN:
I thought your question dealt with is the deposition linear?
MR. BRISINI:
No, it dealt with the uptake.
DR. LEVIN:
The uptake, the uptake is linear.
MR. BRISINI:
Okay. That's…
DR. LEVIN:
It's not one to one because we have to consider the buffering action of the sediments in each lake. Some of the lakes, the sediments may contain a lot of mercury that will go up into the waterway as the waterway mercury drops from deposition changes. And that's a major research question, is how much, how fast that happens. So it's linear, but it's not one to one, it's kind of at a sub-linear slope.
MR. BRISINI:
Okay, but over time it, it gets to the, that you could assume that…
DR. LEVIN:
Well, a relative basis eventually you should have an equilibrium, if the deposition drops no

further the fish should eventually reach that drop in…

MR. BRISINI:

So assuming no other, no change in any other variable…

DR. LEVIN:

Right, exactly, right.

MR. FIDLER:

Dr. Levin, thank you very much. Very useful presentation.

Next we have Ray Chalmers with EPA Region III. Ray, you've got the challenging, you've got the challenge facing you of making a presentation with lunch on the table, but please state your position with Region III and we're looking forward to your presentation.

MR. CHALMERS:

I'm in the Air and Toxics Group with EPA Region III dealing with the Mercury Rule among other things. It's a pleasure to be here to talk about the Mercury Rule. Okay, the Clear Air Mercury Rule is the first Rule adopted in the United States and the first Rule adopted by any country in the world to control mercury emissions from power plants. The Rule will bring about significant reductions in emissions. It's

estimated up to a 69% reduction in emissions when it's fully implemented. It's modeled on our acid rain program, which has been very successful bringing about reductions of about 40% in emissions of sulfur since the 1990 Clean Air Act. We consider it the most cost effective way of bringing about reductions. And also, and of key importance I guess to this meeting, there's a lot of flexibility in this Rule. States can regulate beyond this if they think that that is necessary. They can also change how allocations are given to sources under this Rule. So we hope that you'll seriously consider the existing Rule, which Pennsylvania has adopted by reference. And consider using this Rule. If you believe that there are some other problems that need to be addressed, you might very well find that you have the flexibility to address them under this rule. So let's to on.

This Law, it just basically covers what we've already heard. There is a major mercury problem. The problem does not have to do with the actual air emissions and the breathing of those, but rather with the concentrations of mercury in fish that are eventually consumed. We

can see that it is a widespread problem. I think we've seen that previously. This shows fish advisories throughout the U.S. and we can see that there is a problem throughout the whole country, or most of the country.

We've also seen these slides before but it's important to note that while power plants are the most significant source in the U.S., there are other sources of considerable size as well as far as emissions.

This slide is very interesting. We've seen this, but as you know, U.S. emissions from utilities are just a small portion of the total of global emissions. And, as we've heard earlier, there is a long-range transport of the mercury that's emitted and we are being affected by these emissions elsewhere in the world. And these emissions are not being regulated at this point. So we hope to take the lead here, with this regulation, in setting an example and hopefully encouraging regulation elsewhere.

There are two basic aspects of this Rule. The first part is a NSPS standard. This applies to new sources and under the Rule those are considered sources built after January 30th, 2004.

For those sources there are specific limits that have been established based on the type of coal burn that those plants would have to meet. Those plants would also be covered under the second aspect of the Rule, which I'm going to talk about, which is the national cap. As you can see the main part of the Rule deals with capping emissions at 38 tons per year in 2010 and 15 tons in 2018 and afterwards. And that's where we get the approximately 69% reduction. Those overall national levels have been allocated to the various states and states now have a responsibility to develop a plan that will enable those levels to be met throughout their state. But states do have considerable flexibility in deciding how to accomplish that goal.

We see here the situation for the Mid-Atlantic States and you can see that Pennsylvania is a major source for mercury; it's about 10.4% of total U.S. mercury emissions. If you look at the cap level in 2010 you'll see it's 1.78 tons and reducing to .7 tons approximately in 2018. The interesting fact here is that you're getting substantial reductions in Pennsylvania. Why? Because most of the coal burned in Pennsylvania

is bituminous coal, most of the controls that will be in stalled under the CAIR program are particularly effective in controlling those emissions. So we're going to see very substantial emission reductions in Pennsylvania under the Federal Rule. You can see also, if you look at the 2010 cap, we're getting reductions of approximately 60% even by 2010. So we're getting faster reduction and deeper reductions than on the national average, here in Pennsylvania.

This map shows the 2001 situation with respect to deposition from power plants. You can see that Pennsylvania is an area with heavy deposition. And remember, this is just from power plants. We saw earlier, that if you look at total deposition, we, we have heavier deposition in other areas such as the South. But just looking at power plants, the Middle Atlantic States and westward do have a problem.

Let's look at the situation after implementation of CAIR and CAMR. You can see that the deposition from power plants themselves is substantially reduced.

Now we get into the regulatory requirements themselves. States are required under section

111(d) of the Act to submit a plan that is going to assure that they will meet the cap levels that have been specified. There is a model rule that EPA has developed, and under that model rule, trading is allowed. That trading would be a national trading program. That's considered the most cost effective way of bringing about these reductions. But states are not required to participate in that and states may choose to have a non-trading program themselves and to be more stringent. They can be more stringent both as part of the trading program and with their own program if they choose.

The state mercury budgets are binding on the states, but they can go below those levels. Under the program there are allowances given to individual sources. If they are part of the trading program, those allowances can be banked so that, they're not, it's intended to encourage early reductions in emissions. If those early reductions are achieved, those banked allowances might be used in the future thereby allowing a somewhat higher level of emissions for a few years into the future. But the overall cumulative level of emissions would not increase.

A few plants do not have power plants, a number of states, sorry, a number of states do not have power plants. A few of them in New England, and in our area, the District of Columbia, and so they do not have allowances under this Rule.

We define the sources that are subject as those that were 25 megawatts of production capacity. Also larger cogen sources are subject to the rule if they're supplying power to a electrical generating system. The requirements themselves will be incorporated into the Title V permits which sources have under the Clear Air Act.

If (inaudible) the mercury trading program EPA will implement a tracking system. Sources would report to EPA on their emissions and EPA will make certain that they have the sufficient allowances and will do the entire tracking process. EPA will also do program audits to make certain that sources are in fact meeting our requirements. There will be transfers, of course, of credits allowed since it is a trading program. That process can take place throughout the year. At the end of the year there's a reconciliation process for 60 days and, after

that point, if a source does not have sufficient allowances they would then be subject to enforcement action and penalties.

The benefits of adopting the model rule are consistency on a national basis and we're looking for consistency in the allowance management, the banking, emissions monitoring, and enforcement requirements. All of that is specified in the Rule so if a state chooses to join the program and to use those requirements, that's certainly what we're hoping for, and even if a state adopts its own rule, it might very well want to look at certain of the requirements in the federal rule. Particularly monitoring requirements for their use. If a state wants to join and use the model rule, they're only allowed to change the allocation methodology in the rule itself, which they can also be more stringent.

EPA is recommending that the allowances be distributed based on historic heat input to each unit and with adjustments for coal type. As I said, states have flexibility there as well. Initial allocations would be made to sources for the first five years of the program and afterwards every year the state will, we allocate

for another year, five years ahead. Under the model rule there is a new source set-aside which would allow new sources to be constructed and obtain allowances. We have suggested numbers in the rule. States have flexibility here.

The rule does allow banking with no restrictions as I mentioned. It encourages earlier or greater reductions in emissions and we certainly hope that that would occur. As I mentioned, the bank allowances could be used in the future.

The compliance and penalty provisions, the rule basically provides that if you do not have the sufficient number of allowances at the end of the year you would lose three times that number of allowances for your next year's allocation. You could also be subject to civil and criminal penalties.

With respect to monitoring, it's very important for this program of course. There's two types of monitors that can be used. You have CEMs, also sorbent traps. There's a provision for stack testing to be used for certain low-emitting sources as you can see. The monitors themselves are required to be certified and

collecting data by January 1, 2009. It's just an example of the CEM system providing continuous monitoring of the emissions. The sorbent trap collects the emissions over a longer period, perhaps a week, and these tubes are used to capture the mercury and then it's then sent to a lab for analysis. Both methods can be used.

Of course since it's a new rule there really was not a great demand for mercury monitors until this point. So a lot of research is going on, but mercury CEMs are being developed and demonstrated at this point. This just points out a number of programs. There is one source, it's WE Energy, it used to be, I understand, Wisconsin Energy, has installed CEMs and has them in operation. We have demonstration projects in North Carolina and in Kentucky and if those plants, basically a large number of CEMs have been set up and are operating, along with sorbent traps. Some are performing better than others, but certainly there are effective CEMs out there.

So, so summarize, the Clean Air Mercury Rule is expected to reduce emissions by 70% approximately from 48 tons per year to 38 tons per year in 2010, 15 tons per year in 2018, and

it will achieve those emission reductions cost effectively through the "cap and trade" program.

MR. FIDLER:

Thank you very much Ray. Any, any questions or comments on the federal rule?

MR. STAMOULIS:

Arthur Stamoulis, Clean Air Council. Do you have an estimate on when the full reductions would be achieved with the banking in there?

MR. CHALMERS:

Well, as we said earlier, we estimated approximately 2020. With that I'm just repeating what I said on the earlier slide. That's not official EPA rule.

MR. STAMOULIS:

I thought I had read something when it first came out that it might be after 2025. I can't remember if that was Mr. Homestead (phonetic) or Mr. Vianse (phonetic).

MR. CHALMERS:

Well, it's a guess really. I mean…

MR. STAMOULIS:

They're all guesses.

MR. CHALMERS:

Any other questions?

MR. BRISINI:

This is more of an observation relative to that, for someone to have bank allowances, they have to control early so while, you know, the 15 ton cap may be achieved at a later date, that is achieved because early reductions occur which is one the selling points of the cap and trade program whether you go back to the SO2 or the NOx. The whole idea is if you provide that provision, you provide an incentive to control earlier.

MR. TRISKO:

Below the level of the cap.

MR. BRISINI:

Below the level of the cap, yes.

UNIDENTIFIED:

Or you could just move the cap down when you're developing a regulation.

MR. STAMOULIS:

Well it's a fundamental difference. All I'm saying is, the point is you have a cap, the way you, the way you have that glide path is by early control.

MR. FIDLER:

Other questions?

Thank you very much.

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[Lunch Recess]

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MR. FIDLER:

My rational for starting a bit early after lunch is, we had set aside 45 minutes to have open discussion and workgroup perspectives. As I mentioned at the beginning of the meeting, I would like to go around the table and really get a sense from each of you as to what your primary issues of concern are and what you expectation is for this process. And if everybody takes two or three minutes, I think it's going to take longer than 45 minutes. So I'd rather dedicate time to that and shave a little bit of time from our lunch period. And I appreciate your patience in doing that.

Our next speaker is Bo Reiley. Bob is Counsel for our program. Where'd Doug get to? There he is, okay. Bo is legal counsel for the Air Program in the Commonwealth and Bo was asked to pull together information on what type of institutional arrangements are in place in other states for mercury emission control. Bo.

MR. REILEY:

Thanks you Tom. Good afternoon everyone. I'm going to talk about what other states are doing related to mercury control from coal-fired power plants.

In overview, there are actually 15 states that are doing something related to coal-fired power plants. There's final mercury action and then there's pending regulatory action and then there's also legislative action as well.

The first is Wisconsin. Wisconsin has a final rule. This rule was developed in the year 2000. The regulation has two phases. It has a 40% reduction by 2010, a 75% reduction by 2015, and an 80% goal by 2018. There are no specific emission rates or control requirements. Utilities can select the most effective approach. However, the legislature did modify this rule and has required Wisconsin to adopt CAMR requirements within 18 months after issuance and now Wisconsin is in the process of discussing issues like public participation and the implication of CAMR before it revises its rule.

Connecticut has an enacted legislation. By July 1st, 2008, utilities have to comply with an emission factor, which is equal to or greater

than .6 pounds of mercury per trillion BTUs or an emission rate of 90% reduction. Also by July 1st, 2012, Connecticut is required to review its mercury limits and it authorizes the state to adopt more stringent limits after that.

New Jersey, New Jersey has a rule. By December 15, 2007, they have to, facilities cannot exceed 3 milligrams of mercury or maintain a control efficiency of 90%. Also, if a company controls at least 50% of the megawatt capacity and then controls NOx, SOx and PM levels it can enter into a consent decree with the state to control the remaining 50% by December 15, 2012. And also New Jersey is thinking about extending these regulatory deadlines.

Massachusetts has a rule. By January 2008 or 15 months after the first phase of, phase I of CAIR, they have to capture at least 85% of the mercury or have an emission limit of .005, .0075 pounds of mercury per gigawatt hour. There's also averaging, which is allowed. It has to be within the same facility by October 1st, 2012. They have to capture 95% of the mercury or emit no more than .0025 pounds of mercury per gigawatt hour.

Indiana has a regulatory process. This regulatory process, it's not a regulation per se, what this is is that they have some notices in their bulletin to discuss what they're going to be doing. In June of 2004 there was a mercury rulemaking petition that was filed. There was a utility rule workgroup that was assembled. Then in June of 2005 Indiana published its first notice of comment period. The workgroup identified three alternatives. The first one is to adopt CAMR, second one is to adopt a modified version of CAMR, and then the third one is 90% control which has no cap and trade, and a 2008 compliance date.

Virginia, by July 11, 2005, the Virginia DEQ, Department of Environmental Quality, issued a notice of intended regulatory action for CAMR. There were seven regulatory program alternatives. The first one is to include all of the CAMR elements. The second is to include all the CAMR elements and source specific emission rates. The third one is no CAMR trading, but meet the CAMR's cap. The fourth one would be to include all the CAMR elements, but make compliance dates more restrictive. The next is to include all the CAMR

elements for coal-fired units, but also regulate non-coal-fired units to meet Virginia's environmental needs. The sixth one, in lieu of regulating coal-fired units, regulate all non-coal-fired units to keep within the cap and trade, and not require any CAMR requirements. Then the last one is to take no action at all.

North Carolina. North Carolina's air quality committee for the Department of Environment and Natural Resources is meeting to discuss mercury regulatory options that are more restrictive than CAMR. Such an option needs to be finalized before North Carolina legislature reconvenes, which is in May of 2006.

Michigan has a proposed rule. In 2003 the Michigan mercury electric utility workgroup was formed. As of June 2005, Michigan plans to adopt the CAMR 2010 cap. However, the Michigan Department of Environmental Quality is considering two options for the second cap. The first one is require a 90% reduction by 2013 or require greater unspecified reduction than EPA has by 2018.

STAPP-ALAPCO has a model rule that they are developing for coal-fired units. Owners and

operators of units would be required to install state-of-the-art control technology. However, owners and operators of existing units, which have a number of compliance options. STAPP-ALAPCO is going to be releasing this model rule at the end of October.

Now, moving on to legislation. Ohio has some pending legislation for coal-fired units. This bill was introduced in the 2005/2006 legislative session. Meaning of the bill is to have coal-fired units achieve a 90% mercury reduction or a .6 pound per trillion BTU emission rate by December of 2007.

New Hampshire, in legislation and pending legislation. There's already existing legislation in New Hampshire that requires coal-fired units to reduce emissions of NOx, SOx, CO2, and mercury. There's a pending bill which will require 60% reduction in mercury emissions by July 1st, 2009, and an 89% mercury emission reduction by 2013.

Minnesota also has pending legislation. It was introduced at this legislative session. By July 1st, 2010, existing units have to install BACT, Best Available Control Technology, if

installation is economically feasible. If installation is not economically feasible then they have to upgrade their facility to meet the CAMR NSPS limits. And then facilities also have the option to fuel switch the natural gas to meet the CAMR NSPS compliance but I don't think that's something we would want to consider in Pennsylvania.

And then moving on to Illinois, this was introduced in the 2005 legislative session. This bill would require coal-fired units to reduce mercury by 90% or meet an emission rate of .6 pounds per trillion BTUs whichever is going to be more achievable. And off course, compliance has to be achieved by July 1st, 2008.

New York also has pending legislation that was introduced this legislative session. By January 1st, 2012, no coal-fired unit can emit more mercury than the cap which is determined under the Act. This also applies for municipal waste incinerators. There is a section that requires the commissioner of the DEC, the Department of Environmental Conservation, to take into account to determine what the mercury cap is going to be. So that is in the Act, but it was a

fairly lengthy section and if folks want that I can provide that to them at a later date.

Montana has pending legislation, which was introduced this legislative session. Existing coal-fired or biomass power plants have to reduce uncontrolled mercury emissions by a minimum of 80%. Compliance is required by January 1st, 2010, however, this Bill has not moved out of committee and if you go to the legislative website, it says Bill almost certainly dead. So I don't know if that's a legislative term of art or not, but anyway, I mean, it doesn't look like that Bill is going to be going anywhere.

Maryland's legislative effort, they did introduce a Bill in 2005. The Bill proposed to set emission limits for coal-fired power plants for NOx, SO2, CO2, and mercury. This had passed the senate but it was defeated in the house.

Now besides those two there are a number of other pending legislation or legislation that had been introduced in previous legislative sessions maybe as early as 2002 and 2003 for states like Hawaii, the one I discussed before Minnesota. Minnesota had been introduced in 2003 already. So, so for, at least for some of these states,

it's kind of been an ongoing effort to get legislation passed to control mercury. All of the other, like Ohio, and some of the other states that I had mentioned, those Bills are still ongoing. They're still in committee. I think that they're still live Bills, so I think that there is still a chance that something will happen regarding those states. Also New Jersey and the Massachusetts rules were developed independent of any particular legislation from their state legislatures.

So, the conclusion is there are a number of states that have moved beyond CAMR and there are a number of states that are considering to move beyond CAMR. And that's it. If you need additional information you can contact me. That's my phone number. Or my email address. We do have an internal white paper that we put together that kind of outlines all of these legislative and regulatory efforts. We could polish that up a bit and then give it to folks. Plus we can attach any of the legislation or any of the regulations. So if folks would like us to do that, we can do that. That's it.

MR. FIDLER:

Thank you very much Bo. Any, any questions or comments on the review of other state initiatives? Gene.

MR. BARR:

Yes Tom thanks. Gene Barr, Pennsylvania Chamber. Bo it looks like from looking through here there are four states that at this point looks like have, at least looking at this, have gone beyond CAMR?

MR. REILEY:

Yes.

MR. BARR:

Okay. The others are simply looking at it as investigating options, shall we say, in a regulatory process?

MR. REILEY:

Yes. Like Indiana, Virginia. It's interesting to note though that the Virginia attorney general has issued an opinion that says that the trading of mercury is illegal under Virginia law and that the only trading that's allowed under Virginia law is for criteria points. So I think that that's one of the reasons why Virginia is going down, probably will be going down a different path.

MR. BARR:

The other states you mentioned in terms of them simply had bill introductions, in or one or two cases they may have passed one house.

MR. REILEY:

Yes, that's true.

MR. BURKE:

Frank Burke with Consolidated Energy. I think it's really helpful to have this kind of synopsis put together. The one thing I'd like to ask is when you put together your white paper on this, make it clear whether the numbers that are shown as reductions are reductions versus emissions or some emission baseline, and if so, what the emission baseline is for removal rates from otherwise uncontrolled emissions. I think those numbers tend to get confused sometimes and its really important to make a distinction between the two.

MR. REILEY:

Right, sure, we can do that.

MR. FIDLER:

The timetable for much of that activity, you mentioned some of it is fairly recent, it's ongoing right now. Is there any, was there much

of that occurring pre-CAMR?

MR. REILEY:

Well in fact, yes Tom. Some of it was. There were some states like I had mentioned Hawaii, Minnesota, had developed some legislation, and I think even Ohio had some legislation prior to the finalization of CAMR. But, of course, those didn't go very, it didn't go very far in the legislative process and they probably died in committee. And so, you know, they were reintroduced in the next legislative session.

MS. PARKS:

This is Nancy Parks from Sierra Club. Just quickly, I'd like to see the caps and the states that they're associated with and anything that you have.

MR. REILEY:

For?

MS. PARKS:

Any kind of caps or…

MR. REILEY:

For the CAMR caps?

MS. PARKS:

Or cap proposals. State proposals.

MR. REILEY:

Okay. If we can do it, I mean, with the New York legislation the commissioner of the DEC has to determine what those caps are going to be. So those caps are, my guess is that those caps are going to be lower that what their allocation is under CAMR, but the commissioner has to develop, has to say exactly what those caps are going to be.

MS. PARKS:

Right.

MR. REILEY:

So those caps aren't going to be available, but perhaps with some of the other legislation, you know, the caps may be available. We'll provide that to you.

MS. PARKS:

Thank you.

MR. FIDLER:

Could you just briefly summarize the litigation that's pending between Pennsylvania and some other states on the Clean Air Mercury Rule.

MR. REILEY:

Well Pennsylvania has filed two petitions for review. The first one is challenging EPA's decision to de-list the coal-fire power plants

under section 112(c). So we have filed. We think that how EPA went about removing these units from the list under section 112 is contrary to the Clean Air Act and so we've challenged that. And then the second petition for review that we filed is challenging the Clean Air Mercury Rule. And we're challenging the Clean Air Mercury Rule on two fronts. First, we think that the cap and trade program is illegal, that the only way that you can regulate mercury, or any HAP for that matter, is under section 112 through a max standard. And the second area that we are challenging EPA on relates to the NSPS emissions standards themselves. We think that those standards are not as, not as stringent as they should be. So those are the two petitions for review that, that we filed. Also we did file two petitions for reconsideration with EPA. The first one related to EPA's decision to de-list these coal-fired power plants and then the second one related to, to CAMR itself and it's my understanding that the petition for review, or the petition for reconsideration, EPA's answer to that is with OMB right now so I think that we'll probably be getting the decision from EPA

shortly. So I would think within the next couple of weeks. And I think it will take a little bit longer for the second petition for reconsideration. And then as it relates to the litigation itself, we still have a number of, a number of motions that are still outstanding, so we're still waiting for the Court to answer those motions.

MR. FIDLER:

Any other questions for Bo? And I believe all of our speakers are still here. Did anyone have a question for any of the speakers that made presentations today that you did not have an opportunity to, to ask? Anyone in the audience? Oh, I'm sorry.

MR. CLEMMER:

Reid Clemmer with PPL. This is a question for you Ray. If Pennsylvania were to move forward, or for that matter any other state, but since we're here around Pennsylvania's table right now, what would be the criteria by which a state, EPA would approve a state SIP if it does not follow the model rule? Because, the question really comes to EPA has made a proposal that there's about equivalent of about an 86% reduction

required from 1999 data. So what would be the criteria which EPA would evaluate an acceptable SIP for Pennsylvania?

MR. CHALMERS:

Well again, we'd certainly hope that the state would adopt the model rule with whatever changes that are consistent with participating in the trading program, that it might think would assist in addressing any of its particular concerns. But if the state chose not to do so, we would look at whether or not the state's submittal ensures that the cap levels are attained and that would of course involve looking at first of all, that they specified adequate limits for the individual sources, whether those be caps or emission rates. That they have good monitoring, adequate record keeping, etc., as with any other rule.

MR. FIDLER:

Any other questions? Anyone in the audience?

MS. EPPS:

This is Joyce Epps. I'd like to clarify that we're not required to submit a SIP under section 110 of the Clean Air Act. It's a state plan that's to be submitted under section 111(d).

MR. FIDLER:

Okay, what I would like to do is move into open session at this point and maybe, at the very least what I'd like to accomplish by the end of the first meeting is to have each of you just state what your expectation is for this process and what your, what your primary issues of concern are. It helps us to understand where we may need to provide additional focus by way of presentations, by way of information, that sort of thing. And it helps us also understand where you and your organization may be coming from on this issue.

Let me just ask, are there invited folks that have not been able to find a place at the table? Is everyone, okay. Let's just move around the table then. Doug would you please start?

MR. BIDEN:

Sure, I don't think it will come as any surprise to folks that as Mr. Chalmers suggested EPGA would like to see Pennsylvania follow the federal rule. And I won't go through all the reasons for that. We sent our letter to the Environmental Quality Board and went through all the reasons

for that. One of the reasons that we're here today and one of the reasons given for, for us going forward with the Pennsylvania rule was to protect Pennsylvania coal related jobs. And we've kind of been scratching our heads about that and trying to figure out how a Pennsylvania rule that can be no less stringent than a federal rule could possibly achieve that. And the only thing that we could come up with is if electric generators in this state could in fact participate in the federal cap and trade pool. Much has been made of the disparate treatment between western coal and eastern bituminous coal. And in fact Pennsylvania does have the steepest emission reduction requirement under the Clean Air Mercury Rule. As such we have the highest marginal cost of control of any state in the nation. So Pennsylvania needs access to that, to those trading provisions more than any other state. Conversely, Pennsylvania stands to lose more by not participating in that federal cap and trade program.

Now Pennsylvania has taken the position that that federal cap and trade program is illegal. That's highly problematic for us from an economic

and from a competitive perspective. So if we can't participate in the federal program, if we can't adopt the federal program, we would like to see the Pennsylvania program be as close to the federal program as it can possibly be.

We understand at least one of the reasons why folks don't want to see us participate in the cap and trade program is a concern about hot spots. That some power plants will not control. They will merely buy emission allowances. With an 86, faced with an 86% reduction requirement, that equates, that's an 86% reduction requirement from 1999 levels. That equates, according to our friends in the coal industry, to a 95% reduction from the mercury content in the coal itself. That is an extremely stringent rule for Pennsylvania. We have no technology today to achieve that. So if we cannot participate in the cap and trade program, if we can't in fact control early and bank emission allowances, we don't know how we're going to meet the federal program now, unless we have the time that the federal program afford us to develop new technologies to meet that.

So if we're going to deviate from the

federal program, our hope is that we don't deviate too much. So that would be my, in a nutshell.

MR. FIDLER:

Thank you very much. David.

MR. SPOTTS:

Dave Spotts, Pennsylvania Fish and Boat Commission. For those of you who don't know, my agency has the trusteeship over fish, reptiles, and amphibians. We also regulate fishing and boating opportunities in the State of Pennsylvania.

I was part of a mercury study back in 1992. I joined forces with Fish and Wildlife Service and we tested 12 lakes in Pennsylvania to see if we had mercury in fish. We looked at lakes that were slightly acidic (inaudible) that have sport fish. And we did find mercury in all the fish we tested. Lake Wallenpaupack had walleyes that had mercury over one part million wet weight; one of our fish advisory consumption. And since then DEP has tested fish in their network of stations and, I guess it's a joint task force between DEP, Fish and Boat Commission, and Department of Health, I was in charge of putting advisories on.

If you get a summary book, if you buy a fishing license and get a summary book, you'll see the fish advisory list. There's about 75 waters that have fish consumption advisories with mercury on it. It's our hope that this group reduces that list over time.

MR. FIDLER:

Okay, thank you. John.

MR. SALES:

I'm John Sales from Lehigh University Energy Research Center. For you that may not be familiar with us, we've been in business for about 30 years now, over 30 years working with the coal-fired industry in Pennsylvania and outside of Pennsylvania looking at reducing emissions and improving plant efficiency.

In the mercury area, we're mostly at this point in time, involved with the laboratory and field testing of control technologies and measurement technologies for mercury. We're involved with chemical kinetic modeling, we have a pilot scale test facility where we're looking at servants, the effect of catalysts on mercury, on the speciation of mercury, and we're also involved in full scale testing of the effect of

boiler operations on the fate of mercury, speciation of mercury in the boilers, and we're testing alternate mercury sims that could be used for (inaudible) on the sims. So we're basically looking at technology, looking at what kind of technologies would be applied at different levels. We've worked on plants that will need to comply with different state regulations and we believe that, as Doug has pointed out, that the technologies that are out there, the measurements are out there, the federal rules seem like a reasonable thing to work from, from a technology standpoint.

MR. FIDLER:

Thank you. Cynthia.

MS. GOODMAN:

Cynthia Goodman from the Pennsylvania Department of Health and I'm a public health physician and I've actually worked with a toxicologist who puts out the fish advisories, Dr. Seborasha (phonetic). And the Department of Health is mainly concerned with the human health exposure scenario for mercury and how it affects humans and things as we were talking about today. You heard about the pregnant women exposure and how

that can affect fetuses and the young children growing up and all of these type issues. So that's mainly where my concern comes from.

MR. FIDLER:

Okay, thank you. Gene.

MR. TRISKO:

Thank you, Gene Trisko of the United Mines Workers. First, we appreciate the opportunity to participate here. The Mine Workers most direct concern obviously is the potential impact of a DEP mercury regulation on loss of jobs in Pennsylvania. This extends both to active UMWA members and also to the retiree community, which is very large in the Commonwealth. Anything that adversely affects working miners, and working miners, UMWA miners tend on average to be paid wages and benefits that are three times greater than the average workers in their community. So that one job lost for a union coal miner is the equivalent of the loss of three jobs elsewhere in the community. But anything that causes economic harm, or job loss, on active coal miners also has repercussions for retiree benefits, similar to the social security system.

But our concerns also extend beyond the

direct coal job impacts. I'm very pleased to be here today with Mike Welsh of the IBEW who will address the IBEW's concerns. We note, and noted in comments to the Department, that there are approximately 40 power plants in Pennsylvania whose generating capacity is smaller than 250 megawatts, which are more than 40 years old. I believe on average those plants are some 55 years of age. Those plants, if confronted with a combination of both an additional mercury reduction requirement on top of CAMR and the kinds of proposals for SO2 and NOx control that are under active consideration by the Ozone Transport Commission, of which Pennsylvania is a member state, we believe that the combination of that set of control requirements not only would result in the substantial loss of direct and indirect jobs at those older and smaller power plants in Pennsylvania, but it would also lead, I believe, inevitably to a large degree of fuel switching away from Pennsylvania coals at plants that survive that regulatory regime. And the reason I suggest that risk of fuel switching, and I'm not so much concerned today about coal to natural gas, but rather the precise same risk

that we confronted under the Title IV acid rain law, mainly switching to lower mercury coals. Pennsylvania is one of the largest emitters of mercury and has the highest percentage of reduction requirement under the EPA mercury rule because it has among the highest mercury content among eastern bituminous coals. And if utilities in the Commonwealth are confronted with restrictions on emission trading that prevent them from purchasing allowances sufficient to meet the EPA cap, they may find it advantageous, indeed necessary, necessary, to switch away from higher mercury Pennsylvania coals to lower mercury coals either produced in other eastern states which would be a direct detriment to mining in Pennsylvania, or potentially to western states. Western coals have not only lower SO2 and NOx per million BTUs, they also tend to have lower mercury. And the most recent evidence, and we are in agreement with DEP on this point, the most recent evidence indicates that western coals (inaudible) to removal of elemental mercury through technologies such as activated carbon injection. So we see fuel switch as a very substantial risk if DEP were to proceed along

these lines. That said, the Mine Workers have favored the trading provisions included in the Clean Air Mercury Rule in our comments to EPA.

We, like DEP, are litigating the specific allocation of allowances to different coal types. And we agree that the methods that EPA chose to allocate allowances among bituminous, sub-bituminous and lignite coals are not adequately supported by the rulemaking record and are arbitrary and capricious. And if we prevail, Pennsylvania would be awarded an additional allotment of allowances which could help reduce the risk we see of plant closures and job loss. But we recognize that within this process, given the uncertainties and the time schedule of litigation, that we need to set aside the legality of proceeding under section 111 as distinct from section 112 and set aside disagreements or agreements, as the case may be, on the allocation of allowances among coal types and come to grips with the practical question that has been addressed several times in this brief meeting this morning. That is, that there appears based on the evidence to be very little scientific evidence that would support a more

stringent DEP regulation than what has been proposed by EPA. We are not seeing, from the evidence presented today, a suggestion that a more stringent Pennsylvania State rule would lead to a, to a measurable, much less a statistically significant, reduction in risk to the relevant population, that being women of child-bearing age. And therefore we find it very unlikely that DEP would be able to justify, based upon the health benefits, or environmental benefits, associated with a more stringent rule, would be able to justify that rule based upon incremental health benefits. We would hope that DEP would pursue the kinds of modeling studies that are implicit in the presentations today that Mr. Brisini referred to as getting to the ultimate question, the ultimate issue before us - what are the benefits of going beyond the EPA rule? And that DEP should accept that burden of proof, the burden of demonstrating a public health benefit of going beyond the EPA rule in support of whatever proposal it comes up with.

Other than that, our position is that the DEP should support participation in the model rule as suggested by EPA in order to protect

adequate protection for UMWA members in the Commonwealth. Thank you.

MR. FIDLER:

Okay, thank you. Reid.

MR. CLEMMER:

I'm Reid Clemmer with PPL. And I just want to make certain at the start that I do understand the objective or mission of this working group. Because, as I understand it now, this group is not necessarily to come up with a report, but rather to come up with discussions and various recommendations for considerations by DEP in their deliberations and how to respond to the EQB directive of considering a rulemaking.

MR. FIDLER:

That's right.

MR. CLEMMER:

That being said, I think it's no surprise that PPL supports EPA's CAMR. We certainly recognize the need to address mercury. Mercury is an issue. And as such, it needs to be addressed. But it also needs to be recognized as to where it's coming from and how it deposits, emits, and ultimately gets into the food chain. We recognize mercury as a global and national issue.

And the best way to address it is through a national program on a cap and trade basis.

We're concerned that as, you know, we're open to listening to more information, more discussion, in terms of why is something better, or not that it's better necessarily, but something more restrictive required, and what's the value and benefit to Pennsylvania specifically by going ahead of what EPA's proposing as a national program. I haven't seen anything to date in the presentations that have been out there, although we've been asking for what is the value. And it comes back to incremental value of going beyond. If we're at 86% reduction statewide, what's the value of going 4% more, 5% more, 10% more? The modeling to date shows very limited incremental improvement when you zero out utility emissions for example. That zeroing out utility emissions on a national basis. I would support going forward and getting more data because if it's determined that Pennsylvania should go ahead on its own rulemaking that that determination be based on sound science, sound studies and determinations that a real improvement is going

to be recognized. So I think that's where we're coming from in this - that we need to take a look at everything that's out there. We need the time to look at what's required.

The CAMR, I'll note this as I move forward here for a moment, the CAMR goes in two phases as everybody knows. 2010, 2018. We believe, PPL has stepped up to the bar here to get ahead of the game with respect to what's required under the CAIR rule. We've made decisions, in fact we just got our first permit for Montour scrubbers that we're installing. We're hopeful that those scrubbers will be installed and operational by 2008. If that occurs, and when it, rather not if it occurs, but when it occurs we do expect co-benefits for mercury removal with that equipment that we have in place. We're not certain to what extent or what level we'll get mercury co-benefits, but we're hopeful that we'll be very close to the 2010 requirements. To meet the 2018 requirements, we're not certain what additional technologies will be required, but we're certain that additional measures will be required. And we don't know today what those will be. So the timing that's in EPA's CAMR rule allows that time

to develop technologies, commercially applicable technologies, to apply to those facilities in a cost effective manner. In the meantime, with a cap and trade rule in place, it allows compliance and conformance with the targets that are out there. I think that's where we are.

MR. FIDLER:

Okay thanks. Vince.

MR. BRISINI:

I'm Vince Brisini with Reliant Energy. Importantly I want to thank the Department for putting together this group. This is I think a very important group. It's well represented. I want to also thank the presenters today for what I thought were excellent presentations that gave me a lot of additional insight.

I think what's important, and we need to keep sight of the fact that what we're talking about here is the difference between two programs, two stringent programs. And while it's represented as a 70% reduction, I think it is very important to consider that's a 70% reduction from a 1990 baseline emissions. So the reductions that were achieved previously as co-benefits with low NOx burners and, and the loss

of ignition that was created by those acting as a low grade powder activated carbon further oxidation and SCRs as they're installed provide for a, actually a control that takes place by removal of electrostatic precipitators. That's not in the 70%. So it's going to be much more stringent than 70% reduction from the mercury in the coal.

As I look at this, my main concern is I think we have the potential for significant economic impact and disruption by implementation of a more stringent mercury rule than CAMR. And as Gene pointed out, Gene Trisko pointed out, it becomes exacerbated if you start looking at some of the proposals for much more stringent SO2 and somewhat more stringent nitrogen oxide.

But something that hasn't been mentioned, and it relates to the potential impact in Pennsylvania, is that the more difficult we make it to generate electricity, because of the expansion of the PJM Network to the west and to the south, what will happen is that you will not eliminate coal-fired generation, you will just move it outside of Pennsylvania The potential there is, and this is along the economic impacts,

it's not just the idea of the loss of jobs in electric generating facilities, it's also the loss of coal mining jobs, it's also the loss of transportation sector jobs, and it's also the loss of service sector jobs associated with those industries. And the ripple effect is pretty significant when you think about the amount of coal that we transport outside of Pennsylvania right now with those electric wires. It's a pretty big part of our economy. So I believe what we need to accomplish here, we need to really assess what those incremental benefits would be associated with the incremental differences in programs.

And, as far as expectation, my expectation is this is the spot where we gather those data, those information, and this is the spot where we not only gather it, but we disseminate it and we use that information in the formulation of a recommendation. And I guess personally I believe this is, this is an extremely critical decision that needs to be made relative to a very important aspect of the economy of Pennsylvania.

MR. FIDLER:

Roger.

MR. WESTMAN:

Roger Westman of the Allegheny County Health Department Air Quality Program. As a regulator in air quality my concern primarily is to get the best practical level of control necessary, especially when we're dealing with any air toxics. And that needs to take into consideration all the health impacts as well as the economic impacts and the technology available to do those things.

Also need to see that we have a rule that is able to be administered well. Many times we're faced with rules that cause more troubles in the administration than do in the actual level of control that they manage to get through it all. So we want a rule that would have some clarity, certainly certainty for, not only the agency and what it can expect out of the rule, but for those sources that are being regulated by it so they know what they're required to do, and one that has a reasonable level of administration with it and does not provide an unnecessary burden of administration in the rule.

We certainly have a concern over the cap and trade for any air toxics program or hazardous air

pollution program as well. So those are the three things that we're looking for - that's practical control, good regulation writing and administration, and the concern that you not go with the cap and trade program for an air toxic. Thank you.

MR. CANNON:

David Cannon, Allegheny Energy. One of the advantages of being the fourth utility person is that I can say everything that hasn't already been repeat it in the interest of time. But basically, again, to emphasize what has been said about the fact that you're looking at two fairly compelling federal programs under both CAIR and CAMR, both of which will have dramatic reductions of mercury. And whether there in fact is the data, the scientific data, the toxicological data, the technical ability to go after that any incremental improvement and I think it's a critical and an excellent idea to put this group together. There's a lot of experience from all sides of the room and a lot of good, intellectual powerhouse around the table that can comment on this. But I think that what it comes down to is really is there in fact the technical and

scientific justification for the kind of incremental moves that we're seeing here. And I think that this is just the right forum for that and I think that, as I said and as the other people have said, I don't see that yet. I've not seen any information, based on what I've seen, what I've read, what I've researched, and what's been presented today, that would justify moving beyond what are fairly aggressive federal programs right now.

MR. FIDLER:

Nancy.

MS. PARKS:

I am Nancy Parks, the Sierra Club's Clean Air chair. And Tom and Joyce, I wanted to thank you again for this opportunity for us all to discuss these very important issue to us.

Certainly the goal of the Sierra Club is that we achieve a final regulation that will protect the public health of our 28,000 plus members here in Pennsylvania. We believe that this regulation should be Pennsylvania specific. The fact is that the EPA CAMR rule is too weak and it takes too long to get where it's going to go. The mercury pollutant itself is far too

dangerous to ever be involved in a trading program. It's dangerous both in tiny concentrations and in tiny quantities. It affects not just fetuses and pregnant women, but children, and those effects include learning disabilities. Something we've certainly seen that's become awfully prevalent in our society. We believe that all sources should be required to reduce throughout the state. We believe that there should be a statewide cap without trading. From experience, and I've spent about 14-1/2 years with the Air Quality Technical Advisory Committee, we have seen that, that interim requirements have been highly successful in reducing pollutants nationally under the Clean Air Act and I would certainly like to see, the Sierra Club would like to see, programs that would include components such as step-down caps and or rate reductions and the phasing in of those reductions over time so that we know our sources can make these final reductions by the goals and the times that they're supposed to make them.

We believe that these reductions should be made sooner rather than later. And we

essentially believe that the major consideration the DEP has to have here should be how to protect the health of all Pennsylvanians. Thank you.

MR. FIDLER:

Next.

MR. WELSH:

Mike Welsh, the IBEW. I'd like to thank Gene, he helped me out there a good bit with his speech. We have concern in the IBEW because our members work in these stations so we have a great concern in what happens here.

We feel at the IBEW as a whole, we feel that the EPA rule does go far enough. We feel that it's ample to work with. We do support the cap and trade program. Like Gene pointed out, we have several older units in the State of Pennsylvania that we feel that if that's not in place, we have the potential to lose those stations which in turn we lose a lot of jobs. We also have to question to what type of, you know, improvement are we going to go if we get, increment further? What can we actually obtain from that? If we take it up steps, part of that equation if we do look at it if we're going to go incrementally past those rules, what does that

equate to in the jobs that could be lost? Gene went into a lot more detail, there's no use going to repeat that, but we do have great concern of what that does mean to us and our members. He pointed out that the jobs the UMWA has and what we have in the IBEW are jobs that do pay more than just an average job. We have good paying jobs at these stations. We have concerns for our members too, safety in these stations. We work around what comes out of those stations on a daily basis. So we do have concern for our membership to about, you know, what effects this does have on them. But we feel that these rules that the EPA has, they do go far enough. Thank you.

MR. FIDLER:

Thank you.

MS. CONNER:

Gail Conner. Member of the CAC, actually recently appointed by Governor Rendell. Basically my goal is, as it always is, is to seek balance. A substantive debate so that regardless of what the result is, all the parties have had adequate discussions so whatever you walk out with, you feel as though maybe you didn't win

exactly what you wanted, but you didn't jump over things or get a biased analysis. So, you may notice, that regardless since I come from the University of Wisconsin and the Department of Natural Resources in Wisconsin, and worked for the Department of Air Pollution that did the acid rain legislation, but am a private consultant and an attorney and a biologist, I've had both sides. So my approach is a multiple one. I like to find, usually the real answer is somewhere in the middle and I like to kind of find a way to discuss that real answer regardless of what the outcome is. So you really don't, when I ask a question one way or the other, keep it in mind if I say something or hear something that the presentation seems to be shifting one way or the other, I just want to refocus to show that there may be another approach. And that, that tends to be my approach to dealing with groups.

On the other hand, I represent the citizens which includes those who don't have the resources to be here, who will be impacted, and those workers who provide for those that will be impacted, and the businesses like myself who will be impacted. So "citizens" to me is broader,

it's all of us. So, that's who I am and that's how I approach these types of relationships and interactions. So I'm looking forward to the process. Thank you.

MR. GRAYBILL:

I'm Lowell Graybill with the Pennsylvania Federation of Sportsmen's Clubs as I had introduced myself earlier this morning. And I wanted to take an opportunity first of all just to give you a little bit of a concept of why we are at the table as we've been asked to respond. Some of you may not entirely understand why a group of sportsmen in Pennsylvania would be interested in the topic that we're talking about now. I'm here to let you know the Federation of Sportsmen's Clubs is representative of the largest single organized group of sportsmen in the state and it was formed a little over 75, between 75 and 80 years ago, based on some water quality issues here in this state. And it had some pretty significant impact at that time on some rulings. Over various seasons in the organization's life, there's been changes in the intensities with which we've observed and also had influence or taken the opportunity to have

influence on various environmentally related issues. And this happens to be one that kind of hit our radar screen and we said this is something we need to pay attention to. Why? Because we're consumers in many ways of various aspects of what we've been talking about here. We're a consumer to a larger degree in our group than maybe in the larger study group when Dr. Levin was talking about the amount of fish consumed from fresh water sources. We're also a consumer of many other wildlife resources out there as well as the continuing involvement in the out of doors that exposes the variety of different environmental impacts. We're also a consumer of some of the jobs that are relative to the extraction and use of the, of the coal resource in the state. Meaning we do have a number of our own membership that are employees in those fields and in various aspects of those businesses. So, within our own ranks, it certainly, you would see quite a variation of interests, levels of interest in this topic, and various sentiments as well.

From our standpoint, when we look at the resources that we rely on, the resources that we

enjoy as sportsmen and conservationists, outdoor enthusiasts, there's a fair amount of concern that we've got for a longer term picture than just the short-term costs. And I guess I've got to say, as an organization we're a bit concerned that decisions might, might end up being made more on the relative cost than the relative benefit. In particular when we're looking at short-term as well as long-term benefit. We didn't hear much discussion, if any today, on residual or accumulated effects of mercury or levels of mercury in items other than just fish tissue and yet we know that in many other respects with the deposition issues of mercury, as well as many other environmental compounds, there's a lot of other places that mercury as well as these other compounds are going to show up. And we're a bit concerned that mercury has a much bigger impact in a long run than what we see in the short term as measured by deposition through precipitation. We are concerned about where this is all going. We want to see that an equitable solution is worked out for not only the employees and the employment, the retirees and others who are impacted by that, but that we not

sacrifice long-term environmental benefit to those shorter term costs. There's got to be some kind of balance in there somewhere. Thank you.

MR. BARR:

I'm Gene Barr, Pennsylvania Chamber of Business and Industry. We represent folks that both produce energy as well as consumers, industrial, commercial, and business consumers.

One of the things that I hoped to get out of today, which I think was pretty successful thanks to the presentations that were made, is a better understanding of the magnitude of the issue we're dealing with, the magnitude of the problem, where improvements have been made, where improvements need to go. I think today's were extremely helpful, at least to me, in seeing where we're headed with some of those and what else needs to be done.

Of course our concern is for energy costs. We've heard a little bit about that already, quite a bit already from some of our other members and other folks associated with that, and clearly there is a balancing that needs to be done between environmental as well as cost issues. A couple things that have occurred to me

in talking, in thinking a little bit about where we need to be headed with this and where the Department ought to go, has been a longstanding, or at least 10 year, executive order which says the Department shall issue regulations that are no more stringent unless there's a compelling Pennsylvania reason. I think one of the things that we're sitting here today debating is whether or not there is a compelling Pennsylvania reason why we need to be more stringent than what the federal government has laid out as a model and as a direction. And obviously that's one of the things that we need to talk about. However, as a layperson, what's interesting to me is seeing what some of the other documentation is. We've heard a little bit about the CDC information today and I was looking at a lot of the CDC information and I find it interesting. I brought some that talked about their most recent study released, this is from July, looking at mercury levels in blood. They did a pretty comprehensive survey of people across the U.S. and actually measured contaminants and so forth in the blood. And they said, they made reference to he 58 micrograms level. And what they found is that,

"No women in the survey had mercury levels that approached this concentration of 58." Yes there were 5. (inaudible) levels within a factor of 10 of what has been defined as the health threshold effect. With an 86% Pennsylvania reduction, to me that seems like we're making the right direction to address these health concerns here. But I think it's important to note we've made significant improvements over what has been in previous years, we will continue to make these improvements and I think it's important today, going forward, for us to understand what kind, this has already been mentioned, what kind of incremental benefit do you get out of a state specific rule. The bottom line is that, to be honest, our concern is that implementing a more stringent standard with significantly higher costs, with little if any discernible at this point health benefit, is a real negative for Pennsylvania. It's already been pointed out the negative impact on jobs. What it means is it's fewer dollars that our businesses first can use to employ people, can use to give health care benefits, can use to do all the things that they do in the community and to drive Pennsylvania's

economy. We are in competition, the power producers are in competition in a deregulated environment, our members are in competition not only with other states but with other countries, and obviously when you look at cost you need to make sure that the cost that would be imposed under a state specific program bring some real health and environmental benefits. Thank you.

DR. LYNCH:

I see my role in this as one of a resource to all of you around the table. In my scientific role I will endeavor to provide the best quality data and to make, as I move through in my retirement years here, to make sure that whoever takes over will see that that continues as well. And I will work with DEP to point out where I think they need to make some adjustments or where they need to make some changes that might be beneficial to our understanding of this very complex problem.

MR. FIDLER:

I think I overlooked Dr. Davis.

DR. DAVIS:

I'm Don Davis. I'm a plant scientist at Penn State. I've been there for as long as Jim Lynch has but I have no intention of retiring for 10

years or so. I worked for the past 30 some years primarily on air pollution effects on forests, sulphur dioxide, ozone, and fluorides primarily. And I just got interested in mercury in the last few years. As far as mercury goes, I'm interested primarily in knowing where it is in the forest. Where it's being stored. Especially in forested watershed. And the development of bio-monitors where we can trace spatial and temporal patterns of mercury and (inaudible) over the years.

MS. JARRETT:

I'm Jan Jarrett with Penn Future and I'm part of the reason, I think, that we're all sitting around this table because Penn Future is the organization that decided to bring the petition for rulemaking. And we did that because we are convinced that there is a compelling public health problem out there with exposure of women of childbearing age to mercury contamination in Pennsylvania. Every one of our waterways has a blanket advisory to limit intake of fish, limit our eating of fish. Some of our waterways have even stricter advisories to really limit the intake of fish and so we've got a real documented

mercury problem out there and too many people exposed to contaminated fish.

We are also a huge source of the problem. As we saw in the presentation, Pennsylvania power plants emit the second highest amount of mercury in the entire nation. 10% of the nation's mercury from power plants is coming from Pennsylvania plants. So we've got, we've got, we're both victim of the problem and we are also a cause of the problem. We believe that it is reasonable to ask our utility sector to reduce mercury emissions by 90% in the interest of protecting human health and protecting our natural resources and protecting one of our biggest industries which is fishing, a recreational industry.

There have been reductions of mercury in the past. It clearly hasn't been enough because we still have a serious mercury problem out there. We are also convinced that a cap and trade program does leave many of our citizens exposed to hot spots. We did not see some of the studies that are also out there that document how reductions in local sources of power, or local sources of mercury, lead to significant

reductions locally in the concentration of mercury in fish tissues. And so I'm hoping that we're going to be able to see some of that information as we go on here.

We also believe that the way that the EPA has decided to go about regulating mercury is illegal. We agree with the DEP that that is the case. Mercury emissions from power plants are just as toxic as mercury emissions from any other source. And so we believe that it's inappropriate to de-list mercury power plants from the requirement to control mercury to the highest levels.

My expectation here is that there will be a lot of information presented that we can have a full and open discussion about all of these issues. I actually am appreciate of the opportunity that DEP has provided to have this kind of a dialogue and in the end I'm hoping that the result is that we will move ahead with a mercury rule that provides the protection to Pennsylvania's citizens and public health that we require in this state.

MR. WILLCOX:

Nathan Willcox with Penn Environment. For those

not familiar with Penn Environment, we are a statewide, nonprofit, environmental organization. And we have about 15,000 citizen members across the Commonwealth. I'm definitely pleased to be here and I would first applaud the state for choosing to go down this road of formulating a state level mercury rule. We think it's needed and I think it's worth putting in perspective. There's been a lot of talk about the CAMR rule.

The CAMR rule in essence is a rollback of the Clean Air Act. It is a weakening of the Clean Air Act. So the calls that we are making for 90% reductions or no trading of mercury pollution, we're not pulling those out of the sky. That was written into the Clean Air Act, a document that stood for 30 years and has been extremely effective in reducing air pollution nationwide. That is why we feel that Pennsylvania should go forward with 90% reductions if the federal government will not require those reductions.

I think it's also worth noting, building on comments that Nancy made earlier about figuring out regardless of what the mercury reduction may be for a state level rule versus a federal rule,

what is the impact on public health from that reduction? That's what we need to be determining, less about pounds of mercury and more about what does that mean for public health because that's really the key issue here, is protecting public health and that's what we should be aiming to do through this process.

I will also note there has been several mentions about the Florida study. It is worth tossing out a number that was found in that study. Reductions in mercury pollution from municipal solid waste incinerators resulted in an 80% decrease in mercury levels in fish in Florida. That's what that study found which is obviously a significant reduction in the mercury contamination.

The last thing that I'd mention, or I guess the next to last thing, is that technology is definitely out there to do this, to achieve these reductions. We have seen 90% reductions at plants using bituminous coal in other parts of the country, it can be done here.

And then the last thing that I would mention is that Penn Environment actually went door to door on this issue throughout the summer, talking

to citizens in communities from Philadelphia, to Erie, to Pittsburgh and everywhere in between, and talking to people about this issue, we collected over 10,000 public comments in support of a state level rule requiring 90% reductions from Pennsylvania's coal-fired power plants. So Pennsylvanians, from what we've determined, are supportive of moving forward on this and that's what we hope that this process will result in.

MR. WENDELGASS:

I'm Bob Wendelgass representing Clean Water Action. We're also a statewide environmental organization. Our efforts are focused most heavily in the Pittsburgh, Philadelphia, and the Allentown areas, but we work across the state. We have about 80,000 members across the state. I was actually just thinking that the first time that I remember talking about the mercury issue with someone in then DER was probably in the early '90s when we met with then Deputy Secretary Karen Gladfelty to talk about expanding fish testing so that we could have a broader accumulation of data on mercury levels in fish. There were a couple lakes in which we've seen spikes and high numbers, but there wasn't much

data available and we were encouraging the Department then DER to expand its testing. And I would say that our concern about mercury has only increased since that time. That as we've seen more and more data about the health impacts of mercury and costs associated for society with those health impacts that our concern for appropriate regulation of mercury has only increased. The most recent study I can think of is the one from Mt. Sinai Hospital that looked at the costs, societal costs, associated with treatment of children who are born mentally retarded because of mercury exposure. So there are certainly costs which our society bears due to the public health impacts of mercury exposure.

Similar to what Jan and Nathan have talked about, we believe that it is appropriate to go beyond CAMR, that we believe and return to, if you will, the provisions of the Clean Air Act which would have gotten us further faster. And so we support a state rule that gets us to a 90% reduction quicker than 2018. We believe it's important that that reduction be across the board, not just on new sources, but that existing sources also be required to achieve that level of

reduction.

We do not support of toxic chemicals in any scenario and in this case as well. We don't believe that it's appropriate to trade a toxic pollutant or a hazardous air pollutant like mercury and so we strongly urge the state to oppose any trading program for mercury.

One final comment. I think it's important that when we talk about costs for achieving this rule that we be realistic about those costs. I know I've seen a number of studies that have compared projected costs for implementation of various environmental statutes later to actual costs of implementing those statutes. And the costs have always been significantly less than what was originally projected. We believe it's important to heavily weigh, as other people have said before, the health of Pennsylvania's residents and the health of particularly women in Pennsylvania, and to achieve a rule which is protective of public health. We believe that rule is what was in the Clean Air Act before it was rolled back.

MR. STAMOULIS:

I'm Arthur Stamoulis with Clean Air Council.

We're a statewide environmental group and we are very interested in protecting public health by reducing needless exposure to toxic chemicals. We're hopeful that the rule that's generated out of this process will achieve the greatest reductions technologically feasible in mercury emissions from power plants and other sectors. And we're convinced that with state-of-the-art technology installed at all plants, 90% reductions or more are possible.

We are also concerned about hot spots and we feel the trading of toxins is wholly inappropriate. I was glad to hear that none of the speakers, at least thus far, have challenged the public health benefits of EPA's rule. While we obviously think that that rule does not go far enough in terms of the emission reductions, we really feel that full reductions are needed as quickly as possible. We're very concerned that under the federal rule, with banking you may get your reductions in 2018, I mean without banking you may get our reductions in 2018. With banking nobody seems to know - 2025, even later. There's a strong public health benefit to not waiting a generation to make these improvements in the

emissions. We'd like to see the greatest possible emission reduction as quickly as possible.

We'd like to thank DEP for moving forward with this process and for inviting us.

MR. FIDLER:

Thank you.

MR. BURKE:

My name is Frank Burke. I'm with Consol Energy over at, a coal mining company located in Pittsburgh. And I'm also here today on behalf of the Pennsylvania Coal Association. I've been with Consol for 30 years, in research and development that whole time, and so my perspective on this has at least partly been formed by the research that we and others have done around the mercury issue as early as 1982.

We support the CAMR rule including trading, at least in part because we believe the CAMR rule is a very stringent rule, particularly as implemented in Pennsylvania. It would require by 2010 average removal of mercury coal about 85% based upon the coal mix that was used in Pennsylvania's base period and over 90% in 2018. These are levels of removal that are going to

challenge even the best available technology and under the existing rule.

We also support trading for the reasons that were explained earlier. That there will be marginal cost compliance for some generators that are significantly higher. For those generators that can't achieve those levels through the application of even the best technology, the trading will provide them an opportunity to continue to produce electricity that's needed to maintain Pennsylvania's economy.

I think in terms of the things that this group can do to help inform this process, there are several. And one of them has been amply, I think, articulate here today, and that is to come to some kind of a clear understanding of what the benefits would be for implementing a Pennsylvania specific rule going beyond CAMR. Yet recognizing that CAMR is already a very stringent rule as applied in Pennsylvania. We believe it is incumbent upon DEP in the formulation of this rule to clearly articulate what those benefits would be of any incremental reductions.

Secondly, to get a clearer understanding, if possible even a consensus, on what the

availability is of technology for mercury control. There has been a substantial amount of discussion about this issue and I believe it is an issue that we can come to grips with as a group. It's objective, it's factual information, and I think it's something that this group could very well hope to address in comprehensive manner.

And third, I think to demonstrate that whatever Pennsylvania decides to do, that we understand fully the impact that that would have on both Pennsylvania coal producers and on coal using utilities. I think we need to understand the cost in terms of the actual compliance costs, but also potential costs in terms of employment and economic vitality that would result from a Pennsylvania rule. And again, I believe that is something, which this group could help to inform on that issue. Thank you.

MR. FIDLER:

Thank you. Pam.

MS. WITMER:

Hi, Pam Witmer, Pennsylvania Chemical Industry Council. Thank you first Tom and Joyce for inviting us and also thank you everybody who's

here sitting at the table. It's obviously a very diverse group of individuals we have coming at this from different perspectives.

The chemical industry is, takes public health and the environment very seriously. Our materials are essential to making products that improve public health and protect the environment on an everyday basis. However, having said that, we are large, industrial users of energy. And that, you know, one of the concerns that we have is about the price impact of energy if we were to go through with a state specific rule. Most of our companies operate you know in a number of different states and we don't see the need for Pennsylvania to go beyond what the federal rule is. We don't see yet the compelling reason to go beyond what is already included in the executive order 1995.

I would say however that I do support one comment made by the gentleman from Penn Environment that we do need to know what the public health impact is. And I think the only way we can do that is if the Department were to undertake a real cost benefit analysis of what the proposal is.

MR. FIDLER:

Thank you. Billie.

MS. RAMSEY:

I'm Billie Ramsey, ARIPPA, which is a trade association of 13 of the 14 waste coal plants in Pennsylvania. I'm going to assume for the purposes of my comments that Pennsylvania is going to move forward with the Pennsylvania rule. Depending on what that rule would provide we would decide at that time whether or not we would support it or oppose it. There are two issue specifically that we are very interested in. One is a very mundane, but very important issue, and that's the monetary issue. We would support an exemption from the sims (phonetic) requirement for low emitters and we think an annual stat test for emitters of nine pounds or less and a semi-annual stat test of emitters between nine and 29 pounds would be reasonable. If you talk to people that actually run power plants what, they pull out their hair, at least my (inaudible) do, over the constantly changing monitoring requirements, the time involved in changing the monitoring programs.

Second issue that we're interested in is a

rule that would provide for perhaps not favorable, but no less favorable treatment, for clean sources in Pennsylvania. The CAMR rule did not provide for equal treatment of all sources. In fact (inaudible) appealed the CAMR rule to the D.C. Circuit Court of Appeals. Specifically when EPA developed their rule, they took data that had been developed in 1999 under an information collection request that EPA had promulgated that required a set of different types of generators across the country to test their mercury emissions. Two of the waste coal plants in Pennsylvania were selected for that test. Both of them tested in excess of 99% removal of mercury. I believe one was 99.9% and 99.8% if I recall. When EPA developed the CAMR rule, they took those two data points and assumed that all waste coal plants could meet that 99.9% removal standard at all times. And that is not in fact the case. These units are very clean, but they don't always operate at that level of removal. That's the reason we appealed that rule. In conjunction, the CAMR rule in conjunction with the fact that waste coal plants generally did not receive allowances of SO2 under the CAIR rule

means I predict that our units are going to be struggling beginning in 2010 when these rules kick in. So the combination of EPA's CAIR and CAMR rule has placed the cleanest solid fuel burning sources in Pennsylvania in danger of going out of business so we've appealed both rules.

We're hoping that DEP will develop a rule that establishes an emission standard that applies equally to all sources and we will be able to meet it. And at that time we will decide whether or not we will support the rule or not. Thank you.

MR. FIDLER:

Thank you. Well, my expectation of gaining consensus through this process has been completely dashed. No, at the very beginning I indicated that we were just simply interested in getting a sense from everybody, because we do have a lot of variation in representation of where everyone is coming from.

I would like to talk about next steps, but first is there, is there anyone in the audience that would like to contribute something, or might have a question about any of the presentations

that were made?

Okay, there's been, there's been some good dialogue through the course of the meeting today. There's been some questions raised about availability and cost effectiveness of control technology. There's been some discussion about co-benefit made possible through installation of equipment already being planned and will be in place under CAIR. There's some suggestions that we may need to collect additional information. Just looking for some feedback from the group as to what, if any, types of presentations might further, might allow for further evolution of our discussion on this issue. Any thoughts or suggestions? I've already gotten a suggestion from Mr. Trisko that if in fact we can get a presenter from EPA to talk about the findings of the information that will be released soon on co-benefits expected under CAIR and what changes may be underway potentially with respect to CAMR because of those benefits. Anything else or any suggestions?

MR. CANNON:

I'm David Cannon of Allegheny Energy. A lot of discussion on a lot of people's parts about the

toxicology of this. And I think we talked a lot about technology modeling, deposition, and all. But I think it would be very helpful for this group to bring in somebody who might in fact bring a higher level of expertise than I have certainly through the (inaudible). But the specific toxicology and (inaudible) transport and risk assessments of the mercury risks that we're facing in Pennsylvania.

MS. PARKS:

Tom, I'd certainly like to see us make some suggestions on individuals that could speak to both effects in children, in particular, including the learning disabilities, but also benefits that are associated with, you know, reductions in health like hospitalizations and those kinds of issues.

MR. BRISINI:

I'd like to expand on that to have that person not just talk about the idea of the fish and mercury, but also, I mean, I really think we need to consider that relative to also potential health benefits to a diet of fish. I mean there are a lot of people I know that, there's a lot of, I know DelMonte has raised issues and other

manufacturers have raised issues relative to look at all the benefits you're missing out on over excluding fish from the diet because of the concerns people have now. So it needs to be something that is an overall view of what does it mean to consume fish.

MR. WESTMAN:

This is Roger Westman, Allegheny County. I think we should have some presentations on control technology. Just what is available now and what people project are the levels of control we could see.

MR. STAMOULIS:

This is a quick follow-up to that. It would be great if we could have someone from one of the companies that actually produces this technology to speak to that issue.

MR. BURKE:

I'd recommend, this is Frank Burke from Consol, we have someone from the Department of Energy, NATL, they're planning most of the research that's being done in that in the country right now. And I know that we can get a presenter from there to give a pretty good comprehensive overview of what's going on, what their

expectations are for the commercial availability of that technology.

MR. FIDLER:

Okay, thank you. If we have not already made contacts with some of these sources, we've talked about it. We've certainly talked about having someone from DOE involved in presenting, presenting on some of the research and some of the findings that they have with respect to control technology and we've also talked about having a vendor potentially come in that is already, already has control technology available for mercury removal. Yes, Gail.

MS. CONNER:

Yes, can you include in that presentation an analysis of the trading that has already occurred under the Clean Air Act? As far as Pennsylvania, were we primarily recipients of credits? Or were we sellers of credits? And if we were sellers of credits, were we selling from new sources such as wind or were we selling from controlling our existing emissions from our existing sources so that what was the real actual reduction in PA under the scheme of SO2 and NOx so we can actually see what the pattern is in the state to

compare it to what the possible pattern would be if we indeed considered the EPA trading approach. So we need a historical perspective of what our utilities have already done under the acid rain legislation first.

MR. FIDLER:

So what has the track record been under a trading scenario?

MR. TRISKO:

Gene Trisko for UMWA. Just to restate one of our key interests from a technical perspective, we would like to see a presenter provide a modeling analysis of the deposition changes, deposition changes in Pennsylvania associated with incremental reductions in mercury beyond CAMR. Dr. Levin's presentation came close to providing that but, as he indicated, his modeling was national in scope. And we need to, in this process, focus in on Pennsylvania. And just by way of one clarifying point that may not have been apparent to folks who were looking at the maps that were presented earlier on deposition. The EPA regulatory impact analysis charts which we looked at with CAMR and CAIR and so forth and the benefits in Pennsylvania from the

implementation of the CAMR rule. Those maps assume that Pennsylvania would participate in a national trading program. There were no limits on trading in those analyses. I think that's an important point to bear in mind.

MR. BRISINI:

I think something else we need to look at is with the expansion of DJM into the west and south into traditional regulated utility territory, what effect a PA specific rule will have on the investment in Pennsylvania companies beyond something that can be identified as a co-benefit type program. In other words, if the ability to, to get monies from financial institutions is impacted by that expansion, we need to understand what does that mean to Pennsylvania?

MR. FIDLER:

That's quite a bit of feedback.

MR. BIDEN:

I'm not sure that past patterns of emission allowances and purchases would be representative of what we would expect to see on mercury because Pennsylvania's reduction is, is, is steeper than that of other states. And virtually every power plant, because it is so steep, virtually every

power plant in Pennsylvania is going to have to put some sort of mercury control on or we'll never reach that 86% reduction. So I would expect to see sources in Pennsylvania perhaps purchasing emission allowances from the states to the west that were over allocated allowances as a result of the Clean Air Mercury Rule whereas under the SO2 and NOx, that may not necessarily have been the case.

MS. CONNER:

Well that wasn't the reason for the analysis request.

MR. BIDEN:

Oh, I must have misunderstood you then.

MS. CONNER:

The reason is just that when we have the best available control technology, or a reasonable available control technology, and all those other, you know, control mechanisms versus the trading, you can actually go to a source, look at their stat test data, and evaluate the controls and the reductions and relate it to the fishing bodies in the water, at least in the Great Lakes areas. However, when they went to a trading, because you can trade on the commodities exchange

and get the credits, you may not have necessarily reduced your emissions if you had like an older plant if you had another partner plant that you own in another state that you can kind of do those credits. So I guess I need a visual picture of the Pennsylvania, were we big buyers or traders, and if we were traders, were we trading from our original sources or were we trading from new sources like clean energy like windmills and things? I guess I need to know what, what happened there so I can really see what the pattern is in the state and what your condition is. Because that give you two pictures. It lets you know whether or not the Clean Air Act trading that originally happened between NOx and SO2, how the industry struggled or not, were you in a position of difficulty because you were having to struggle already by buying credits in the first place in order to deal with the acid rain technology requirement because of the trading. But the other side of the picture is it also lets you know whether or not, whether or not your technology, if you use other new sources in order to offset it in order to get a better bubble and it will give us a

pattern. You'll understand what I'm saying if I can talk to you one on one. But if gives a pattern versus, you know, I need to know whether or not Pennsylvania was trading with most of your utilities or whether or not you were buyers of the credits so you were already putting out money trying to struggle to get credits, or were you generating credits and selling them?

MR. CLEMMER:

Reid Clemmer with PPL. If in fact the historical background is an appropriate thing to do, and it would be interesting, then I would add to it that it's more important to take a look to see what's the expected future market going to be looking like when utilities are moving forward under the CAIR requirements for the 2010 and 2015. Because that is a major program that's going to be effective of us and more representative of what utilities are going to do going forward and how we're going to be complying with those requirements and what steps we'll be taking. And then what co-benefits are also likely to be achieved. I think EPA's modeling that they've done for compliance under CAIR takes a large portion of that into consideration already. I

think it's an interesting historical perspective but I think the real benefit and value to us looking at it is, as a group, which steps, what measures or controls, how many facilities will be controlled, do we expect to be seeking control under CAIR in 2010, is there going to be any change in the fleet, shifting of coal or shifting a generation to outside PJM, we don't know that yet, or outside traditional PJM into the broader PJM as Vince has already described. So if in fact we undertake a historical, I think we'd have to do it in a perspective of "okay, that's what was." Here's what we expect it to be because we're looking at a future scenario. You have to build that in to it to look at your picture, to make it more comprehensive.

MR. FIDLER:

Could I, could I just, in preparation for this meeting we were hoping to establish some cause and effect relationships and that, because of lack of data primarily, that was not something that we felt we had the time to develop. And with this request for additional information, is there a possibility of modeling impacts from plants within Pennsylvania, in Pennsylvania? One

of the things I'd like to ask for, if in fact we do some additional modeling work, do the utilities in fact have mercury speciation information that in fact we could see and use as we move forward in trying to establish cause and effect relationships and what really is important for us to focus on as we move forward in this rulemaking process. And actually we're, we're drafting a letter requesting that information, so if in fact that could be provided it would be very helpful as part of this process.

MS. RAMSEY:

When's that letter going out?

MS. WITMER:

Soon.

MR. BRISINI:

In response to that, hopefully it would not be required to be gathered with Ontario Hydro. As you know, we're experimenting with the much simpler, much more cost-effective to gather that data in conjunction with testing that the Department is doing. So, do people usually have that speciated data? We don't, the cost was too high, the test method was too variable, too inaccurate. But rather than just say that was

the circumstance, we're working with some people who have, we believe, a superior technology so that information may actually be achievable. But Gail's discussion brought something to mind that we need to think about not only from the standpoint of what effects this rule might have on the, you know, considering the expansion of PJM into the more traditional utility areas as opposed to wholesale electric generator territory where we are, is we should probably also think about what does this mean to the use of natural gas in Pennsylvania and the price of natural gas. Because one of the unintended consequences of that's occurred is that we have been using natural gas to make electricity as opposed to having natural gas for industry and we, we desperately need to consider what the effect is going to be when you're looking at the costs that are being paid for natural gas right and the numbers of dollars in assets that are sitting there not being utilized because of the cost of natural gas due to this use or this desired use to make electricity.

MS. RAMSEY:

I have a question. Just a simple one. Are we

going to be talking about the specifics of the regulation or are we going to focus on whether or not we should have the regulation?

MS. EPPS:

We will focus on the content of the regulation after we finish the fact-finding discussions.

MR. FIDLER:

Yes, Cynthia.

MS. GOODMAN:

I think my comments, Cynthia Goodman from the Department of Health, kind of centers around that. I was just thinking that maybe these last all suggestions could be piled up into one thing or maybe one person hopefully could briefly, briefly, briefly review the Clean Air Act and what has happened in Pennsylvania as far as with the power plants, what they've been doing, this type of deal like she was saying for the historical data. I mean maybe somehow draw all of that together into one presentation would be real helpful at least for some of us that haven't been totally in on the whole process from the very beginning and to see it all in one big picture. Does that make sense?

MS. EPPS:

We'll ensure that we present a presentation for you that gives you an overview of the significant reductions in a number of criteria pollutants and the strides we've made in Pennsylvania.

MR. BRISINI:

What you're looking for is what's been accomplished since the passage of the Clean Air Act.

MS. GOODMAN:

Right, how did the whole process go together.

MS. EPPS:

We can do that.

MR. BRISINI:

Just as a bit of information, I was just asking Reid, there was just a request from Sam Rotolotono (ph) to review all of our, okay, this is Vince Brisini, but Sam Rotolotono (ph) is the head of the acid rain division, clean air markets division and what we're doing is we've been asked to provide corrections to their data base associated with all of the units that we operate. So there may be a source of information for not just Pennsylvania, but for the entire country available and that's something that the Commonwealth might want to talk to Sam Rotolotono

(ph) about.

MR. FIDLER:

Thank you, we do touch base with Sam quite a bit. Any other comments or suggestions for additional information that would be helpful to be shared as part of this process?

We do have a potential date for the next meeting. We were looking at two weeks from today, October 28th. This room is available John? Okay. And we'll try to get out an agenda for that meeting as quickly as we are able to line up some of the speakers that you've suggested you'd be interested in hearing from.

Yes Jan?

MS. JARRETT:

Are we going to have a roster of all the participants available?

MR. FIDLER:

Sure.

UNIDENTIFIED:

Is there a website, I'm sorry somebody had mentioned it but I didn't know.

UNIDENTIFIED:

Dean, what's the web address?

UNIDENTIFIED:

I don't remember it off-hand, but if you go to the main Department's website and in the keyword block, type in "mercury rule" you'll go to the web page that has information on the mercury petition, PA's CAMR rule, and this work groups process and materials.

UNIDENTIFIED:

Is there any possibility of setting up more meetings? I'm assuming we're going to need them with that agenda.

[Scheduling of future meeting dates was discussed.]

MR. FIDLER:

So let's shoot for the 28th for the next meeting and we'll try to line up some of the speakers that you've suggested and the follow-up meeting to that would be the 18th of November.

I'd like to thank everybody for taking the time out of their busy schedules to participate in this session. I think first meetings are always a little bit tentative, but I think there's been a lot of good information shared and I'm looking forward to subsequent meetings.

Thank you everybody and have a great weekend.